An Investigation of the Relationship between Japanese University Students' English Syntactic Awareness and Their Use of Cognitive and Metacognitive Reading Strategies

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Abstract

The main aim of this study was to explore the relationship between Japanese university students' English syntactic awareness and their use of cognitive and metacognitive reading strategies. A total of 48 Japanese second-year university students from a computer engineering department in a Japanese university participated in the study, which employed a quasi-experimental approach (one-group pre-test/post-test design) and quantitative analyses. A pre-test was composed of a syntactic awareness section and a reading comprehension section. It was followed by six 60-minute lessons (one lesson per week) focusing on cognitive and metacognitive reading strategy training and then by a post-test composed of a reading comprehension section. Immediately after the post-test, an anonymous questionnaire was administered to check whether the participants actually attempted to use cognitive and metacognitive reading strategies. The results of the pre-test and post-test were analyzed with paired two-sample *t*-tests and correlation calculations (calculations of Pearson product-moment coefficients). The analyses with the *t*-tests were verified through calculations of Cohen's *d* and Pearson product-moment coefficient (*r*) and the analyses with the correlation calculations were verified through significance tests. The findings of the study indicate that cognitive and metacognitive reading strategy training enabled the Japanese university students to use cognitive and metacognitive reading strategies (e.g., recalling background information relating to the subject matter) and leads them to rely on their syntactic awareness less frequently than before when identifying the relations among words in a sentence. They also indicate that, through reading strategy training, the students were able to use cognitive and metacognitive reading strategies, irrespective of their level of English syntactic awareness. The training helped even participants with low level of English syntactic awareness use reading strategies and improve their reading comprehension in English. This result was inconsistent with the notion of the linguistic threshold hypothesis (LTH), which claims that second/foreign language readers are not able to use cognitive and metacognitive reading strategies unless they satisfy a certain level of syntactic awareness in the target language. It is suggested that teachers' ways of administering reading strategy training, rather than students' level of syntactic awareness, determine whether or not students become able to use reading strategies to increase their reading comprehension.

Certification of Dissertation

I certify that the ideas, results, analyses, and conclusions reported in this dissertation are entirely my own effort, except where otherwise acknowledged. I also certify that the work is original and has not been previously submitted for any other award, except where otherwise acknowledged.

Signature of candidate: _____ Date: _____

Endorsement

Signature of Principal Supervisor: _____ Date: _____

Signature of Associate supervisor: _____ Date: _____

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Chapter 1
Introduction

1.1 Background to the Research

All four basic language skills (listening, speaking, reading and writing) are important to successfully communicate and study academic subjects at schools. However, among these language skills, reading may be the one which greatly affects the academic success of students (Grave, 1991; Johns, 1981). Generally, students are required to read more texts as they proceed to the next stage of education. University students are expected to read a large amount of materials related to their studies and thus are required to have effective reading skills to comprehend them efficiently.

Also, for the majority of Japanese university students, acquisition of effective English reading skills is important. Japanese university students are encouraged to read more English materials related to their studies than before, so that their reading comprehension increases (Nagata, Yamauchi, Matsumoto, & Yamamoto, 2008). In addition, an increasing number of classes in Japanese universities have been taught in English using materials written in English. Moreover, because many companies in Japan include applicants' TOEIC (Test of English for International Communication) scores in the factors to be considered for recruitment, a majority of Japanese university students have been encouraged to periodically take TOEIC tests, which ask test-takers to read and comprehend lengthy passages in a short period of time. Nevertheless, since the grammar-translation method which focuses on word-for-word translation is still prevalent in English reading classes at Japanese junior and senior high schools (Morita, 2010; Oshita, 2007; Yamaoka, 2013), it appears that many Japanese university students have trouble becoming successful readers of English (Bradley, 2012). The grammar-translation method is considered of preventing students from not only acquiring effective reading strategies (such as getting the gist of a text) but also getting the pleasure of reading in a foreign language (Takase & Otsuki, 2012). Therefore, the effectiveness of introducing reading strategy training into English reading classes at schools should be paid more attention by educational practitioners in Japan.

Factors which affect comprehension of first language (L1) or second/foreign language (L2/FL) readers have been investigated by a number of studies (e.g., Feng, 2011a, 2011b; Frantzen, 2003; Jiménez, 1994; Leeser, 2007; Spooren, Mulder, & Hoeken, 1998). It has been found that readers' comprehension is affected by a

number of variables including readers' syntactic awareness, lexical knowledge and use of reading strategies. Syntactic awareness – a variable focused in this study – is considered as one of the major variables which affect readers' comprehension, and the relationship between readers' syntactic awareness and comprehension has long attracted the attention of reading researchers in terms of both L1 reading (e.g., Bentin, Deutsch, & Liberman, 1990; Cain, 2007; Glass & Perna, 1986; Nation & Snowling, 2000; Rego, 1997) and L2/FL reading (e.g., Alderson, 1984; August, 2006; Jung, 2009; Shiotsu & Weir, 2007; Urquhart & Weir, 1998).

There has been considerable attention to the relationship between L1 or L2/FL readers' comprehension and each of the major variables which affect their comprehension (e.g., syntactic awareness, lexical knowledge and use of reading strategies). However, searching the database of the Education Resources Information Center (ERIC) revealed that relatively little attention has been paid to how the relationship between L1 or L2/FL readers' comprehension and one major variable is affected by the change of another major variable. Searching it also revealed that almost no attention has been paid to the change of the relationship between L1 or L2/FL readers' comprehension and syntactic awareness, caused by acquisition of effective reading strategies.

The use of reading strategies has also been considered as a major variable which affects L1 or L2/FL readers' comprehension. It has been recognized that generally successful readers and unsuccessful readers use different reading strategies (Anderson, 1991; Carrell, 1989; Mokhtari & Reichard, 2002; Padrón, 1992; Zhang & Wu, 2009). On the assumption that the types of reading strategies commonly used by successful readers are effective, research attempts (e.g., Hardin, 2001; Kong, 2006; Pearson & Gallagher, 1983; Sheorey & Mokhtari, 2001; Zhang, Gu, & Hu, 2008) have been made to identify what these strategies are and what are the relationships between L1 or L2/FL readers' use of the strategies and comprehension.

Following the increase of attention on effective reading strategies among researchers and educators, an increasing number of reading classes at schools in many countries have been taught by teachers by administering reading strategy training. The effects of such training on students' reading comprehension have been reported by many studies in terms of both L1 reading (e.g., Aarnoutse & Schellings, 2003; Gourgey, 1998; Johnson & Zabrucky, 2011; Padrón, 1992; Salataci & Akyel, 2002) and L2/FL reading (e.g., Auerbach & Paxton, 1997; Carrell, 1998; Salataci & Akyel, 2002;

Shang, 2011; Song, 1998). One common problem among those studies in terms of L2/FL reading is that L2/FL readers' syntactic awareness was not considered when the effects of reading strategy training on reading comprehension were examined. The negligence of this consideration has prevented previous studies from identifying the primary cause of success or failure of reading strategy training and what primarily determines the magnitude of the effects of reading strategy training.

When reading comprehension is studied by researchers, the focus of interest may differ between L1 reading and L2/FL reading. Readers who are already literate in L1 possess a variety of reading strategies. Many studies (e.g., Brisbois, 1995; Lee & Schallert, 1997; Pritchard & O'Hara, 2008; Taillefer, 1996; Talebi, 2013) have been conducted on when and how the transfer of these strategies from L1 to L2/FL occurs. The two representative hypotheses which have attracted researchers most are the linguistic threshold hypothesis (LTH) and the linguistic interdependence hypothesis (LIH) (Jiang, 2011; Park, 2013; Yamashita, 2001). It has been controversial among researchers (e.g., August, 2006; Kobayashi, 2002; Park, 2013; Schoone, Hulstijn, & Bossers, 1998; Taillefer, 1996) about which hypothesis is superior to the other. The LTH suggests that an L2/FL reader needs a certain level of L2/FL proficiency before transfer of reading strategies from L1 to L2/FL occurs whereas the LIH proposes that such transfer automatically occurs if having acquired sufficient reading abilities in L1 (Bernhardt & Kamil, 1995; Jiang, 2011; Park, 2013; Torki, Kasmani, & Valipour, 2014; Yamashita, 2001).

While the superiority of the LTH over the LIH has been supported by accumulated empirical studies (e.g., August, 2006; Brisbois, 1995; Kobayashi, 2002; Schoone, Hulstijn, & Bossers, 1998; Taillefer, 1996), the LTH also has some theoretical limitations. For example, it still remains unclear what composes the linguistic threshold and to what extent the individual components relate to readers' comprehension (Alderson, 2000; August, 2006; Koda, 2004). Whereas L2/FL readers' syntactic awareness has been considered as one of the major components of the linguistic threshold (Alderson, 2000; August, 2006; Grabe, 1991; Koda, 2005; Tunner & Hoover, 1992), it has not been clarified which syntactic knowledge is required at least, to allow reading strategies to automatically transfer from L1 to L2/FL. Accordingly, it has not been revealed which syntactic knowledge is required at least, to become able to use reading strategies through reading strategy training. Therefore, the LTH has not yet been introduced to L2/FL reading classes at schools, despite wide recognition of its theoretical superiority among researchers (e.g., Jiang,

2011; Lee & Schallert, 1997; Pichette, Segalowitz, & Connors, 2003; Schoone, et al., 1998; Taillefer, 1996). In other words, the LTH has not been properly studied in such a way that educators and L2/FL learners can gain any benefit from the application of its theory: that is, an L2/FL reader needs a certain level of L2/FL proficiency before becoming able to use reading strategies.

1.2 Research Aims and Questions

The main aim of this study was to explore the relationship between Japanese university students' English syntactic awareness and their use of cognitive and metacognitive reading strategies. If the notion of the LTH is valid, Japanese university students who do not satisfy a certain level of English syntactic awareness may not become able to use cognitive and metacognitive reading strategies through reading strategy training.

The LTH implies that L2/FL readers who are unaware of basic syntactic knowledge do not improve their reading comprehension through cognitive and metacognitive reading strategy training. Therefore, it is meaningful for a reading teacher to identify the types of basic syntactic knowledge which unsuccessful readers are unaware of, for the following two reasons: (1) The teacher will be able to increase the effect of reading strategy training by instructing the identified types of syntactic knowledge to students (who are unaware of them) prior to administration of the training; and (2) the identified types of syntactic knowledge may be considered as components of a syntactic threshold (part of a linguistic threshold suggested with the LTH) because the unawareness of the syntactic knowledge may hinder students from using cognitive and metacognitive reading strategies. The types of basic syntactic knowledge focused on in this study are rules of word order and intra-sentence syntactic relations. Since English is a fixed word-order language (Gertner, Fisher, & Eisengart, 2006; Oostdijk & Pieter, 1994), L2/FL readers may not comprehend the central meaning of English sentences unless they are aware of basic rules about English word order and basic rules about how words in a sentence relate to one another (Berman, 1984).

Cognitive and metacognitive reading strategy training has been introduced into a number of reading classes and positive effects of such training have been demonstrated by many empirical studies (e.g., Auerbach & Paxton, 1997; Cummins, Streiff, & Ceprano, 2012; Dhieb-Henia, 2003; Salataci & Akyel, 2002; Sari & Sibarani, 2013). It is, however, probable that positive effects reported by the studies

were attributed to the improvement of only students who had already satisfied a certain level of syntactic awareness before receiving reading strategy training. The keys to the success of reading strategy training are teachers' giving straightforward instructions about when and how to use which strategies, their modeling the way of using strategies and their providing students with opportunities to practice the use of strategies (Padrón, 1992; Wittrock, 1991). However, students who do not satisfy a certain level of syntactic awareness may not improve their reading comprehension even if they are properly instructed and modeled about the way of using effective reading strategies and are given opportunities to practice them. The LTH suggests that L2/FL readers are not able to use cognitive and metacognitive reading strategies unless they satisfy a certain level of L2/FL proficiency.

To achieve the research aims, this study attempts to answer the following three questions:

1. What is the relationship between Japanese university students' basic syntactic knowledge of English and their English reading comprehension?
2. In which way does cognitive and metacognitive reading strategy training affect the relationship between the students' basic syntactic knowledge of English and their English reading comprehension?
3. Which basic syntactic knowledge is required for the students to be able to use cognitive and metacognitive reading strategies?

If these questions are answered successfully, more English teachers in Japanese universities may be motivated to introduce cognitive and metacognitive reading strategy training into their reading classes. Moreover, those teachers may improve reading comprehension of even students who lack basic syntactic knowledge needed to use reading strategies: these students will be provided with lessons which focus on missing syntactic knowledge prior to reading strategy training.

1.3 Terms and Definitions

This section introduces significant terms used in this thesis and their definitions.

- Reading strategies and skills

Reading strategies are defined by Urquhart and Weir (1998) as "ways of getting round difficulties encountered while reading" (p. 95), and reading skills are described

by them as cognitive abilities which "a person is able to use when interacting with written texts" (p. 88). They point out that reading strategies are reader-oriented and represent readers' conscious decisions, while reading skills are text-oriented and are deployed unconsciously.

- Syntactic awareness

Syntactic awareness refers to understanding of the syntactic structure of sentences and ability to manipulate that structure (Mokhtari & Thompson, 2006). It does not designate only possessing knowledge about the syntactic structure of sentences: that is, it also includes free accessibility to needed syntactic knowledge (Yaden & Templeton, 1986). Another important nature of syntactic awareness is that it helps readers not only identify syntactic relations among words in a sentence but also foresee words that will come next in a sentence (López, 2008).

- Cognitive reading strategies

Cognitive reading strategies refer to cognitive actions which a reader intentionally takes while interacting with the text in his/her attempt to construct meaning from the text (Kenanlar & Pilten, 2014). Such actions involve knowing what strategy to use and when/how to apply it (Karbalaei, 2010). The typical cognitive reading strategies listed in the reading literature include activating background knowledge, predicting what will come next, guessing meaning from context, and skipping unknown words and incomprehensible sentences besides scanning and skimming.

- Metacognitive reading strategies

Metacognitive reading strategies are described by Baker and Brown (1984) as a reader's deliberate and conscious actions to monitor his/her comprehension and to regulate activities according to his/her reading goal. Monitoring one's own comprehension involves evaluating the effectiveness of cognitive reading strategies being used (Karbalaei, 2011). The typical metacognitive reading strategies mentioned in the reading literature include previewing, prediction, self-questioning and self-monitoring. While the distinction between metacognitive reading strategies and cognitive reading strategies is common (Koda, 2004), clear distinction between them is difficult and some overlap exists (Cohen, 1998).

- Language learning strategies

Language learning strategies are defined by Oxford (1990) as "specific actions taken by the learner to make learning easier, faster, more enjoyable, more self-directed,

more effective, and more transferable to new situations" (p. 8). She broadly classified language learning strategies into direct strategies – (strategies for working with the language itself) – and indirect strategies – (strategies for managing a learning process). Because the studies of cognitive and metacognitive reading strategies have been underpinned by studies of language learning strategies (Zahedi & Dorrimanesh, 2008), language learning strategies are detailed later in Chapter 2.

- Reader variables

Reader variables are reader-related factors which affect reading comprehension. Reading comprehension has been found to be largely affected by readers themselves in a variety of ways. These factors include readers' schemata (background knowledge), skills, strategies, purposes and motivations, and each of these factors largely differs among readers in terms of quality, quantity and variety. The two variables focused on in this study – syntactic awareness and use of cognitive and metacognitive reading strategies – fall in the category of reader variables.

- Text variables

Text variables are text-related factors which affect reading comprehension. Reading comprehension has also been found to be largely affected by the text to be read, in a variety of ways. These factors include text content, genre of text and sentence structure. Text variables are no less significant to reading comprehension than reader valuables. Depending on text variables, even readers who have high language proficiency and a reasonable amount of background knowledge may have trouble comprehending a text (Feng, 2011b).

- Schemata

Schemata typically refer to networks of information and knowledge stored in the brain, which act as a filter for interpreting incoming information (Alderson, 2000; Rashidi & Soureshjani, 2011). Individual pieces of information and knowledge cannot exist in the brain on their own and thus have to be integrated into a relevant schema – an organized and coherent mental representation (Nassaji, 2002). People develop and retain schemata as the result of repeated interactions within their environments (Guthrie & Mosenthal, 1987), and schemata are structured in such a way that they define the relationships among their components.

- Genre of text

Genre of text is defined by Richards, Schmidt, Platt and Schmidt (2003) as "a type of

discourse that occurs in a particular setting, that has distinctive and recognizable patterns and norms of organization and structure, and that has particular and distinctive communicative functions" (p. 224). Knapp and Watkins (2005) state, "genres are classified according to their social purpose and identified according to the stages they move through to attain their purpose" (p. 22). The genres classified for texts include description, exposition, narration, explanation, instruction and argumentation (Bruce, 2005; Knapp & Watkins, 2005; Schmidt, 1991; Shi & Kubota, 2007; Toledo, 2005).

- Linguistic threshold

A linguistic threshold is typically defined as basic linguistic knowledge (of the target language) which a reader needs to acquire before he/she becomes able to use cognitive and metacognitive reading strategies when reading in the target language (Alderson, 2000). Its notion is central to the linguistic threshold hypothesis (LTH) whose assumption can be traced back to the literature of Alderson (1984). According to the above-mentioned definition of a linguistic threshold, a syntactic threshold, which has been rarely discussed in the reading literature, may be described as basic syntactic knowledge (of the target language) which a reader needs to acquire before he/she becomes able to use cognitive and metacognitive reading strategies. Considering that linguistic knowledge is widely known to include syntactic knowledge, lexical knowledge (vocabulary knowledge) and metalinguistic knowledge, it is presumable, at least, that a linguistic threshold is composed of constituents such as a syntactic threshold, lexical threshold and metalinguistic threshold.

- Compensation hypothesis

A compensation hypothesis represents the notion that the lack of knowledge or skills in one area may be compensated for by knowledge or skills in another area (Alderson, 2000). Based on this notion, Stanovich (1980) presented a reading-oriented model, which he called "interactive-compensatory model" (p. 32). His model suggests that when one source of knowledge about the meaning of a sentence or clause is inaccessible, other sources of knowledge may provide alternative ways of determining the meaning.

1.4 Structure and Format of the Dissertation

This dissertation is organized into six chapters. Chapter 1 has introduced and described the background of the study, research aims, questions and definitions of the

terms which are considered significant in the dissertation. Chapter 2 is concerned with literature relevant to the study and presents a conceptual framework of the study. Chapter 3 describes the research design and participants, instruments and procedure used for the study. Chapter 4 presents the results of descriptive analyses of data collected from the participants for each data collection instrument. Chapter 5 discusses the findings of the study in line with each of the research questions. Chapter 6 concludes the dissertation and presents research implications and recommendations for further studies.

Chapter 2
Literature Review

2.1 Overview

This chapter presents a literature review on the past studies that focused on research issues which are relevant to this study. The research issues include the nature of reading, models of reading, factors affecting reading comprehension, research on FL/L2 reading, relationships between reading comprehension and syntactic awareness, significance of reading strategies and selections of reading comprehension assessment techniques. Delving into previous studies on these issues is important to establish the theoretical framework of this study and to provide a rationale for the research questions.

Figure 2.1 provides an overview of research issues that are related to this study. All areas located inside the large circle in the figure are directly related to the study. The areas outside of the large circle are also elaborated in this chapter since those areas are closely related to the areas inside the large circle. Moreover, Figure 2.2 shows how each of the areas inside the large circle in Figure 2.1 is related to one another. In Figure 2.2, areas which are theoretically related one another have been positioned next to each other. The shaded portion in the figure represents a syntactic threshold which is part of a linguistic threshold. It was assumed in the study that L2/FL learners are not able to use cognitive and metacognitive reading strategies unless they satisfy the threshold.

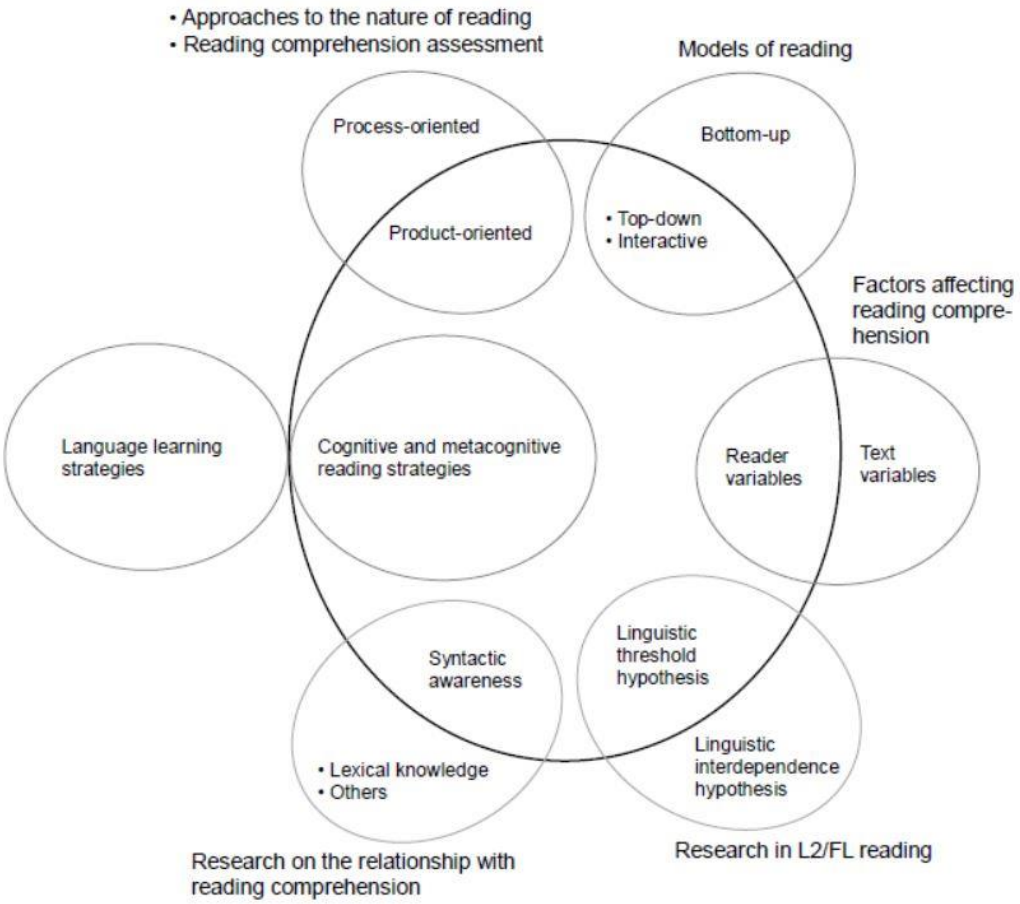


Figure 2.1. Overview of research issues related to the study.

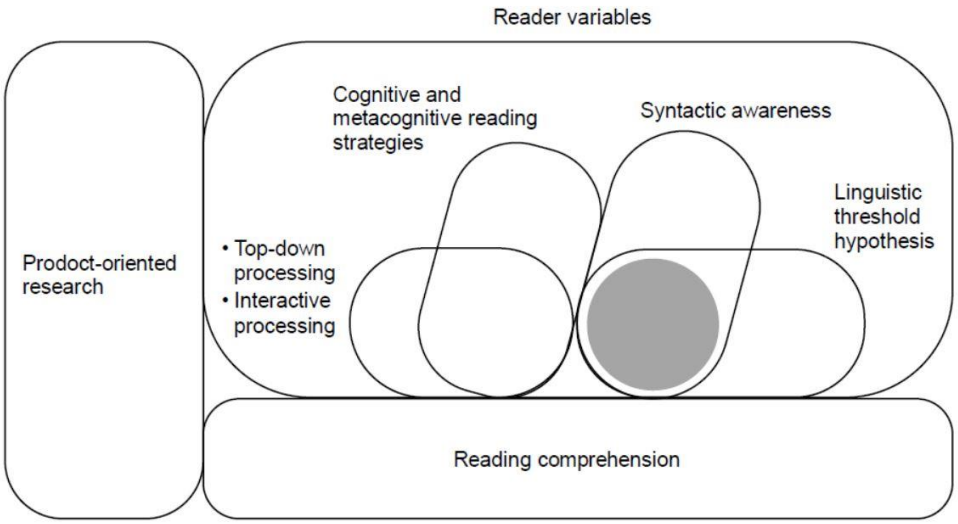


Figure 2.2. Overview of the relations of the research areas directly related to the study.

2.2 Process and Product of Reading

While reading is typically defined as a process of getting meaning from text, a consensus has not yet been reached among reading researchers on what reading is. This is probably because reading is a complex activity which involves a range of different skills, processes and types of knowledge. In this dissertation, the definition above (i.e., a process of getting meaning from text) is adopted since it has been agreed among a number of reading researchers (e.g., Alderson, 2000; Cain, 2010; Gibbons, 1991; Koda, 2004; Urquhart & Weir, 1998).

The nature of reading can be approached from two perspectives: the process of reading and the result of that process, that is, the product (Liu, 2010b; Yamashita, 2002, 2004). The process of reading involves various strategies that the reader uses (Yamashita, 2004) and represents various mental activities that the reader is engaged in for the purpose of reconstructing meaning (Yamashita, 2002). The product of reading refers to "the level of understanding, which is considered to be achieved by ones' reading ability" (Yamashita, 2004, p. 2) or "both quality and quantity of meaning representation" (Yamashita, 2002, p. 272) that the reader constructs in the process of reading.

The process of reading is dynamic and variable, and many things may happen during the process of reading (Alderson, 2000; Liu, 2010b). Even for the same reader and the same text, the process may change at different times and with different purposes in reading (Alderson, 2000; Liu, 2010b). Like many other studies about reading, this study concerns the process of reading: the participants' way of using reading strategies in the process of reading is one of the key issues in this study.

The process of reading is considered to be the interaction between the reader and the text (Alderson, 2000; Liu, 2010b). In the process, the reader interacts actively with the text when he/she tries to elicit meaning from the text, for example, by bringing his/her own background knowledge of the topic (Gibbons, 1991). It has been widely recognized that reader-text interactions can be broadly divided into two components: decoding (or word recognition) and comprehension (Alderson, 2000; Cain, 2010; Koda, 2004; López, 2008; Urquhart & Weir, 1998). In a decoding process, "linguistic information is extracted directly from print" (Koda, 2004, p. 5). This study is not concerned with decoding; rather, it is concerned with comprehension, which "occurs when the reader extracts and integrates various information from the text and combines it with what is already known" (Koda, 2004, p. 4). It has been reported by

reading researchers (e.g., Blackmore & Pratt, 1997; Durgunoğlu, 2002; Mokhtari & Thompson, 2006; Pascale & Francoise, 2003; Tunmer & Hoover, 1993) that decoding is much more strongly affected by phonological awareness than syntactic awareness, which was focused on in this study. Unlike research on comprehension, which has studied with adolescent readers, research on decoding has typically focused on only children (e.g., Lipka & Siegel, 2007; Martohardjono, et al., 2005; Nation & Snowling, 2000) and dyslexic readers (e.g., Milne, Nicholson, & Corballis, 2002; Monika, Ladina, Lutz, & Martin, 2011; Yap & Van Der Leij, 1993).

Understanding the process of reading is important to understand the nature of reading (Alderson, 2000; Liu, 2010b). In attempts to measure or reveal the process of reading, such methods as interviews, think-aloud protocols and questionnaires are generally used (Yamashita, 2004). However, it is difficult to properly externalize the process of reading, which is normally silent, internal and private (Alderson, 2000). For example, asking a reader to read aloud text is one popular method used by reading researchers to externalize the process of reading, but it can change readers' way of decoding and comprehending texts (Alderson, 2000). Reading aloud is not people's normal way of reading, and the process of reading aloud is largely different from that of silent reading (Alderson, 2000). This problem happens also when asking the reader to think aloud while reading, even though think-aloud protocols have been increasingly used to investigate the reading process.

One important question about the process of reading is what is actually read by the reader – "individual letters, letter-clusters, phonemic units, morphemic units, whole words, or even phrases" (Underwood & Holt, 1979, p. 84). This question asks, in other words, whether the reader needs to convert the print into a phonological form or code to comprehend its meaning or he/she directly contacts his/her lexicon without such an intermediate (i.e., phonological decoding) stage (Underwood & Holt, 1979). Koda (2004) points out that phonological decoding is important for the reader to make a quick access to oral vocabulary in lexical memory, which is stored in phonological forms. Gathecole and Baddeley (1993) point out that phonological decoding is essential for the reader to hold recognized words in working memory and relate them to existing knowledge in long-term memory, so that he/she can process and comprehend the text smoothly.

Compared with the process of reading, the product of reading is less complex (Alderson, 2000) and can be measured with reading comprehension tests (Yamashita,

2004). Moreover, unlike typical methods for process-oriented studies such as interviews and think-aloud protocols, product-measuring tests allow administration to a number of subjects at a time and need a relatively short time for scoring and data analysis (Yamashita, 2004).

The product of reading is closely related to the distinction among the different levels of understanding (Alderson, 2000; Liu, 2010b). One typical distinction used by reading researchers and teachers is "reading the lines", "reading between the lines" and "reading beyond lines" which respectively refer to literal meaning of text, inferred meanings and readers' critical evaluation of text (Alderson, 2000). It has been assumed that readers first learn how to understand text literally, then how to infer meanings from text and later how to approach text critically (Alderson, 2000). This order of learning reflects the order of difficulty of understanding. That is, inferring meanings from text is more difficult than understanding text literally, and approaching text critically is more difficult than inferring meanings from text.

The two variables focused on in this study – syntactic awareness and use of cognitive and metacognitive reading strategies – are involved in the process of reading, in which the reader actively interacts with the text while consciously or unconsciously recalling and applying needed syntactic knowledge and reading strategies. In the study, an anonymous questionnaire composed of closed and open-ended questions was administered to identify the participants' ways of using reading strategies in the process of reading. Since the result of the process (i.e., the product) was examined using reading comprehension tests, however, the study is categorized as a product-oriented one. Yamashita (2002) states that a product-oriented study is test-based quantitative research in which test scores are used as representations of abilities that researchers intend to examine.

2.3 Models of Reading

One way of understanding the process of reading is to examine the models of reading suggested by researchers. To date, various attempts (e.g., Anderson & Pearson, 1988; Goodman, 1967; Gouch, 1972; Grabe & Stroller, 2002; Stanovich, 1980) have been made to model the actual process of reading, and models suggested in these attempts are called process models (Urquhart & Weir, 1998). According to Ridgway (1994), a model refers to "an instantiation of a theory which enables it to make predictions about a specific situation" (p. 56). The three representative process models widely known among reading researchers are bottom-up processing, top-down processing

and interactive processing. Depending on which of these process models is used for reading, the frequency and timing of relying on syntactic awareness differ (Abbott, 2006; Plakans, 2009).

Strategies used in bottom-up processing are referred to as local strategies and those used in top-down processing are referred to as global strategies (Abbott, 2006; Gascoigne, 2005; Plakans, 2009; Radach, Huestegge, & Reilly, 2008; Young & Oxford, 1997). Global strategies share many strategy similarities with cognitive and metacognitive reading strategies (Hamdan, Ghafar, Sihes, & Atan, 2010; Mokhtari & Reichard, 2002; Plakans, 2009), which were focused on in this study.

2.3.1 Bottom-up processing

In bottom-up processing, the process of reading is considered as a text-driven, serial decoding process where the reader begins with letters. A bottom-up approach views a text as a chain of isolated words, each of which needs to be decoded individually, and a reader as a person who exclusively concentrates on decoding individual letters and words in a sequential manner. This approach puts emphasis on knowledge about phonics and word recognition (Hardin, 2001). Foreign language learners who have been taught with the grammar-translation method (like typical L1-Japanese English learners) tend to read texts through bottom-up processing (Sidek, 2012).

The most frequently cited example of a bottom-up approach is Gough's (1972) in which the reader recognizes individual letters, converts the string of letters into a string of systematic phonemes and then recognizes them as a word (Urquhart & Weir, 1998). The reader then moves to the next word and proceeds in the same way until all of the words in a sentence are processed. That is, he/she reads all of the words in a phrase or sentence before being able to comprehend. The term "bottom-up" was entitled due to this sequential process where the reader deals with letters, words, phrases and then sentences to get the meaning (Urquhart & Weir, 1998).

Bottom-up processing was "associated with behaviourism in the 1940s and 1950s, and with 'phonics' approaches to the teaching that argue that children need to learn to recognise letters before they can read words, and so on" (Alderson, 2000, p. 17). This processing was well suited to the audiolingual method of L2/FL teaching in the 1960s and 1970s, which considers the decoding of sound-symbol relationships essential in a language learning routine (Lally, 1998). In English reading classes at schools in Japan that are taught by Japanese-speaking English teachers, instructions

of word-for-word translation (i.e., grammar-translation method), which resorts to bottom-up processing, are still prevalent (Morita, 2010; Oshita, 2007; Yamaoka, 2013) although lessons using the grammar-translation method have been disappearing in English classes other than reading classes at schools in Japan (Takase & Otsuki, 2012). The efficacy of the grammar-translation method to reading comprehension is still claimed by some Japanese researchers (e.g., Matsumoto, 2011; Nakahara & Nakagawa, 2010; Narita, 2014). For example, Narita (2014) argues that word-for-word translation allows students to recognize differences in syntactic structure between two languages and helps them develop metalinguistic awareness (i.e., the ability to manipulate the structural features of language).

The main problem with a bottom-up approach is that it sees the processing of reading as being proceeded only in one direction. This approach suggests that panoramic analysis of text does not affect the way of conducting lower level analysis at all. The approach assumes that the reader will successfully comprehend the meaning of a sentence only when he/she accurately decodes small linguistic units and identifies the relations among words in the sentence. In practice, it is not always possible for the reader to store in his/her working memory the meaning of every word in a sentence and to relate one word to other words (Davies, 1995). Another weakness of a bottom-up approach is that, if individual letters need to be recognized prior to words, it should take the reader longer time to recognize a word than a single letter; in practice, however, words may be recognized more quickly than individual letters (Urquhart & Weir, 1998).

2.3.2 Top-down processing

As the term “top-down” indicates, top-down processing has been commonly recognized as the opposite of bottom-up processing. If literally interpreted, top-down processing suggests that a reader begins with the largest unit, namely the whole text. However, it is highly unlikely that a reader deals with a text as a whole and then proceeds to paragraphs, sentences, words, ending with letters (Urquhart & Weir, 1998). Given that in practice the term top-down is used to refer to an approach in which a reader’s expectations play a dominant role in the processing of text, the use of the term can be misleading (Urquhart & Weir, 1998). Urquhart and Weir (1998) suggest the use of terms “text (or data)-driven” and “reader-driven” (p. 42) instead of bottom-up and top-down respectively to describe the contrast.

A top-down approach emphasizes the importance of schemata which a reader brings

to text. Schemata are composed of networks of information (i.e., background knowledge) stored in the brain, represent general concepts of a given object, event or situation, and act as a filter for interpreting incoming information (Alderson, 2000; Rashidi & Soureshjani, 2011). In top-down processing, a reader activates a schema which he/she considers relevant to incoming information and maps the information relative to the schema (Alderson, 2000). A reader's schemata influence how he/she interprets information as well as how he/she stores it (Alderson, 2000). This view is based upon the schema theory, which explains "the acquisition of knowledge and interpretation of text through activation of schemata" (Alderson, 2000, p. 17).

According to the schema theory, a text alone does not carry meaning; rather it provides guidance for readers as to how they should construct the intended meaning from their background knowledge of content and structure and their experience (Carrell, 1983). This implies that what readers get from texts as meanings varies depending on their background knowledge and experience. Authors write texts, expecting that meanings they want to express are correctly interrupted by readers as intended. However, readers' interpretations can differ from authors' intensions, depending on readers' knowledge and experience. Therefore, depending on the types of texts (e.g., web pages, reports and manuals), it is necessary for authors to figure out typical readers' knowledge and experience which are relevant to the subject matters, before starting to write texts.

Goodman's (1967) model is known as one of those which represent a top-down approach. He proposes the idea of reading as a "psycholinguistic guessing game" (p. 127) in which the reader comprehends the meaning of a text while relating new or unexpected information found in the text to his/her schemata and guessing the meaning of the text. He also suggests that reading is an interactive process which involves a transaction between a text and a reader and that a successful reader predicts what he/she is about to read and then confirms or rejects his/her prediction on the basis of what follows. In other words, a successful reader forms hypotheses about which words will come next and takes in only enough information from the remaining part of the sentence to test their hypotheses. Whereas Goodman's (1967) model is often cited as the representative of a top-down approach, Urquhart and Weir (1998) point out that it is arguable whether he is a theorist of a strict top-down approach. According to Urquhart and Weir (1998), Goodman's position in his paper was presented as a reaction to (not against) theorists like Gough, and Goodman was "against a pedagogic tradition, which stressed a fairly strict bottom-up approach to

the teaching of reading to young native speakers" (p. 42). However, considering that Goodman's model places significant emphasis on the importance of guessing meaning from contexts, there seems to be no doubt that the model can be categorized as a top-down approach.

While Goodman's model has drawn much attention from researchers, his way of describing the process of reading has been controversial because of his extreme emphasis on the importance of guessing meaning from contexts. For example, Goodman (1967) argues that successful readers do not need to visually identify individual letters and/or words correctly since they are able to get the meaning of text without accurate word recognition. This argument has been opposed by many researchers (e.g., Adams, 1990; Harrison, 1998; Rayner & Pollatsek, 1989; Stanovich, 1986; Vellutino, 1991) who consider that Goodman's view about word recognition can mislead L2/FL learners to a wrong idea about the importance of word recognition. Vellutino (1991) points out that, according to empirical research, successful readers "process virtually all the words they encounter in connected text, and typically, all of the letters in those words" (p. 82). Harrison (1998) also points out that advances in eye movement measurement techniques have shown that successful readers not only fixate most words rapidly but also process individual letters in each word even when the word is highly predictable. Goodman's claim on successful readers' unnecessity of accurate word recognition certainly seems to be an extreme view.

Top-down processing is closely relevant to this study in the sense that global reading strategies, which represent this type of processing, share many strategy similarities with cognitive and metacognitive reading strategies. The common strategies include "previewing the text to see what it's about before reading it", "deciding what to read closely and what to ignore" and "trying to guess the meaning of unknown words or phrases" (Mokhtari & Reichard, 2002, p. 253).

2.3.3 Interactive processing

Neither bottom-up processing nor top-down processing may precisely describe the actual process of reading. It has been widely recognized among reading researchers (e.g., Bensoussan & Kreindler, 1990; Grabe, 1991; Hedgcock & Ferris, 2009; Hudson, 2007; Liontas, 2002) that successful readers do not resort entirely to either bottom-up processing or top-down processing; rather, they use the combination of the two types of processing. This is known as interactive processing, in which

bottom-up and top-down processing work and interact in complex and poorly understood ways, with balances which vary depending on texts, readers and purposes (Alderson, 2000). In interactive processing, comprehension is considered as "the interaction between top-down processing from activated schemata and bottom-up processing from concepts expressed by the sentence" (Bensoussan & Kreindler, 1990, p. 57).

Grabe and Stroller (2002) argue that some reading researchers assume in their literature that "one can take useful ideas from a bottom-up perspective and combine them with key ideas from a top-down view" (p. 33) but this reasoning is contradictory because the essential components of bottom-up processing (i.e., efficient automatic processing in working memory) are "incompatible with strong top-down controls on reading comprehension" (p. 33). To deal with such a contradiction, they proposed a modified interactive approach. This approach suggests that a reader may automatically recognize words by perceiving information from graphemes, phoneme-grapheme correspondences and spelling and that he/she may draw on top-down processing only when encountering unknown or ambiguous words. That is, activating schematic resources is time-consuming and thus efficient word recognition may not require schematic knowledge.

Stanovish (1980), a well-known proponent of an interactive approach, called his model an interactive-compensatory one. This model was presented, based on the notion of the compensation hypothesis, which had already long been discussed in other fields including psychology. This notion suggests that the lack of knowledge or skills in one area may be compensated for by knowledge or skills in another area (Alderson, 2000). The interactive-compensatory model suggests that when a reader has difficulty in comprehending a text because of his/her insufficient linguistic knowledge or skills, he/she may be able to compensate for the shortcoming(s) with strength in another area of knowledge or skills such as cognitive and metacognitive skills. As agreed by many reading researchers, interactive processing represented by Stanovish' (1980) model appears to describe the process of reading most accurately among the three process models of reading introduced in Section 2.3.

2.4 Factors Affecting Reading Comprehension

Reading comprehension is affected by a wide variety of factors. This view has been commonly agreed among reading researchers (e.g., Alderson, 2000; Feng, 2011a, 2011b; Kendeou & Broek, 2007; Koda, 2004; Shin, 2002) while their assertions

differ in terms of what affects reading comprehension and how much individual factors affect reading comprehension. The factors which may affect readers' comprehension can be broadly divided into reader-related ones (reader variables) and text-related ones (text variables). Since comprehension occurs through interactions between the reader and the text (Alderson, 2000), both reader variables and text variables are significant to successful reading. Therefore, when readers' comprehension is studied, both reader variables and text variables need to be taken into consideration.

2.4.1 Reader variables

It is clear that various factors that readers bring to the process of reading affect the way they process and comprehend a text (Alderson, 2000; Feng, 2011a; Koda, 2004; Leeser, 2007; Shin, 2002). The reader-related factors found to be significant to successful reading include readers' schemata (background knowledge), skills, strategies, purposes and motivations (Alderson, 2000; Feng, 2011a; Leeser, 2007). Each of these factors largely differs among readers in terms of quality, quantity and variety. The two variables focused on in this study (i.e., syntactic awareness and use of cognitive and metacognitive reading strategies) fall in the category of reader variables.

Schemata designate networks of information and knowledge stored in the brain, which act as a filter for interpreting incoming information. In the reading literature, the term schemata is used interchangeably with background knowledge (An, 2013). When a reader processes text, he/she relates new information from the text to his/her existing schemata, and he/she comprehends the information only when he/she can successfully relate it to his/her existing schemata (Carrell, 1983). Schemata enhance reading comprehension through facilitation of inference (Guthrie & Mosenthal, 1987). Successful readers "use cues from text to initiate appropriate schemata to form hypotheses, and as they read on, they test these hypotheses and make appropriate adjustments as needs arise" (Kong, 2006, p. 22). Hudson (1982) points out that unsuccessful reading in L2/FL is caused by activating wrong schemata rather than not activating any schemata at all. The teacher in an L2/FL reading class should teach his/her students how to activate appropriate schemata and also should provide them with information which they are lacking in their schemata, to facilitate their reading comprehension (Floyd & Carrell, 1987). Activating appropriate schemata is considered as one of the most effective cognitive and metacognitive reading strategies (Urquhar & Weir, 1998).

Distinguishing different kinds of schemata is meaningful to understand their functions and characteristics. One example is suggested by Carrell (1983) who broadly distinguished between formal schemata and content schemata. According to Carrell (1983), formal schemata refer to "background knowledge of the rhetorical structures of different types of texts" (p. 83), and content schemata refer to "background knowledge of the content area of a text" (p. 83). Syntactic awareness concerns formal schemata whereas the use of cognitive and metacognitive reading strategies concerns both formal schemata and content schemata.

Formal schemata, which represent language knowledge or linguistic knowledge, include syntactic knowledge, lexical knowledge (vocabulary knowledge) and metalinguistic knowledge. Gertner, Fisher and Eisengart (2006) point out that "languages are composed of words and rules by which words are meaningfully combined" (p. 684). In natural texts, individual words are not used in isolation, and how they relate one another to make larger units is governed by the syntax of the language (Lin, 2002). Therefore, a reader needs to possess syntactic knowledge to identify how individual words in a sentence relate to one another and to comprehend the entire sentence (Lin, 2002).

In L1 reading research, relatively little attention has been paid to the roles which syntactic knowledge plays in reading comprehension (Alderson, 2000; Koda, 2004). Koda (2004) points out, "basic syntactic knowledge is presumed to have been acquired by the time reading instruction commences" (p. 258). However, this presumption cannot be made for L2/FL reading research because many L2/FL readers begin reading before acquiring adequate L2/FL syntactic knowledge (Koda, 2004). Unlike L1 readers, L2/FL readers need explicit learning of syntactic knowledge to help them in reading comprehension (López, 2008). Since the relationship between readers' syntactic awareness and comprehension is one of the key issues focused on in this study, the significance of syntactic awareness is elaborated in Section 2.6.

It seems to be self-evident that lexical knowledge is absolutely necessary to reading comprehension. In the reading literature, lexical knowledge is used interchangeably with vocabulary knowledge (Qing, 2009). While research (e.g., Carver, 1994; Hsuch-chao & Nation, 2000; Laufer, 1992; Shiotsu & Weir, 2007; Qian, 2002) has demonstrated that lexical knowledge highly correlates with reading comprehension,

there is also a reverse relationship between lexical knowledge and reading comprehension. That is, vocabulary learning and processing depend largely on reading comprehension because in most cases the precise meaning of individual words is determined by the contexts in which they appear (Koda 2004). However, little has been reported about possible ways reading comprehension contributes to lexical knowledge development (Koda, 2004).

Classification of lexical knowledge – understanding what is involved in knowing a word – has been one of the main concerns for lexical researchers. It has been widely supported among reading researchers (e.g., Ehsanzadeh, 2012; Qian, 1999, 2002; Read, 1988; Shen, 2008; Wesche & Paribakht, 1996) that lexical knowledge which affects reading comprehension can be measured in terms of two main dimensions: breadth and depth. Breath of lexical knowledge (also referred to as vocabulary size) designates the number of words known while depth of lexical knowledge relates to how well individual words are known. According to Qian (1999), the depth of lexical knowledge involves components such as pronunciation, spelling, meaning, register, and morphological, syntactic and collocational properties. He points out that these components are interconnected structurally and functionally and that they interact with one another in a reading process so that the best comprehension is resulted.

The importance of both breadth and depth of lexical knowledge in reading comprehension has long been recognized by L1 reading researchers (e.g., Booth & Hall, 1994; Curtis, 2006; McKeown, Beck, Omanson, & Perfetti, 1983; Stahl & Fairbanks, 1986; Tannenbaum, Torgesen, & Wagner, 2006). However, relatively little attention has been paid to the relationship between depth of lexical knowledge and comprehension in L2/FL reading research although depth of lexical knowledge may also be highly related to L2/FL reading comprehension (Qian, 2002). The research conducted by Qian (2002) is one of the studies which have attempted to investigate this relationship. For this purpose, he studied 217 students who attended an intensive English as a second language (ESL) program at one Canadian university. The findings of his study demonstrate that having deeper lexical knowledge helps L2/FL readers guess the meaning of unknown words more properly, while having a larger vocabulary size gives L2/FL readers a larger database to be searched for guessing unknown words.

The effect of metalinguistic knowledge on reading comprehension also has long been investigated in both L1 reading research (e.g., Dreher & Zenge, 1990; Flood &

Menyuk, 1983; Zipke, 2007) and L2 reading research (e.g., Francis, 1999; Malcolm, 2009; Miguel, 2012). Metalinguistic knowledge, which is defined by many researchers (e.g., Alderson, Clapham, & Steel, 1997; Bialystok, 1979; Elder, Warren, Hajek, Manwaring, & Davies, 1999; Ellis, 2004; Roehr, 2008) as a person's explicit knowledge about language, may refer to a person's ability to think about and analyze language and its rules (Oxford, 1990). Applied to reading, metalinguistic knowledge means knowledge of reading strategies (Alderson, 2000). It has been found that successful readers possess knowledge of reading strategies and are aware of when and how to apply the knowledge which they have (Alderson, 2000; Sheorey & Mokhtari, 2001; Zhang, Gu, & Hu, 2008; Hardin, 2001; Kong, 2006). Knowledge and awareness of reading strategies will be elaborated in Section 2.8 because they are central issues of this study.

Content schemata, which represent knowledge about the content of text, include knowledge of subject matters, knowledge of the world and cultural knowledge. The importance of content schemata in L2/FL reading has received much attention from a number of researchers (e.g., Ajideh, 2003; Keshavarz, Atai, & Ahmadi, 2007; Landry, 2002; Lin, 2002; Nassaji, 2002), and empirical findings (e.g., Alemi & Ebadi, 2010; Bensoussan, 1998; Hardin, 2001; Lin, 2002; Pritchard, 1990) have supported their role as a major factor in L2/FL reading comprehension. These findings demonstrate that even readers who have sufficient amount of formal schemata may have trouble comprehending texts if their content schemata which are relevant to the texts are insufficient. Therefore, when reading materials for reading lessons or passages for reading comprehension tests are chosen, the content schemata of relevant readers need to be considered as well as their formal schemata. Also, in this study, the content schemata of the participants also were taken into account when passages for reading strategy training and those for reading comprehension pre-test and post-test were chosen.

When a text is written by an author, information which readers are assumed to have possessed may be omitted from the text by the author (Urquhart & Weir, 1998). Therefore, a reader needs to supply additional information derived from his/her existing content schemata when reading a text (Urquhart & Weir, 1998). If the reader knows little about the topic of the text, he/she will find it difficult to process individual sentences because he/she will not be able to compensate for incompleteness of the text with his/her additional information (Alderson, 2000). When reading a text in his/her familiar areas, the reader may smoothly comprehend

its content because he/she will be able to use his/her additional information to compensate for the incompleteness of the text (Alderson, 2000).

A reader's knowledge of how the world works is also essential to reading (Alderson, 2000; Xie, 2010). World knowledge typically refers to a reader's world. The way his/her world works and some of such knowledge may be unique to him/her because of personal history and experiences unique to the person (Alderson, 2000). According to Long (1989), world knowledge is organized and stored in the form of schemata composed of stereotyped scenarios and sequences of actions that define common situations. While world knowledge may differ among readers, the disparity of readers' world knowledge varies among different countries, regions or societies (Narvaez, 2001). For example, it is highly likely that the disparity of world knowledge of students in Australia (a multiethnic country) is much larger than students in Japan (a homogeneous country) where most people receive similar education based on almost uniform compulsory education curriculums and share the same information through national broadcast channels. When reading research is conducted with Australian students, the diversity of the participants' world knowledge needs more careful attention than studies with Japanese students.

While world knowledge differs among people, cultural knowledge is shared by people who experience the same culture. Cultural knowledge is also crucial to reading comprehension. When a reader reads a text written about a subject matter whose nature differs among cultures, he/she tends to comprehend the text, based on his/her own cultural assumptions (Alderson, 2000). It has been reported by many researchers (e.g., Droop & Verhoeven, 1998; Erten & Razi, 2009; Long, 1989; Rashidi & Soureshjani, 2011; Zhao, 2011) that reading texts in unfamiliar cultural settings results in difficulty of processing and/or misunderstanding. The disparity of readers' cultural knowledge also varies among different countries, regions or societies (Narvaez, 2001). For example, the disparity of Japanese people's cultural knowledge may be small because a large number of Japanese people move to other regions for the sake of works, education or travel and thus have many opportunities to experience cultures of various regions.

It may be self-evident that readers must have some kinds of skills to process information in order to comprehend texts (Perfetti, Landi, & Oakhill, 2005). According to Afflerbach, et al. (2008), the term "skill" has been used in the fields of psychology and education for a hundred years to refer to various types of behaviors

and cognitions, and in the field of reading, the history of its wide use is longer than the term “strategy”, which is used as a synonym of skill.

Reading skills may refer to cognitive abilities which readers are able to use when interacting with written texts (Urquhart & Weir, 1998). These skills are automatic processes, not consciously controlled processes (Afflerbach, et al., 2008; Urquhart & Weir, 1998). Afflerbach, et al. (2008) point out that readers may comprehend a text without any problem merely using their usual reading skills if they have sufficient background knowledge and the texts are not syntactically complicated. L2/FL learners should be motivated to become skillful readers “because skill affords high levels of performance with little effort” (Afflerbach, et al., 2008, p. 372).

The kinds of skills which are needed for successful reading have been investigated by many researchers (e.g., Landi, 2010; Lepola, Niemi, Kuikka, & Hannula, 2005; Lesaux, Lipka, & Siegel, 2006; Lipka, 2012; Nassaji, 2003). The classification of those skills differs among researchers, and many different lists, taxonomies and hierarchies of skills have been presented in the past (Liu, 2010a). The taxonomy presented by Munby (1978, as cited in Alderson, 2000) suggests the following 19 skills. His classification implies that reading skills needed for successful reading are wide-ranging.

- Recognizing the script of a language
- Deducing the meaning and use of unfamiliar lexical items
- Understanding explicitly stated information
- Understanding information when not explicitly stated
- Understanding conceptual meaning
- Understanding communicative values of sentences
- Understanding relations within the sentence
- Understanding relations between parts of text through lexical cohesion devices
- Understanding cohesion between parts of text through grammatical cohesion devices
- Interpreting text by going outside it
- Recognizing indicators in discourse

- Identifying the main point or important information in discourse
- Distinguishing the main idea from supporting details
- Extracting salient details to summarize (the text, an idea)
- Extracting relevant points from a text selectively
- Using basic referent skills
- Skimming
- Scanning to locate specifically required information
- Transcoding information to diagrammatic display (p. 10)

Readers may read a text which they are not able to comprehend by using their reading skills, which are automatic processes. When the text is syntactically or semantically complex or a reading task is difficult, readers are also required to use effective reading strategies. When readers' reading skills and strategies well complement each other, they are able to comprehend the text smoothly (Afflerbach, et al., 2008).

In the reading literature, the term "strategy" is used interchangeably with skill to refer to the same reading process while distinction can be made between them (Alderson, 2000; Afflerbach, et al., 2008; Manoli & Papadopoulou, 2012). Manoli and Papadopoulou (2012) state, "such inconsistency is particularly evident when processes such as contextual guessing are referred to as strategies in some studies and as skills in other studies in the reading literature" (p. 817). Afflerbach, et al. (2008) point out that the inconsistency in use of the two terms results from "confusion about how skill and strategy are conceptualized" (p. 372). A lack of consistency in use of the terms may "confuse students and teachers and render instructions less effective" (Afflerbach, et al., 2008, p. 364).

In order to diminish confusion caused by the inconsistent use of skills and strategies, some attempts (e.g., Afflerbach, et al., 2008; Alderson, 2000; Liu, 2010a; Manoli & Papadopoulou, 2012; Urquhart & Weir, 1998) have been made to clarify the distinction of the terms. Urquhart and Weir (1998) point out that skills are text-oriented and are deployed unconsciously while strategies are reader-oriented and represent the reader's conscious decisions. Afflerbach, et al. (2008) presented similar but more elaborate descriptions about the distinction as below:

> Reading strategies are deliberate, goal-directed attempts to control and modify the reader's efforts to decode text, understand words, and construct meanings of text. Reading skills are automatic actions that result in decoding and comprehension with speed, efficiency, and fluency and usually occur without awareness of the components or control involved. (Afflerbach, et al., 2008, p. 368).

In this study, the distinction above is adopted, and the term "cognitive and metacognitive reading strategies" is used rather than cognitive and metacognitive reading skills like many other studies (e.g., Brenna, 1995; Cubukcu, 2008; Dhieb-Henia, 2003; Lawrence, 2007; Ozek & Civelek, 2006).

The types of strategies which are important for successful reading have been clarified by a number of studies (e.g., Block, 1986; Brenna, 1995; Kletzien, 1991; Saricoban, 2002; Zhang & Wu, 2009) through students' reports on what they are doing while reading. Those studies report that comprehension of unsuccessful readers can be improved by teaching the reading strategies found to be effective. The findings of the studies have motivated many researchers to examine the effects of instructions of effective strategies on L1 reading (e.g., Gourgey, 1998; Guterman, 2002; Sari & Sibarani, 2013) and L2/FL reading (e.g., Dhieb-Henia, 2003; Fan, 2010; Gurses & Adiguzel, 2013).

Readers' comprehension is also affected by their purposes for reading. In most cases, readers have any specific purposes when reading texts. The same reader's purpose for reading varies from time to time. Moreover, the extent of the variety of reading purpose intended in daily lives differs among readers because of their different variety of daily activities. The kinds of purposes of reading which a reader may have are diverse. For example, in a classroom, students engage in various activities intended for different purposes such as learning new information, learning some vocabulary, learning some grammar, comprehending questions in a test and finding out answers for a test.

The purpose of reading also needs to be given serious consideration when reading research is conducted. Alderson (2000) points out that one critical problem with most of studies which focus on the purpose of reading is that participants read texts because they are paid by researchers or because they have to take a test. That is, their purposes for reading are not their own, and this may adversely affect their reading

performance. Researchers need to consider how to minimize the adverse effect which may be brought by this problem, when designing reading research which focuses on the purpose of reading (Alderson, 2000).

Considering that different purposes may need different skills, it is probable that the reader's purpose for reading affects the way he/she reads and how well he/she comprehends (Alderson, 2000; Feng, 2011a; Narvaez, 2002). For example, if the purpose of reading is to learn new information, the reader will read the relevant passages very closely: he/she may attempt to comprehend every single sentence of the passages. However, if the purpose of reading is to locate needed information in the text, the reader may scan the text quickly to find out where the information is present: he/she will never attempt to comprehend every single sentence of the text.

The ways of reading, which are affected by the purpose of reading, have been classified differently by different researchers. Urquhart and Weir (1998), for example, classified readers' ways of reading into the five types as follows:

- Skimming is the way of reading to obtain the gist of the text while avoiding to pay close attention to details.
- Search reading is the way of reading to locate information on predetermined topics, for purposes such as answering any questions. "It differs from skimming in that the search for information is guided by predetermined topics so the reader does not necessarily have to establish a macropropositional structure for the whole of the text" (p. 103).
- Scanning is the way of reading selectively, to achieve a specific reading goal (e.g., finding specific information in publication), and it involves looking for a specific item (in the text) such as a word, phrase, figure, name and date.
- Careful reading is the way of reading which is required, to learn new information and/or knowledge in academic contexts, with a textbook or any other learning materials. In the process of reading of this type, "the reader attempts to handle the majority of information in the text, that is, the process is not selective" (p. 103).
- Browsing refers to any sort of reading which is done with no specific goal in mind. In the process of reading of this sort, the reader may skip parts of the text fairly randomly and makes "a little attempt to integrate the information into a microstructure" (p. 104).

Motivation to read is closely related to the purpose of reading. Gambrell (2011) described motivation to read as "the likelihood of engaging in reading or choosing to read" (p. 172). The kinds of motivation can be broadly categorized into extrinsic motivation and intrinsic motivation (Alderson, 2000). Extrinsic motivation (e.g., reading for taking a test) can lead the reader to read a text at the surface level, paying attention to facts and details (Alderson, 2000; Feng, 2011a). On the other hand, intrinsic motivation (e.g., reading for the reader's enjoyment or satisfaction) can cause the reader to pay attention to main ideas, what the text is about and which ideas in the text relate to each other (Alderson, 2000; Feng, 2011a). The latter type of reading (higher levels of understanding) is considered to be superior to the former type of reading (lower levels of understanding) and to be educationally desirable (Alderson, 2000; Feng, 2011a).

The lack of motivation to read may adversely affect readers' reading performance (Aarnoutse & Schellings, 2003; Alderson, 2000; Dhanapala, 2008; Feng, 2011a; Yamashita, 2004). While a reader's degree of motivation to read largely depends on whether it is an extrinsic or intrinsic one, the teacher in a reading class may help his/her students increase the motivation to read. When students are encouraged to read text prepared by their teacher (or by their school), particularly, the teacher's role of increasing his/her students' motivation is significant.

How to increase students' motivation to read has been one of the important concerns of reading researchers as well as reading teachers. To date, a number of studies have been reported to introduce techniques found to be effective for the increase of students' motivation to read. These techniques include choosing reading materials which arouse students' curiosities (e.g., Gambrell, 2011; Guo, 2012; Guthrie, et al., 2006), introducing reading tasks or activities which are relevant to students' daily lives (e.g., Gambrell, 2011; Guthrie, et al., 2006; Lowery, 2003), giving students opportunities to interact with others about the text they read (e.g., Gambrell, 2011; Moser & Morrison, 1998; Robert, 1999) and giving students chances to choose which materials to read (e.g., Gambrell, 2011; Johnson & Blair, 2003; Moser & Morrison, 1998). For the reading strategy training in this study, reading materials which would increase the participants' motivation to read were carefully chosen, so that the effect of the training would increase. Moreover, the participants were motivated to discuss subject matters in groups before the texts were read and discuss information in the texts in groups after the texts were read.

2.4.2 Text variables

As well as readers themselves, text variables have been found to affect readers' comprehension in a variety of ways (Alderson, 2000; Brantmeier, 2005; Feng, 2011b; Koda, 2004; Shin, 2002). Even readers who have high language proficiency and a reasonable amount of background knowledge may have trouble comprehending a text, depending on text variables such as text content (Feng, 2011b). Text variables have drawn much attention from not only reading researchers but also reading teachers who need to choose reading materials which suit for their students. The aspects of text which may facilitate or make the reading process difficult include text content, genre of text and sentence structure (Alderson, 2000; Feng, 2011b; Shin, 2002). While text variables were not central issues in this study, whose main focus was placed on the relationship between the participants' syntactic awareness and reading comprehension, they were considered as significant in the study because the participants' reading comprehension might be greatly affected by the variables. Therefore, in the study, text variables were taken into consideration when texts were chosen for the reading comprehension tests and reading lessons.

Text content also affects how readers process texts (Alderson, 2000; Clapham, 1996; Feng, 2011b; Guthrie, McRae, & Klauda, 2007; Shohamy, 1984). Abstract texts are possibly harder to understand than concrete texts, which describe real objects, events or activities and which allow readers to easily elicit visual cues for comprehending meanings (Alderson, 2000). Readers find it easier to understand texts which are more concrete, imaginable or interesting or texts on more familiar topics (Alderson, 2000). Concreteness of texts is important to allow readers to effectively use their content schemata, which represent knowledge about the content of the text. Only when texts are concrete, readers' content schemata may largely contribute to their reading comprehension (Clapham, 1996). As the text becomes more abstract, a greater role may be played by the readers' formal schemata, which represent language knowledge or linguistic knowledge.

Considering that text content affects reading comprehension, the appropriateness of text content to examinees should be considered when texts are chosen for reading comprehension tests (Alderson, 2000; Clapham, 1996; Shohamy, 1984). For example, Alderson (2000) suggests to choose "texts from popular fiction and non-fiction on the grounds that they are likely to be less biased in terms of difficulty, and therefore more suitable for tests of reading" (p. 63) while Clapham (1996) suggests to choose texts whose contents are reasonably familiar to examinees, so that they can use

sufficient existing content schemata and deploy appropriate skills and strategies to comprehend the texts. For this reason, the texts chosen for the reading comprehension tests and reading lessons in this study are concrete and describe real objects, events or activities which are reasonably familiar to the participants. This choice was made to allow the participants to use their content schemata when reading the texts.

One of the concerns of reading researchers about text content is to find out whether text content or language proficiency is a better predictor of reading comprehension. Many empirical studies (e.g., Barry & Lazarte, 1995; Chen & Donin, 1997; Clapham, 1996; Tan, 1990; Usó-Juan, 2006) showed that language proficiency was a better predictor than text content, while their findings also indicated that both of the two factors largely affected reading comprehension. For example, Usó-Juan (2006) conducted a study with a total of 380 Spanish-speaking undergraduate students – 154 majoring in psychology, 145 majoring in tourism and 81 majoring in industrial engineering – with English texts relating to their subject areas. She measured the participants' scores of three variables (i.e., discipline-related knowledge, English proficiency and reading comprehension) and subjected them to multiple regression analyses. The results of the analyses made her conclude that English proficiency is a much better predictor of reading comprehension than discipline-related knowledge.

While the relative significance of text content and language proficiency to reading comprehension has attracted researchers' attention, it is possible that the relative significance of the two factors to reading comprehension varies depending on factors such as difficulty of subject matters. If the subject matter of the text is relatively easy, the reader's language proficiency may play a more important role than his/her familiarity with the text content, whereas a text written about a more difficult subject matter may require the reader's subject matter knowledge to play a more important role (Alderson & Urquhart, 1985). It is also worth mentioning that the significance of text content to reading comprehension may vary depending on the reader's language proficiency level. Familiarity with text content may be more helpful to readers having low language proficiency than readers having high language proficiency (Chan, 2003).

Another significant text variable which may affect reading comprehension is genre of text. One of the typical genres of texts is description: the texts chosen for the reading comprehension tests and reading strategy training in this study belong to this genre.

A typical descriptive text serves to describe a particular person, place, event or thing objectively or subjectively (Mardiyah, Saun, & Refnaldi, 2013). Description is widely used across all learning areas and one of the first skills which young children learn to control (Knapp & Watkins, 2005). Knapp and Watkins (2005) state that description is extensively used "in many text types, such as information reports, literacy descriptions, descriptive recounts and, due to the need to classify and/or describe a process before explaining it, in the opening paragraphs of most explanations" (p. 22).

Besides description, genres of texts known as representatives are exposition, narration, explanation, instruction and argumentation (Bruce, 2005; Knapp & Watkins, 2005; Schmidt, 1991; Shi & Kubota, 2007; Toledo, 2005). One thing that distinguishes these different genres is the way the text is organized: that is, how its paragraphs relate to each other and how the relationships between ideas are signaled or not signaled (Feng, 2011b). Depending on different text organizations, readers' comprehension may vary. In previous studies (e.g., Best, Ozuru, Floyd, & McNamara, 2006; Dennis, 1982; Duke & Kays, 1998; Taylor & Beach, 1984; Williams, 2000; Zabrucky & Moore, 1999) about effects of specific text organizations on reading comprehension, a focus tended to be placed on different reading performance between exposition and narration whereas description – genre chosen for this study – has drawn little attention with respect to comparison with another genre in terms of this issue.

Compared with narrative texts, expository texts are found to be harder to process by previous empirical studies (e.g., Best, Ozuru, Floyd, & McNamara, 2006; Dennis, 1982; Duke & Kays, 1998; Taylor and Beach, 1984; Williams, 2000; Zabrucky & Moore, 1999). Duke and Kays (1998) point out that expository texts tend to contain more difficult words and concepts than narrative texts, making especially L2/FL readers have more difficulty of comprehending. Shokouhi and Maniati (2009) state that "expository texts are less cohesively organized by temporal and causal connections, thus demanding more explicit logical inference" (p.15) while narrative texts "are typically more ambiguous and open to different interpretations than expository texts thus inviting personal participation and meaning interpretations" (p. 15). Iwai (2007) also points out that expository texts are harder to read than narrative texts because expository texts explain particular contents, unlike narrative texts in which readers can easily follow the plot.

When investigating the relationships between genres of texts and reading comprehension, researchers assume that their target genres differ in text organizations, sentence structures and syntactic features. The clarification of these differences among genres of texts has been significantly contributed by systemic functional linguists, including its pioneer Halliday (1978, 1985). Systemic-functional linguistics (SFL) aims to provide descriptions about how individuals use language and how language is structured for its different usages (Eggins, 1994). Presuming that language is used to accomplish any social functions, SFL considers language as systemic because language consists of a set of systems, in each of which a speaker or a writer is provided with a variety of ways to express his/her intended meaning, and also as functional because language serves functional purposes (Halliday 1978, 1985). Martin (1984), another systemic-functional linguist, is widely known for his theory called genre theory, which originated in the linguistic theory of Halliday. The genre theory suggests that spoken or written texts can be understood only when speakers or writers share the same social contexts with their listeners or readers and that texts which have the same purpose have similar syntactic features and sentence structures; therefore, being familiar with these features and structures is important to improve abilities of both interpreting and creating texts. According to Knapp and Watkins (2005) who detailed syntactic features of individual genres based on the notion of the genre theory, the syntactic features of description include the following:

- When describing from a technical or factual point of view, the use of the present tense is predominant in terms of tense of verbs.
- Relational verbs (i.e., *is*, *are*, *has* and *have*) are used when describing appearance, quality, parts and functions of things or phenomena.
- Action verbs (e.g., s*peak, sing* and *walk*) are used when describing behaviors.
- Action verbs may be used metaphorically to create effect in literary or commonsense descriptions: e.g., John *bubbled* with enthusiasm.
- Mental verbs (e.g., feel, like and hate) are used when describing feelings.
- Adjectives are used to add extra information to nouns (e.g., *beautiful* flower) or may be used on their own (e.g., *Great!*).
- Adverbs are used to add extra information to verbs to provide more detailed descriptions: for example, Tom speaks *fast*.
- Adverbial phrases are used to add more information about manner, place or

time: for example, We played baseball *in the park*. (p. 98)

Sentence structure has also been considered as one of the text variables which largely affect reading comprehension. As for sentence structure, it has been controversial whether syntactically-simplified texts are more comprehensible than authentic texts. Some studies (e.g., Berman, 1984; Oh, 2001; Sarab & Karimi, 2008; Tweissi, 1998; Yano, Kong, & Ross, 1994) report that syntactically-simplified texts are easier to comprehend while some other studies (e.g., Blau, 1982; Keshavarz, Atai, & Ahmadi, 2007; Ulijn & Strother, 1990; Walmsley, Scott, & Lehrer, 1981; Young, 1999) disagree. Koda (2004) argues that "syntactic complexity – such as lack of structural transparency, violation of prototypicality, and ambiguity – also generates comprehension problems" (p. 258). Berman (1984) points out that L2/FL readers' comprehension can be hindered by sentences that violate SVO (subject-verb-object) ordering, which L2/FL readers typically expect and by sentences having constructions which extend the basic SVO structure "so that one or more of the sentence constituents is 'heavy', containing many sub-parts of embedding or modification" (p. 142).

There may be various ways of simplifying texts. According to Tweissi (1998), reading comprehension is largely improved by the type of simplification, not amount of simplification. Berman (1984) asserts that to acquire specific information from the text accurately and in detail, "intra-sentential syntactic complexity might be of an impediment" (p. 146). Yano, Long and Ross (1994) compared the readability of unmodified, simplified and elaborated texts, using Japanese university students. While they agree with the idea that generally syntactically-simplified texts are more comprehensible than authentic ones, they conclude that simplified texts do not necessarily lead to better comprehension than properly elaborated ones. On the other hand, based on their empirical study, Ulijn and Strother (1990) assert that simplification of individual sentences does not increase readability – "the sentence is not a good unit for rewriting" (p. 49) – and that "textual (propositional) and lexical rewriting might have much more effect" (p. 49). In this study, syntactically-simplified texts were chosen for the reading comprehension tests and the reading strategy training. The texts for the reading comprehension tests were written for English proficiency tests for Japanese test-takers (as detailed in Section 3.3), and the texts for the reading lessons were written for English-speaking children.

The study conducted by Ulijn and Strother (1990) is meaningful in the sense that one

of their research aims was to investigate whether the syntactic simplification of texts relating to their participants' academic field would provide them with better comprehension. Typically, in studies which attempt to measure the effect of syntactic simplification on reading comprehension, participants' background knowledge is not paid a close attention as a variable which may affect the results of studies. In the study by Ulijn and Strother (1990), 24 L1-English university students majoring in computer science and 24 L1-Dutch university students majoring in computer science were tested with an authentic English article about computer science and its syntactically-simplified version. To simplify the syntactic structure of the text, nominalizations, passive constructions and participial constructions in the text were rewritten as verb phrases, active constructions and subordinate clauses respectively. No significant difference in scores was resulted from both of the L1-English and L1-Dutch students who read the two different versions of texts. The conclusion of Ulijn and Strother (1990) is, "syntactic rewriting of professional texts to increase readability is not needed" (p. 49).

While the study by Ulijn and Strother (1990) is noteworthy, it seems to be too hasty to jump to such a conclusion merely with the study which tested their participants using a single computer science article. According to Ulijn and Strother (1990), the L1-Dutch participants had a strong English background with considerable exposure to English textbooks during three years of study at their university. The result may largely differ if L1-Japanese university students are tested with English texts. The English proficiency of average Japanese university students has been found to be extremely low and be nearly the lowest even among Asian countries (including China and South Korea) where English is not their second language but their foreign language (Bradley, 2012). The result may also be affected by the semantic complexity of a used text and the difficulty of a subject matter, and thus it is ideal to use multiple articles which differ in terms of semantic complexity of texts and difficulty of subject matters.

2.5 Research on L2/FL Reading

Research on L2/FL reading differs from research on L1 reading in terms of various factors including readers' linguistic proficiency of the target language. However, L2/FL reading research in the past has mostly resorted to the theoretical ground of L1 reading research. While this might be a logical point of departure, borrowed research paradigms do not cover the unique characteristics of L2/FL reading (Koda, 2004). L2/FL reading differs from L1 reading in that L2/FL readers start to read in L2/FL

before acquiring basic linguistic knowledge (syntactic and semantic knowledge) that L1 readers already possess (Alderson, 2000). L2/FL reading can be considered as "a complex psycholinguistic process where a variety of associated variables come into play" (Jung, 2009, p. 36) or as "an interactive meaning-making process in which readers capitalize on various available sources and utilize a multitude of strategies to achieve the goal of comprehension" (Zhang & Wu, 2009, p. 38).

Since L2/FL readers who are already literate in L1 supposedly possess a variety of reading strategies, it is likely that successful transfer of these strategies is partially responsible for individual differences in the use of strategies for L2/FL reading (Koda, 2004). In their literature, van Gelderen, Schoonen, Stoel, de Glopper and Hulstijn (2007) properly addressed L2/FL reading research issues by relating them to L1 reading comprehension as follows:

> An important issue in these studies is the question of to what degree components of L1 and L2 reading comprehension are different from one another. To what extent do readers who start reading in a second language use the skills they already have acquired in learning to read in their first language, and to what extent do they have to acquire new language and skills – such as L2 linguistic knowledge and fluency – to become proficient in L2 reading comprehension? (p. 477).

In his often-cited literature, Alderson (1984) addressed a controversial issue about L2/FL reading: is L2/FL reading "a reading problem or a language problem?" (p. 1). That is, whether problems of unsuccessful readers are attributed to any fundamental abilities commonly needed for reading in any language or to L2/FL proficiency including lexical knowledge and syntactic knowledge.

With respect to the relationship between L1 and L2/FL reading comprehension, several hypotheses have been suggested and examined. Among these, the two representative hypotheses which directly answer the controversial question aforementioned (i.e., Is L2/FL reading a reading problem or a language problem?) are the linguistic threshold hypothesis (LTH) and the linguistic interdependence hypothesis (LIH). The two hypotheses have provided research on L2/FL reading with a meaningful foundation for investigating the causes of problems of unsuccessful L2/FL readers.

2.5.1 Linguistic threshold hypothesis (LTH)

The LTH suggests that a certain level of L2/FL proficiency is needed before cognitive and metacognitive skills transfer from L1 to L2/FL (Bernhardt & Kamil, 1995; Jiang, 2011; Park, 2013; Torki, Kasmani, & Valipour, 2014; Yamashita, 2001). Its main assertion is that L2/FL readers need to acquire basic L2/FL linguistic knowledge (L2/FL syntactic knowledge included) before they are able to read in L2/FL. This basic L2/FL linguistic knowledge which is essential for successful L2/FL reading has been considered as a linguistic threshold in the target language. The LTH's answer to the question aforementioned (i.e., Is L2/FL reading a reading problem or a language problem?) is that L2/FL reading is a language problem.

When the LTH is discussed in the reading literature, typically Clarke (1979, 1980) and/or Cziko (1980) is mentioned as the originator of the LTH. However, neither Clarke (1979, 1980) nor Cziko (1980) referred to a linguistic threshold in their literature. Clarke (1979) states, "limited control over the language 'short circuits' the good reader's system, causing him/her to revert to poor reader strategies when confronted with a difficult or confusing task in the second language" (p. 138). Clarke (1979) called his theory "short circuit hypothesis" (p. 139). Cziko (1980) states, "second-language readers with less than advanced competence in the language are more reliant on graphic information and less sensitive to contextual information than readers with advanced or native-speaker competence in the language" (p. 111). Both of their statements merely mean that low L2/FL proficiency leads L2/FL readers to rely significantly on local reading strategies. In their literature, neither of Clarke (1979, 1980) and Cziko (1980) used a term, such as threshold, ceiling and certain level, which is associated with a linguistic threshold assumed by the widely recognized notion of the LTH.

The widely recognized notion of the LTH can be traced back to the literature of Alderson (1984). The following presumption which he made in the literature has been widely and mistakenly recognized as the notion originated in the studies of Clarke (1979, 1980) and Cziko (1980):

> We could arrive at a statement of the relationship between reading ability and language ability in foreign language reading that predicated that foreign language readers will not be able to read as well as in the foreign language as in their first language until they have reached a threshold level of competence in that foreign language (Alderson, 1984, p. 18).

2.5.2 Linguistic interdependence hypothesis (LIH)

The LTH is typically discussed with its counterpart, linguistic interdependence hypothesis (LIH). This is mainly because the theoretical notions of both the LTH and LIH describe how L1 linguistic skills affect L2/FL linguistic skills (August, 2006). The LIH suggests that there is an underlying common proficiency which can be applied to both L1 and L2/FL and cognitive skills in L1 should be properly developed prior to extensive exposure to L2/FL (Bernhardt & Kamil, 1995; Jiang, 2011; Park, 2013; Torki, Kasmani, & Valipour, 2014; Yamashita, 2001). Muñiz-Swicegood (1994) pointed out that the LIH presented a "rationale for the utilization of a student's first language to assist in the formulation of second language literacy" (p. 85).

The LIH is also referred to as transfer hypothesis because the LIH originated in Goodman's (1971) theory called transfer hypothesis (Jung, 2009). Goodman states, reading is "much the same for all languages with minor variations to accommodate the specific characteristics of the orthography used and the grammatical structure of the language" (p. 140). This statement implies that L2/FL reading comprehension needs only slight accommodations to the specific characteristics of L2/FL orthography and grammatical structures.

As the originator of the LIH, Cummins (1979) is typically mentioned in the reading literature. This reference, however, seems to be misunderstanding. The developmental interdependence hypothesis, which he addresses, concerns reading problems of especially bilingual children, and its notion is not identical to the widely recognized notion of the LIH. Cummins (1979) described the developmental interdependence hypothesis as follows:

> However, for children whose LI skills are less well developed in certain respects, intensive exposure to L2 in the initial grades is likely to impede the continued development of LI. This will, in turn, exert a limiting effect on the development of L2. In short, the hypothesis proposes that there is an interaction between the language of instruction and the type of competence the child has developed in his L1 prior to school. (p. 233)

The LIH presumes that cognitive skills developed in L1 can be easily transferred to L2/FL, and the transfer of reading skills from L1 to L2/FL occurs automatically once readers learn to read in L1, or more generally, acquire cognitive skills in L1.

According to its theory, a reader with weak L2/FL reading competence has a general reading or language program which is common to both L1 and L2/FL (August, 2006). The LIH suggests that unsuccessful L2/FL readers will be best served by a curriculum which focuses to improve their cognitive skills in L1 (August, 2006). The LIH's answer to the question aforementioned (i.e., Is L2/FL reading a reading problem or a language problem?) is that L2/FL reading is a reading problem.

The LIH, however, has theoretical limitations and has not gained wide support among researchers (e.g., August, 2006; Bernhardt & Kamil, 1995; Jiang, 2011; Pichette, Segalowitz, & Connors, 2003; Schoone, et al., 1998). The LIH does not elaborate which cognitive skills in L1 transfer in which way and how transfer may vary among L2/FL learners with different levels of educational attainment and maturity (August, 2006). Furthermore, considering that L1 reading comprehension itself is affected by so many factors, it is unreasonable to presume that only a single factor (i.e., cognitive skills in L1) among them is an extremely important predictor of L2/FL reading comprehension (Schoone, et al., 1998). It is also problematic that the LIH assumes that acquiring the syntactic structure of L2/FL is not much difficult for L2/FL learners. In practice, for example, to most Japanese-speaking English learners, acquisition of English syntactic awareness is not an easy task (Kawase, 1998) because of significant differences in syntactic structure between Japanese and English. It is also worth mentioning that the LIH may mislead teachers to the idea that instructions for improving students' L2/FL proficiency are much less important than instructions for improving their cognitive skills in L1 (irrespective of their current developmental and academic levels) to help them develop their reading comprehension in L2/FL. The evidence for the LIT has been mostly derived from studies of children who are in the developmental stages of both L1 and L2 reading skills (Bernhardt & Kamil, 1995).

The LTH also has some theoretical limitations while a number of empirical studies (e.g., Jiang, 2011; Lee & Schallert, 1997; Pichette, Segalowitz, & Connors, 2003; Schoone, et al., 1998; Taillefer, 1996) have supported the LTH over the LIH. The concept of the linguistic threshold has not been elaborated sufficiently (Yamashita, 2001), and a possible mechanism of its phenomenon has not yet been clarified (Kato, 2009). It still remains unclear what constitutes the linguistic threshold and to what extent the individual components relate to reading comprehension (Alderson, 2000; August, 2006; Koda, 2004), and research evidence has not been reported about what skills and strategies transfer, how the transfer occurs, roles of instructions in

facilitating the transfer, the transfer of processing skills and the effect of non-linguistic skills such as memory (August, 2006). The main aim of previous studies relating to the LTH (e.g., Jiang, 2011; Lee & Schallert, 1997; Pichette, Segalowitz, & Connors, 2003; Schoone, et al., 1998; Taillefer, 1996) was to verify that L2/FL proficiency is more important to successful L2/FL reading than cognitive skills in L1. This study, however, is designed to identify which types of basic syntactic knowledge are needed to become able to use cognitive and metacognitive reading strategies: the LTH suggests that L2/FL learners do not become able to use those reading strategies unless they satisfy a certain level of L2/FL proficiency.

It is also important to recognize that a linguistic threshold is not absolute and may vary depending on text-related factors (Alderson, 2000; López, 2008) and reader-related factors (López, 2008). The text-related factors may include "discourse structure, clarity, and syntactic complexity" (López, 2008, p. 184) besides difficulty of reading tasks (Alderson, 2000). The reader-related factors may include lexical knowledge, background knowledge and reading speed (López, 2008). Accordingly, a syntactic threshold may vary depending on these text-related and reader-related factors.

2.6 Syntactic Awareness

The significance of syntactic awareness to reading comprehension may not be much different from that of lexical knowledge. Since a reader may not comprehend a sentence without identifying the syntactic relations among words in a sentence, syntactic awareness has been considered as one of the significant variables which affect reading comprehension. Syntactic awareness helps a reader not only identify the syntactic relations among words in a sentence but also foresee words that will come next in a sentence (López, 2008). That is, together with a reader's background knowledge, his/her syntactic awareness enables him/her to predict what will come next in a sentence. Berman (1984) explained the importance of syntactic awareness to reading comprehension as follows:

> In order to get at the basic *propositional content* of a sentence, readers must be able to manipulate the following interrelated components of sentence structure: constituent structure – what the parts of a sentence are, and how they interrelate hierarchically; structural items – function words and affixes which serve as markers of grammatical relations and of constituent and rhetorical structure; and dependencies – relations expressed between discontinuous elements (p. 140).

Regarding the relationship between syntactic awareness and reading comprehension, the strength reported by previous empirical studies was not always the same despite wide consensus among researchers that syntactic awareness plays an important role in reading comprehension. Some studies (e.g., August, 2006; López, 2008; Mokhtari & Thompson, 2006; Shiotsu & Weir, 2007; van Gelderen, et al., 2007) reported a strong relationship between them, while some other studies (e.g., Bowey & Patel, 1988; Brisbois, 1995; Cain, 2007; Haynes & Carr, 1990; Layton, Robinson, & Lawson, 1998) suggested a weak relationship. Conflicting results were reported about the strength of the relationship possibly because the relationship is affected by many factors including the difficulty of the language of the text, the difficulty of the reading task, and readers' linguistic knowledge such as lexical knowledge and phonological knowledge (Alderson, 2000; López, 2008).

Differences in way of assessing participants' syntactic awareness might be another cause which induced different results about the strength of the relationship between syntactic awareness and reading comprehension. For example, for the purpose of syntactic awareness assessment, Mokhtari and Thompson (2006) who studied with children and reported a strong relationship used part of the Test of Language Development - Intermediate, 3rd Edition (TOLD-I:3), which assessed both expressive and receptive syntactic awareness. In the test, the participants' syntactic awareness regarding sentence combining, word ordering and grammatical mistakes was measured. As for sentence combining, the participants were asked to form a long sentence by combining two related sentences. Cain (2007) who also studied with children but reported a weak relationship, however, used the Test for Reception of Grammar - II (TROG-II), which assessed only receptive syntactic awareness. For each question of the test, the participants were presented with four pictures and were asked to choose the picture which matched the sentence spoken by the examiner. In the test, the participants' syntactic awareness regarding embedded clauses and reversible structures was measured while the early blocks of questions aimed to check comprehension of vocabulary items. Readers' ages may be another factor which affects the relationship between readers' syntactic awareness and comprehension (Cain, 2007; Demont & Gombert, 2006). Cain (2007) points out that metalinguistic ability and vocabulary develop with age, and the strength of the relationship between these variables and reading comprehension may change depending on age groups of readers.

The relationship between syntactic awareness and reading comprehension has been studied from various perspectives. The relative significance of syntactic and lexical knowledge to reading comprehension is one of these that has been reported in empirical studies (e.g., Barry & Lazarte, 1995; Bossers, 1992; Brisbois, 1995; Shiotsu & Weir, 2007; Yalin & Wei, 2011). Their findings showed conflicting results about the relative significance of the two variables. Bossers (1992) who conducted a study with 50 Turkish-speaking Dutch-learning high school students asserted that Dutch lexical knowledge was a better predictor of Dutch reading comprehension than Dutch syntactic knowledge. His assertion was supported by Brisbois (1995) who conducted a study with 131 English-speaking French learners at the U.S. Air Force Academy. Conversely, Shiotsu and Weir (2007), who conducted a study with 624 Japanese-speaking English language learners from five universities in Japan, asserted that syntactic knowledge was a better predictor of reading comprehension than lexical knowledge. Their assertion was supported by Yalin and Wei (2011) who conducted a study with 68 Chinese-speaking English language learners from one university in China.

The conflicting results of the studies above may be attributed to factors including the ways and methods of measuring syntactic knowledge, lexical knowledge and reading comprehension. Jung (2009) argued that the studies upholding lexical knowledge as a better predictor than syntactic knowledge did not isolate measurement of lexical knowledge from that of reading comprehension. She pointed out that the lexical knowledge test in the study by Brisbois (1995) asked the participants to figure out the meaning of individual words in reading passages. She then pointed out that Shiotsu and Weir (2007), however, used a multiple-choice fill-in-the-blank test for lexical knowledge. Jung (2009) asserts that lexical knowledge tests such as the one used by Brisbois (1995) "could have measured overlapping constructs in L2 reading with possible result of vocabulary appearing to be a better predictor of L2 reading ability" (p. 41).

Despite considerable attention paid to the relationship between L1 readers' syntactic awareness and comprehension, little has been clarified about the relationship (Mokhtari & Thompson, 2006). As for L2/FL reading research, the situation seems to be worse. Relatively little research has been reported about the relationship between L2/FL readers' syntactic awareness and comprehension (Gabrielea, Trosethb, Martohardjonob, & Otheguyb, 2009; Morvay, 2012; Shiotsu & Weir, 2007), and the number of relevant studies targeted for adolescent L2/FL readers is extremely small

(August, 2006; Morvay, 2012). Such unfavorable status regarding research on the relationship between L2/FL readers' syntactic awareness and comprehension may be partially attributed to the fact that much of the previous L2/FL reading research has been based on the conceptual frameworks of L1 reading research and has been started with replication of L1 reading research (Norvay, 2012).

With respect to L2/FL reading research, the extent to which syntactic awareness is required for successful L2/FL reading also remains uncertain (López, 2008). Such an extent can differ depending on various factors including reading purposes, genres of texts and text difficulties (Shiotsu & Weir, 2007). For example, university students, when reading academic texts, may need syntactic awareness beyond a certain level because in those texts syntactic structures convey essential information which allows students to interpret individual sentences properly (August 2006). Berman (1984) conducted a study with 20 Hebrew-speaking university students. From his findings he concluded that the role of syntax is significant when the purpose of reading is to acquire specific information accurately and in detail, however, the role of syntax is insignificant when the purpose of reading is to get the gist of an entire text.

Regarding the relationship with reading comprehension, readers' overall syntactic awareness (not specific syntactic awareness) was focused on in most of previous studies on L2/FL reading (e.g., August, 2006; Gottardo, Siegel, & Stanovich, 1997; Lipka & Siegel, 2007; López, 2008; Shiotsu & Weir, 2007). Little attention has been paid to the relationship between certain types of syntactic knowledge and reading comprehension, and the relationship has not been properly discussed in the literature yet. Alderson (2000) claims that "research has shown the importance of a knowledge of particular syntactic structures, or the ability to process them" (p. 37), but he cited only a single reference to such a study (i.e., Berman, 1984). Urquhar and Weir (1998) also point out that certain types of syntactic knowledge may be more important in reading than others and suggest that, in grammar instruction in L2/FL reading classes, priorities should be given to "prepositions over articles, declaratives over interrogatives, and simple as opposed to continuous verb forms" (p. 268). However, they did not show any evidence to support their suggestions.

A study conducted by Martohardjono, et al., (2005) is one which attempted to investigate the relationship between certain types of syntactic knowledge and reading comprehension. The types of syntactic knowledge focused on in their study are coordinating conjunctions (e.g., "and", "but" and "or") and subordinating

conjunctions (e.g., “because”, “if” and “when”). However, because their research interest was the effect of children’s syntactic development on improvement of their word recognition abilities, they conducted a study with children whose mean age was 5.9, and measured their pre-reading abilities by administering the Gates MacGinite Kindergarten pre-reading test. According to Martohardjono, et al., (2005), the test was composed of four sections (i.e., Literary Concepts, Phonological Awareness, Letter and Letter-Sound Correspondence, Listening Comprehension), and “being a pre-reading test, it does not contain a reading comprehension section, but rather includes a listening comprehension section” (p. 1531).

The syntactic knowledge focused on in this study falls under the category of traditional grammar, which is known as a representative system of grammatical rules as well as formal grammar and functional grammar. Quirk, Greenbaum, Leech and Svartvik (1985) introduced the seven clause word order types – SV, SVO, SVC, SVA, SVOO, SVOC and SVOA, where S, V, O, C and A stand for subject, verb, object, complement and adverbial, respectively – as a set of patterns which represent “the most general classification that can be usefully applied to the whole range of English clauses” (p. 53). SV, SVO, SVC, SVOO and SVOC were presented in an English grammar book written by Hosoe (1917, as cited in Ando, 1983) as the five basic sentence patterns. These five basic sentence patterns have been recognized as the framework of English grammar by Japanese-speaking English teachers and taught in English classes at junior and senior high schools in Japan over the past several decades (Miyawaki, 2012).

Traditional grammar was based on the study of written classical languages, Latin and Greek, and it sees language as a set of rules originally taken from these languages (Burns, 2009; Martin & Rothery, 1993). Latin was considered to be a logical and organized language (Burns, 2009), and was used as a basis to codify parts of speech such as articles, nouns, verbs, pronouns and conjunctions (Burns, 2009). According to Martin and Rothery (1993), traditional grammar was applied to vernacular languages including English during the Renaissance period and then began to be introduced to language education at schools. It was in the 18th century that traditional grammar became widespread among schools in England when grammarians made significant efforts to establish “a ‘standard’ written language shared across speakers of different ‘spoken’ dialects” (p. 138) since “dialects were often so different that speakers from different parts of the country, or from different social classes for that matter, could not understand one another” (p. 138). While

Martin and Rothery (1993) state, traditional grammar "continued to be taught until 'progressive' education had a major impact on schools in the 1970" (p. 138), it has not yet been widely taken over by another type of grammar in grammar lessons at schools (Alduais, 2013). For the last two decades, English education in Japan has also been largely shifted from grammar-centered teaching to communication-centered teaching (Yamaoka, 2013). However, traditional grammar is still taught in grammar lessons especially at senior high schools in Japan (Yamaoka, 2013).

Formal grammar was developed to provide descriptions of universal regularities across different languages including English (Knapp & Watkins, 2005; Martin & Rothery, 1993). The most typical example of this type of grammar is Chomsky's (1965) Transformational Generative (TG) grammar. Chomsky believes that all humans are born with a universal grammar from which they spontaneously develop grammatical rules specific to their native languages. He argues that the deep structures of universal grammar enable people to acquire their native languages, so that they become able to deal with sentence structures specific to their native languages. Formal grammar categorizes language into classes – for example, classes of phrases and words – like traditional grammar, and many of the labels assigned to these classes came from traditional grammar: for example, N for noun, V for verb, ADJ for adjective and ADV for adverb. Formal grammar was not recognized by language researchers and educators as being directly applicable to language teaching (Martin & Rothery, 1993). However, Chomsky's theories provided them with a new way of looking at language acquisition and it had a large influence on the area of linguistic research (Burns, 2009).

Functional grammar is a grammar model developed to account for people's daily use of grammar and it covers both spoken and written language. Unlike traditional grammar and formal grammar, which look at language as a set of rules for making appropriate sentences, functional grammar sees language as a source for making and sharing meanings with other people in daily lives (Knapp & Watkins, 2005; Martin & Rothery, 1993). Halliday's (1985) Systemic Functional Grammar (SFG) is well known as the representative of this type of grammar. Functional grammar concerns the way of using language in both cultural and social contexts, presuming that peoples' choice of language (e.g., words, phrases and syntactic structures) largely depends on their present cultural and social contexts (Martin & Rothery, 1993). While traditional grammar and formal grammar treat language in the unit of a

sentence, functional grammar treats language in the unit of a text. Functional grammarians use the term "text" to mean "a stretch of language that hangs together and is appropriate to its context" (Martin & Rothery, 1993, p. 144). A text may be composed of only a single word (e.g., Good!) or may constitute a whole book.

Functional grammar also differs from traditional grammar and formal grammar in that it codifies language with focus on its different types of meanings (not its different types of forms): that is, ideational meaning, interpersonal meaning and textual meaning. According to functional grammar, ideational meaning involves doing with the experiences represented or constructed within language, interpersonal meaning involves doing with the nature of the relationships of persons in the use of language, and textual meaning involves doing with the organization of language as coherent messages (Chirstie, 1999). Since its introduction in the 1960s, functional grammar has increasingly drawn attention from language researchers and it is currently recognized as a major force in the area of linguistic research (Feng, 2013). However, it seems that functional grammar has not widely taken over traditional grammar in grammar lessons at schools. One possible reason is that functional grammar uses more labels than traditional grammar and is more complex than traditional grammar (Martin & Rothery, 1993).

Reviews of previous studies on the investigation of the relationship between L1 or L2/FL readers' syntactic awareness and comprehension bring up a common critical problem. Syntactic elements focused on in syntactic awareness tests do not match the distinct syntactic structures of the texts of given reading comprehension tests or do not play an important role in reading comprehension. In Cain's (2007) study with 196 primary school students in England, for example, the grammar test employed was composed of a grammatical correction task and a word-order correction task. The error types featured in the grammatical correction task included subject-copula verb agreement, subject-verb agreement and tense agreement. However, the students' lack of knowledge of those syntactic elements might not adversely affect their reading comprehension of texts containing such syntactic elements because "the combined words have a meaning relationship between them which makes them more than just a list of words" (Lightbown & Spada, 1999, p. 2). Urquhar and Weir (1998) point out that "there is often little obvious relationship between text and grammar" (p. 257) in terms of textbook passages labeled reading comprehension, accompanied by grammatical exercises. Similar problems have occurred on grammar and reading tests which are used to investigate the relationship between readers' syntactic

awareness and comprehension. In this study, attention was paid to the appropriateness of the relationship between grammar and reading comprehension tests, and the syntactic elements focused on in the syntactic awareness test were confirmed to be actually present in the reading comprehension tests.

In addition, a syntactic awareness test to be used must be one which measures examinees' actual syntactic knowledge (Urquhar & Weir, 1998). However, some syntactic awareness tests used in previous studies seem to have resulted in measurement of readers' comprehension and/or lexical knowledge (Shiotsu & Weir, 2007). Shiotsu and Weir (2007) point out the difficulty of complete separation between a syntactic awareness test and a reading comprehension test, stating "most measures of L2 syntactic knowledge would involve the processing of visually presented text, which may in itself be judged as a kind of reading" (p. 105). They suggest that to minimize the overlap between a syntactic awareness test and a reading comprehension test, a syntactic awareness test "should attempt to reduce the need for semantic processing as far as possible and keep contexualisation to a minimum" (p. 106). For the syntactic awareness test used in this study, the words composing the individual clauses were chosen from those familiar to the participants and clauses having straightforward meanings were adopted, to minimize the necessity of semantic processing.

2.7 Language Learning Strategies

Studies of cognitive and metacognitive reading strategies have been underpinned by studies of language learning strategies, which were "particularly influenced by developments in cognitive psychology" (Zahedi & Dorrimanesh, 2008, p. 161). While the term "language strategy" has been defined by many researchers (e.g., Faerch & Kasper, 1983; O'Malley & Chamot, 1990; Oxford, 1990; Wenden & Rubin, 1987; Zhang, 2001), it seems that most of the presented definitions do not differ fundamentally. It is agreed among most researchers (e.g., Bialystok, 1981; Kouraogo, 1993; Oxford, Cho, Leung, & Kim, 2004; Wenden, 1985; Zare, 2012) that some sort of consciousness and awareness are essential in the use of strategies. Zhang (2001) defined language learning strategies as "learners' conscious, active, and self-directed efforts for learning a language or meaning-making" (p. 271). However, all language learners may use any kinds of language learning strategies not only consciously but also unconsciously when processing new information and performing tasks in language classrooms. Cohen (1998) points out that if a learner keeps using a strategy for a long period, the use of the strategy becomes habitual or automatic, and the

strategy becomes an unconscious process.

However, no matter whether language learning strategies are used consciously or unconsciously, they will give language teachers valuable clues about how their students approach tasks assigned (or problems faced) in the process of language learning. Research on language learning strategies (e.g., Alhaisoni, 2012; Green & Oxford, 1995; Radwan, 2011; Takeuchi, 1993; Wharton, 2000) has revealed a number of effective strategies which language teachers may encourage unsuccessful students to acquire in order to become more successful in language learning. It has been found that, compared with unsuccessful language learners, successful language learners tend to use more variety of learning strategies and use individual strategies with higher frequency and that these two factors (number of strategies used and frequency of use of strategies) correlate with the proficiency levels of language learners (Oxford, et al., 2004). However, when it comes to the performance of a specific language task, these factors are not necessarily indicators of the degree of success on the task: the appropriate choice and effective use of strategies are likely to become more important (Cohen, 1998; Oxford, et al., 2004). Oxford, et al. point out that "more successful L2 learners tend to use strategies that are relevant to specific tasks and to their own learning styles, while less successful (and often anxious) L2 learners tend to use strategies in an impulsive, almost desperate fashion" (p. 5).

Learning strategies can be effective only when they are used appropriately. According to Oxford (1990), a learning strategy is useful if the strategy relates to the present task well, if the strategy fits the language learner's preference of learning style and if the language learner employs the strategy effectively and links it with other relevant strategies properly. A strategy which satisfies these conditions makes learning "easier, faster, more enjoyable, more self-directed, more effective, and more transferable to new situations" (Oxford, 1990, p. 8).

The language teacher who intends to train his/her students in acquisition of language learning strategies should first learn about the students: for example, strategies currently being used, preferences of learning styles, interests and motivation (Hismanoglu, 2000). For this purpose, besides observing his/her students' behaviors in class, the teacher may interview them and/or administer a questionnaire to them (Hismanoglu, 2000). Considering that students in the same class differ in the aspects aforementioned, the teacher should carefully choose the purpose of the lesson, how and which learning strategies to instruct and which teaching materials to use, taking

the differences into account.

A questionnaire is one typical method for assessing strategies used by language learners (Gu, Hu, & Zhang, 2005). For the assessment, Oxford's (1990) Strategy Inventory for Language Learning (SILL) is widely used in survey studies (e.g., Al-Jabali, 2012; Kavaliauskienė, Anusienė, & Kaunienė, 2011; Marefat, 2003; Tsan, 2008; Zahedi & Dorrimanesh, 2008). This inventory uses a 5 point Likert-scale for which students are asked to indicate their response (1, 2, 3, 4 or 5) to each of the strategy descriptions. Like other similar types of questionnaires, the SILL attempts to measure "how often students report using certain learning strategies in general L2 learning situations" (Oxford, et al., 2004, p. 2).

Language learning strategies have been classified by many researchers (e.g., Bialystok, 1981; Ellis, 1994; O'Malley, Chamot, Stewner-Manzanares, Küpper, & Russo, 1985; Rubin, 1987; Stern, 1992). Among them, the classification by Oxford (1990) is one which is most cited in the literature (e.g., Alhaisoni, 2012; Al-Jabali, 2012; Deneme, 2008; Hismanoglu, 2000; Razi, 2008). She broadly classified language learning strategies into direct strategies (strategies for working with the language itself) and indirect strategies (strategies for managing a learning process). She then classified direct strategies into cognitive strategies (strategies for understanding how the language works and manipulating its materials), memory strategies (strategies for storing new information in memory and retrieving it later) and compensation strategies (strategies for using the language despite missing knowledge). Furthermore, Oxford classified indirect strategies into metacognitive strategies (strategies for planning, organizing and evaluating learning), affective strategies (strategies for approaching the task positively) and social strategies (strategies for working with other people to input and practice). Oxford (1990) suggests that cognitive strategies enable a language learner to manipulate language materials in direct ways by analyzing, reorganizing or summarizing information while metacognitive strategies enable a language learner to manipulate it in indirect ways by identifying his/her own learning strategy preferences (e.g., preference of cognitive strategies) and monitoring and evaluating the success of chosen learning strategies. Cognitive strategies and metacognitive strategies as defined by Oxford (1990) uphold cognitive reading strategies and metacognitive reading strategies, respectively, which will be detailed in Section 2.8.3.

2.8 Reading Strategies

To comprehend texts properly and efficiently, readers may need to use both skills and strategies. According to Carrell, Gajdusek and Wise (1998), the term "strategies" is used rather than the more traditional term "skills", to refer to actions that persons "select and control to achieve desired goals or objectives" (p. 97). They point out that it emphasizes persons' active participation and actual way of doing something (or persons' performance) while the term skills may represent persons' "competence or only passive abilities which are not necessarily activated" (p. 97). Having a clear idea of the difference between strategies and skills is essential to properly explore the nature of reading strategies.

2.8.1 Identification of effective reading strategies

The relationship between readers' awareness of effective reading strategies and their comprehension has drawn much attention from researchers (e.g., Anderson, 1991; Carrell, 1989; Mokhtari & Reichard, 2002; Padrón, 1992; Zhang & Wu, 2009). Many empirical studies (e.g., Hardin, 2001; Kong, 2006; Pearson & Gallagher, 1983; Sheorey & Mokhtari, 2001; Zhang, Gu, & Hu, 2008) have been conducted to identify effective reading strategies by studying successful readers' performance and awareness. Pearson and Gallagher (1983), for example, described successful readers as those who:

1. Use background knowledge more effectively during reading.
2. Have larger and more precise vocabulary.
3. Draw inferences more frequently and appropriately.
4. Perceive and use text structure more effectively to enhance memory.
5. Are better at monitoring and adjusting their reading strategies.
6. Have better summarization skills. (p. 33)

The relationship between readers' awareness of reading strategies and their comprehension also has been steadily clarified. Successful readers know a variety of strategies, which strategies to use in given contexts and how to properly use more than one strategy together (Anderson, 1991). Since the relationship between the efficacy of reading strategies and reading comprehension is not simple and straightforward, and the use of specific strategies does not always lead to successful

reading comprehension (Carrell, et al., 1998), readers' awareness of reading strategies is significant to successful reading. Successful readers also know how to monitor the efficiency of chosen strategies and how to regulate the use of different strategies (Anderson, 1991). Anderson (1991) points out that merely knowing which strategies to use does not differentiate between successful and unsuccessful readers – what differentiates them is competence in implementing strategies and monitoring their applications – and the reader must be able to apply strategies strategically.

It appears that much of the relationship between readers' awareness of reading strategies and their comprehension has already been explored. Nevertheless, the typical aims of previous studies were merely to find out the types of effective reading strategies commonly used among successful readers, in which way those effective strategies are used by them and to what extent reading strategy training affects readers' comprehension. However, one of the main aims of this study is to identify the types of basic syntactic knowledge which are needed for Japanese university students to become able to use reading strategies.

2.8.2 Local and global reading strategies

Reading strategies have been classified in various ways as results of researchers' different views of reading processes and strategies (Koda, 2004). Among those classifications, two broad distinctions are typically used: distinction between local and global strategies; and distinction between cognitive and metacognitive strategies (Koda, 2004). Local and global strategies are clearly distinguishable from each other while cognitive and metacognitive strategies cannot be distinctly distinguished and some overlap exists (Cohen, 1998).

Local and global strategies respectively represent bottom-up processing and top-down processing elaborated in Section 2.3. When using local strategies, readers start by processing information at the word level and then move to a phrase and a sentence. As they process information that each sentence conveys, they may check to see how the information fits, using global strategies such as background knowledge, prediction, getting the gist of the text and skimming (Barnett, 1988; Carrell, 1989). It has been reported by many studies (e.g., Anderson, 1991; Block, 1986; Carrell, 1989;

Hardin, 2001; Zhang, et al., 2008) that successful readers generally use both local and global strategies and properly choose which strategies to use while poor readers tend to rely significantly on local strategies.

2.8.3 Cognitive and metacognitive reading strategies

The distinction between cognitive and metacognitive strategies is a typical way of classifying reading strategies found to be effective to reading comprehension. This distinction is meaningful to clarify the types of reading strategies which are important for successful comprehension (Koda, 2004). However, cognitive reading strategies and metacognitive reading strategies are occasionally treated together as effective reading strategies in the literature for two possible reasons: (1) clear distinction between the two kinds of strategies is difficult and some overlap exists (Cohen, 1998), and (2) the two kinds of strategies are found to be used together by successful readers (Carrel, Gajdusek, & Wise, 1998).

The notion of cognitive reading strategies seems to be straightforward compared with metacognitive reading strategies. The notion concerns cognition, which is often defined as the act or process of knowing, or which may be defined as "acquisition and processing of information" (Gourgey, 1998, p. 83). The types of cognitive reading strategies typically listed in the literature include activating background knowledge, predicting what will come next, guessing meaning from context, and skipping unknown words and incomprehensible sentences besides scanning and skimming. However, there is little consensus as to what is included in cognitive reading strategies. According to Oxford (1990), the types of cognitive reading strategies include using prior knowledge, predicting, analyzing, summarizing, inferencing, using context cues and taking notes on main points. It has been reported by a number of studies (e.g., Anderson, 1991; Hardin, 2001; Moore, 1983; Singhal, 2001; Zhang, 2001) that successful readers use a variety of cognitive strategies and use different cognitive strategies more effectively.

Using merely cognitive reading strategies does not necessarily bring out successful reading. In many cases, success of reading depends on how well appropriate cognitive reading strategies are used metacognitively – that is, through conscious monitoring and control of these strategies – (Carrel, Gajdusek, & Wise, 1998). Compared with cognitive reading strategies, the notion of metacognitive reading strategies, which concerns metacognition, is less straightforward and thus needs more detailed descriptions. Metacognition is typically referred to as a person's

cognition about cognition or thinking about thinking – that is, "learners' understanding and control of their own thinking and learning" (Koda, 2004, p. 211). Applied to reading, metacognition may refer to "thinking about what one is doing while reading" (Block, 1992, p. 320).

The term "metacognition" was coined by Flavell (1976) who defined it as "one's knowledge concerning one's own cognitive processes and products or anything related to them" (p. 232). In short, he suggests that metacognition is what organizes the learning process. Since his presentation of its concept, metacognition has become one of the prominent constructs in cognitive and educational psychology (Hartman, 1998), and its concept has offered great insights to reading research as to how readers manage their cognitive activities to comprehend text before, during and after reading (Wenden, 1998). Carrell, et al., (1998) point out that metacognition is significant because "if learners are not aware of when comprehension is breaking down and what they can do about it, strategies introduced by the teacher will fail" (p. 100). Hamdan, et al. (2010) state that "metacognition is probably the most actively invested cognitive process in contemporary research in a developmental psychology" (p. 135). According to Mokhtari and Reichard (2002), the increased recognition of the significant role of metacognition in reading comprehension by researchers and educators coincides with the steady growth of interest in metacognition and academic learning. The role of metacognition in academic learning is significant because "students can enhance their learning by becoming aware of their own thinking as they read, write, and solve problems at school" (Mokhtari & Reichard, 2002, p. 250).

Metacognition has been recognized as being composed of two main components: knowledge about cognition and regulation of cognition (Baker, 1991; Brown, 1987; Flavell, 1976; Kuhn & Dean, 2004; Schraw, 1998). Knowledge about cognition refers to "what individuals know about their own cognition or about cognition in general" (Schraw, 1998, p. 114), and regulation of cognition refers to "a set of activities that help students control their learning" (Schraw, 1998, p. 114). Knowledge about cognition includes three different kinds of metacognitive awareness: declarative knowledge, procedural knowledge and conditional knowledge which respectively refer to knowing about things, knowing how to do things and knowing why and when things are to be done (Schraw, 1998).

As well as knowledge about cognition, regulation of cognition is significant to reading comprehension. For successful comprehension, readers' ways of using

cognitive reading strategies have to be regulated by the use of metacognitive reading strategies (Carrel, 1998; Carrel, Gajdusek, & Wise, 1998). This implies that unsuccessful readers may not lack awareness of cognitive strategies but may fail to access them metacognitively (Dhieb-Henia, 2003). Zhang and Wu (2009) point out that cognitive strategies themselves "are not inherently good or bad, but they have the potential to be used effectively or ineffectively in different contexts" (p. 39). Metacognitive strategies include "knowledge of different types of cognitive strategies that could be used for specific problems and knowing which ones are the most appropriate in a given situation" (Muñiz-Swicegood, 1994). Sheorey and Mokhtari (2001) describe metacognitive reading strategies as the combination of the conscious awareness of strategic reading processes and the actual use of reading strategies which distinguish successful readers from unsuccessful readers. Karbalaei (2011) provided clear descriptions about metacognitive reading strategies, through comparison with cognitive reading strategies. He states "if cognitive reading strategies are about knowing what strategy to use and how to apply it" (p. 7), metacognitive reading strategies involve "understanding the rationale for applying a particular strategy in a particular context, and evaluating its usefulness in terms of appropriacy and effectiveness for that context" (p. 8).

Regulation of cognition can be further broadly categorized into planning, monitoring and evaluation (Schraw, 1998). Schraw (1998) describes planning as a process which "involves the selection of appropriate strategies and the allocation of resources that affect performance" (p. 115), monitoring as "one's on-line awareness of comprehension and task performance" (p. 115), and evaluation as "appraising the products and efficiency of one's learning" (p. 115). According to Urquhar and Weir (1998), planning, monitoring and evaluation in terms of reading represent pre-reading, while-reading and post-reading respectively. The typical pre-reading strategies which Urquhar and Weir (1998) suggest are previewing and prediction. Previewing is used to make a decision about whether to read a book, an article or a text by thinking about titles, checking the edition and date of publication and checking the tables of contents quickly. After a decision to read the text is made, prediction is used to anticipate the content of the text by activating schemata relevant to the text with several stimuli in the text such as the title, subtitles, photographs, illustrations and topic sentences. Self-questioning and self-monitoring are typical while-reading strategies (Urquhar & Weir, 1998). Self-questioning is used to draw on existing knowledge, to investigate a text as it is read and to analyze the beliefs and motives behind the author's surface meaning (Bindon & Santeusanio, 2006).

Generated questions "may relate to the content, style, structure, important messages, events, actions, inferences, predictions, author's purpose, or may be an attempt to clarify meaning" (Bindon & Santeusanio, 2006, p. 19). Self-monitoring is used to check whether comprehension is taking place (i.e., whether read content is fitting in with what already known) and, if it is not taking place, which strategy is to be used instead of the current one (Urquhar & Weir, 1998).

The studies of cognitive and metacognitive reading strategies concern the fundamental question about reading: How do people read? While this question is frequently approached from cognitive perspectives, it can be a sociological question as well: "Under what circumstances and on what occasions do people who can read actually do so?" (Griswold, McDonnell, & Wright, 2005, p. 132). According to Griswold, et al. (2005), previous societal literacy research suggested answers to "How do people read" from two dimensions: practice and collective nature. Reading can be regarded as a social practice, considering that "people read all the time as an unnoticed part of their everyday pursuits, in addition to their more formal occasions of sitting down and reading" (Griswold, et al., 2005, p. 132). Reading can also be regarded as a collective activity in the sense that people occasionally read in groups, and "even individual reading is the result of collective memberships" (Griswold, et al., 2005, p. 132). While reading research from sociological perspectives is also significant, it is not the focus of this study because it is not directly concerned with the relationship between readers' syntactic awareness, their reading comprehension and use of cognitive and metacognitive reading strategies.

2.8.4 Cognitive and metacognitive reading strategy training

Positive effects of cognitive and metacognitive reading strategy training on reading comprehension have been reported by many empirical studies in terms of both L1 readers (e.g., Cummins, Streiff, & Ceprano, 2012; Salataci & Akyel, 2002; Sari & Sibarani, 2013) and L2/FL readers (e.g., Auerbach & Paxton, 1997; Dhieb-Henia, 2003; Gurses & Adiguzel, 2013). Such training gives L1 and L2/FL readers a chance to plan before reading, control their own reading process, organize their own rules and evaluate their reading performance. It also helps them become independent readers.

Reading strategy training can be helpful when appropriate reading strategies are modeled for students and students are given opportunities to practice them (Wittrock, 1991) and when reading strategy training matches students' ability levels and leads

them to understand when and how to use the strategies (Padrón, 1992). Extensive studies (e.g., Auerbach & Paxton, 1997; Carrell, 1998; Salataci & Akyel, 2002; Shang, 2011; Song, 1998) have been conducted to identify the kinds of reading strategy training which improve readers' comprehension.

It has been recognized that two main components are necessary to make reading strategy training successful: knowledge about cognition, which concerns what strategies to use and when and how to use them; and regulation of cognition, which covers monitoring, planning and transferring processes (Carrell, 1998). As mentioned in Section 2.8.3, these two components compose metacognition. Paris and Winograd (1990) point out that metacognition-focused (consciousness-raising) training has two main advantages: "(a) it transfers responsibility for monitoring learning from teachers to students themselves, and (b) it promotes positive, self-perceptions, affect, and motivation among students" (p. 15). Based on their empirical study, Bereiter and Bird (1985) assert that students do not readily acquire effective reading strategies simply by imitating their teacher's modeling, and they also need to engage in comprehension-monitoring activities which include recognizing comprehension problems and selecting problem-solving strategies.

Following the increased recognition of the significant role of metacognition in reading comprehension, the majority of previous studies relating to reading strategy training have focused on cognitive and metacognitive reading strategy training. The five representative approaches suggested for cognitive and metacognitive reading strategy training in the past are: (1) Question-Answer Relationships (QAR); (2) Reciprocal Teaching Approach (RTA); (3) Experience-Text Relationship (ETR); (4) Cognitive Academic Language Learning Approach (CALLA); and (5) Transactional Strategy Instruction (TSI). These approaches have much in common because all of them originated mostly from studies of cognition and metacognition.

The approach called Question-Answer Relationships (QAR) suggests training in which students are instructed to locate specific information in a text using effective reading strategies. According to Guthrie and Mosenthal (1987), locating information in text "refers to the performance of learners who have the goal of detecting specific subset of information within a relatively wide array of information that is displayed for visual inspection" (p. 283). Locating information in written documents is frequently required in academic settings (Guthrie & Mosenthal, 1987). Moreover, as Guthrie and Mosenthal (1987) point out, adults across a range of occupations may

spend more time in locating information "than reading for other purposes such as gaining knowledge, relaxing, or constructing something manually" (p. 283).

In reading strategy training with QAR, students are taught in which cases and in which ways they should combine what they know from the text with their background knowledge to locate information (in the text) needed to answer given questions (Biggs, 2004-2005). Without such instructions, students may excessively rely on either information in the text or their background knowledge. QAR helps students recognize the significance of relying on both information in the text and information which comes from their background knowledge and allows them to learn how to answer questions based on both what is actually found in the text and their background knowledge.

QAR was first suggested by Raphael (1982) who found that some of his students assumed that every question's answer was explicitly stated somewhere in the text while others assumed that the answers were only in their heads. He classified question/answer relationships into four categories – "Right There", "Think and Search", "Author and Me" and "On My Own" (p. 188) – and instructed his students to identify which of these categories applies to the current question and to use the strategy which meets the identified category. The four different question/answer relationships classified by Raphael (1982) designate the following cases: Right There indicates a case where the answer is stated explicitly in the text (usually within a single sentence), and words used to form the question and words which answer the question are typically the same; Think and Search indicates a case where the answer is in the text but some searching and inferential text connections are required to find the answer within a paragraph or across paragraphs; Author and Me indicates a case where the answer is not in the text, so the answer needs to be figured out using information in the text as clues; and On My Own indicates a case where the answer relates to the text, but students can probably answer the question using their background knowledge even if they do not read the text.

In reading classes, QAR is typically used with self-questioning (Cummins, Streiff, & Ceprano, 2012). That is, students are instructed to generate questions concerning the text on their own, following their teacher's modeling. Questions created by students themselves promote active thinking and learning more than questions generated by teachers (Aldridge, 1989; Wagner & Sternberg, 1984). QAR combined with self-questioning has been focused on in many studies (e.g., Cummins, Streiff, &

Ceprano, 2012; Davey & McBride, 1986; Gourgey, 1998; Muñiz-Swicegood, 1994; Padrón, 1992) and has been found to be effective to improve reading comprehension. Also in this study, QAR combined with self-questioning was used for the cognitive and metacognitive reading strategy training.

Reciprocal Teaching Approach (RTA) was developed by Palincsar and Brown (1984) to help students extract meaning from text with and without their teacher's assistance. RTA is based on the notion of the cognitive-constructivist theory applied to reading – that is, reading is a process in which a reader actively attempts to get meaning from text (Allen, 2003; Lawrence, 2007). The cognitive-constructivist theory suggests that comprehending text is an active, constructive process and the reader is constructing meaning through a combination of text and his/her background knowledge retrieved from a store of knowledge in his/her brain. That is, in the process of reading, the reader needs to actively consider how the text he/she is currently reading links with what he/she has already interpreted and also with ideas, topics and events which come from his/her store of background knowledge (Allen, 2003). Moreover, assuming that people's background knowledge is greatly influenced by their interactions in social contexts, the theory strongly recommends discussions and group work to elicit all possible meanings out of the text (Allen, 2003).

In reading strategy training with RTA, scaffolding plays an important role (Allen, 2003; Lawrence, 2007). Gourgey (1998) describes scaffolding as an approach in which "the teacher initially offers much support but gradually reduces it as students become more proficient" (p. 85). Scaffolding allows students to do something meaningful that they might not have been able to do without their teacher's support. The most important aspect of scaffolding is the teacher's cognitive and metacognitive modeling in which he/she actually demonstrates the way of doing rather than merely telling his/her students the way of doing. As the teacher proceeds with the task that his/her students will be asked to do, he/she may speak out his/her thought processes (Allen, 2003). The notion of scaffolding is upheld by Vygotsky's (1978) idea of "zone of proximal development" (p. 37). Vygotsky (1978) refers to the zone as the difference between what a student can do with the teacher's help and what he/she can do without such help and suggests that this difference be considered by the teacher so that what and how the teacher instructs will match the students' current abilities.

RTA covers both cognitive and metacognitive reading strategies and helps students

improve their reading comprehension and become independent readers (Lawrence, 2007). When using this approach, the teacher in a reading class explains to his/her students what are appropriate strategies for successful reading and instructs them about when and how to use these strategies. At the initial stage, the teacher provides many prompts about what to do and when to do it and also feedback and re-explanations of the strategies as needed. Whereas the teacher initially provides scaffolding like this, the responsibility is gradually transferred to his/her students, with the teacher ready to intervene with additional instructions if any students face difficulties. In the end, students are expected to be able to use appropriate strategies as needed and perform reading tasks without any help from their teacher.

In practice, in a reading class, while interacting with his/her students divided into small groups, the teacher may lead them to generate questions through group discussions before asking them to read the text, to monitor their comprehension, to find ways to clarify misunderstanding and to answer their own questions through group discussions. After reading the text, students are encouraged to discuss and clarify any confusion in the text in their groups. In this way, RTA can enable students to "generate and answer their own questions, to differentiate important content from trivial details, to monitor comprehension and find ways to clarify misunderstanding, and to activate their prior knowledge and create expectations about future content" (Gourgey, 1998, p. 85). Palincsar and Brown (1984) originally used RTA to provide lessons for using reading strategies for children who had adequate decoding skills but weak comprehension skills. The reading strategies instructed to the children are "summarizing, questioning, clarifying and predicting" (p. 1). After the teacher modeled the way of using the reading strategies, he/she divided the children into small groups, nominated one leader for each group and instructed the children to have a group discussion (on the use of the strategies) led by the designated leaders.

Experience-Text Relationship (ETR) first suggested by Au (1979) has been found to be effective through a number of empirical studies (e.g., Carrell, Pharis, & Liberto, 1989; Medina, 2012; Sari & Sibarani, 2013; Saunders, 1999; White, 2005). According to Au (1979), ETR is based on the notion that Betts (1950, as cited in Au, 1979) presented as Directed Reading Activity (DRA) in which the teacher in a reading class is encouraged to conduct preliminary assessment of his/her students' existing background knowledge. As well as QAR, ETR is intended to help students effectively use their background knowledge when reading texts. Moreover, it enables students to learn a way of monitoring their reading comprehension and to become

aware of reading strategies which they use in reading strategy training being administered by their teacher.

A typical procedure of ETR is composed of the following three phases (Walker, 2003). In the first phase, the teacher starts discussion to activate his/her students' background knowledge about the topic of the text to be read. In the discussion, the teacher asks his/her students a broad range of questions about the topic to activate their relevant background knowledge to the utmost extent. At the end of the discussion, the teacher leads his/her students to make predictions about the content of the text to be read, based on the information on their previous experiences which they told the teacher. In the second phase, the teacher instructs the students to read a small part of the text and asks questions on the part of the text to check whether the students understood what they read and also to let them consider whether what they read matches their predictions. In the third phase, the teacher leads a discussion which focuses on the students' overall understanding of the text. He/she then directs the discussion to key aspects of the text which relate to the students' personal experiences and knowledge, helping them express their understanding of those relationships.

ETR provides students with an opportunity "to make comparisons and contrasts with what they already know and to accommodate the new information into their preexisting schemata" (Ajideh, 2003, p. 7), so that student's schemata become redefined and extended through the process. Ajideh (2003) states that "the teacher has the responsibility of leading the students to the appropriate answers without giving them too much information, so the task becomes one of self-discovery and integration" (p. 7). As he suggests, teachers' roles are important in this approach, and training with the approach will be helpful to students only when they are instructed and led by teachers carefully and properly.

Cognitive Academic Language Learning Approach (CALLA) was first suggested by Chamot and O'Malley (1986) as an approach to L2 learning strategy training. However, it has been found to be effective also when applied to reading strategy training (Allen, 2003; Gurses & Adiguzel, 2013; Lawrence, 2007). CALLA aims to integrate instructions for teaching academic language and instructions for teaching academic content into the same bundle of training lessons so that students' development of language and acquisition of academic content occur at the same time.

CALLA was originally intended for L2-learning school children. Empirical studies (e.g., Cubukcu, 2008; Gurses & Adiguzel, 2013; Marimuthu, Muthusamy, & Veeravagu, 2011; Nosratinia & Mardi, 2013; Tsai, 2012), however, have shown that reading strategy training with CALLA can produce a positive effect also when administered to students who learn at higher education. For example, Marimuthu, et al. (2011) studied 65 Malaysian university students to investigate whether training with CALLA will improve the students' English reading comprehension. They reported that the students (n = 33) who received reading strategy training with CALLA significantly improved their reading comprehension compared with the students (n = 32) who took reading lessons taught with the university's conventional method.

According to Allen (2003), CALLA is based on four areas of theories: constructivism, which emphasizes the fact that comprehending text is an active, constructive process; cognitive information processing, which focuses on the student's mental process and two different types of knowledge (declarative knowledge and procedural knowledge); schema theory, which describes how a person's mind organizes information into schemata or mental structures; and social-cognitive theory, which explains how a person interacts with other persons to facilitate learning. The cognitive information processing model describes how people learn and remember and how this immediate information is stored in long-term memory, and suggests that learning new information requires mental processing – that is, organizing the information, elaborating it and linking it with existing knowledge (Allen, 2003). Accordingly, CALLA puts emphasis on cognitive strategies such as summarizing, making inferences and predicting what will come next in the text (Allen, 2003; Mansoor & Ebrahim, 2014). Declarative knowledge focused on by the cognition information processing model represents knowing about something such as facts, beliefs and events, and procedural knowledge, which represents knowing how to do something, is learned through practice and becomes automatized (Allen, 2003).

When a CALLA-use program was designed by Chamot and O'Malley (1996), the following three points were given special consideration. First, the content in the L2/FL classroom is aligned with the content of an academic subject: in the beginning, an academic subject (e.g., science) which most students may find interesting and motivating should be chosen. Second, the chosen academic subject is taught in L2/FL in such a way that all four language skills (speaking, listening, reading and writing) will be improved. Through lessons, students are expected to learn concepts of

academic content and skills such as analyzing, evaluating, justifying and persuading, which are needed in the academic contexts of school. Third, strategies are taught explicitly by naming the strategies, telling students what these strategies do to assist learning, providing them with sufficient amount of instructional supports and providing them with opportunities for practicing use of the strategies.

To apply CALLA to practical lessons, Chamot and O'Malley (1996) reflected the three important points to a five-stage instructional sequence: preparation (phase 1), presentation (phase 2), practice (phase 3), evaluation (phase 4) and expansion (phase 5). In phase 1, the teacher identifies his/her students' strategies through a general class discussion. In phase 2, the teacher explains and demonstrates the use of effective reading strategies. In phase 3, the students are given opportunities to practice the new strategies. In phase 4, the students are instructed to evaluate their own use of strategies through discussions in small groups and with the instructor. In phase 5, the students are led to transfer acquired strategies to new tasks, combine strategies into clusters and develop a repertoire of preferred strategies. Chamot and O'Malley (1996) suggest that the five-stage sequence be repeated each time "new content, language, and strategies are introduced" (p. 267).

Transactional Strategy Instruction (TSI) developed by Pressley and his colleagues (Pressley, et al., 1992) emphasizes the importance of transactions between the teacher and his/her students and transactions between the students and the text. It places importance on the teacher's ability to facilitate discussions in which the students collaborate to make joint interpretations of the text and gain deeper understanding of the mental process and cognitive strategies involved in comprehension. The approach considers it also important for the teacher to provide his/her students with explicit explanations about thinking process used in reading. Meanwhile, it places more emphasis on the interactive exchanges among students in the classroom, so the term "transactional" was included in the name of the approach.

The most representative feature of TSI is its emphasis on collaborative discussions between the teacher and his/her students and among the students themselves. Topics to be discussed include interpretation of the meaning of a text and application of reading strategies. The strategies frequently instructed in strategy training with TSI are "prediction based on prior-knowledge activation", "question-generation", "seeking clarification when confused", "mental imagery", "relating prior knowledge to text content" and "summarization" (Pressley, 2002, p. 119).

In a reading class using TSI, the teacher is expected to value his/her students' thoughts, needs and preferences (Pressley, et al., 1992; Pressley & Wharton-McDonald, 1997). For example, the teacher and his/her students may jointly determine strategies that will be used to comprehend the text. Even when the teacher has particular ideas about what is to be discussed in groups and how the discussion should proceed, he/she may not intervene as long as some improvement is likely to be seen on the way of using strategies. The teacher may change tactics only when his/her students have trouble to comprehend or the discussion goes in a wrong direction, which will not result in acquisition of strategies.

Whereas TSI was originally designed for a strategy instruction program offered to non-reading disabled students, research by Anderson (1992) revealed that the approach is also effective to severely reading-delayed students. In his study, a total of 84 students aged 12 to 16 were instructed in small groups over a three-month period (twice a week, 40 minutes per lesson). Nine groups received reading strategy training with TSI, and seven groups were used as the control and were instructed with the conventional method. The analysis of both of the expository pre-test/post-test and standardized comprehension pre-test/post-test (from subtests of the Stanford Diagnostic Reading Test) showed that the students in the nine experimental groups made greater progress than the students in the seven control groups.

Like RTA and CALLA, constructivism underlies TSI as one of its supporting theories (Allen, 2003). According to Allen (2003), researchers and educators who support TSI believe that a student who constructs his/her own knowledge of a subject area has a greater ownership of the material rather than being taught such knowledge. They also believe that the student should be instructed by his/her teacher in such a way that he/she becomes able to not only understand how to use the constructed knowledge but also transfer acquired learning strategies from one subject area to another. Considering that the use of strategies gives students "an opportunity to acquire a deep, personal understanding of the intellectual processes being acquired" (Pressley & Wharton-McDonald, 1997, p. 12), it is understandable that supporters of TSI strongly insist on the importance of enabling students to transfer learning strategies from one subject area to another.

The five approaches elaborated above have much in common. For example, all of these approaches value teachers' scaffolding (and/or modeling) and students'

initiatives on group discussions about the way of using reading strategies and/or on self-generation of questions to be explored when a text is read. These approaches are also common in that the effectiveness of the approach has been reported by many empirical studies. Future research on reading strategy training is expected to move further than verifying the effectiveness of any reading strategy training. In an L2/FL reading class, not all students may improve their reading comprehension through reading strategy training. If research can successfully identify problems shared by many students who do not gain benefits from reading strategy training, L2/FL reading teachers may improve the effectiveness of reading strategy training by executing the following two steps before administering reading strategy training: (1) checking whether any of the students have the identified problems; and (2) giving the relevant students lessons which help them overcome the problems.

Problems which prevent acquisition of reading strategies may differ among students and seem to be diverse: for example, weakness of syntactic knowledge, semantic knowledge or background knowledge (about the subject matter); the student's negative feelings towards reading itself or chosen reading materials; and the student's negative attitude towards group discussions on what is written about or on the way of using reading strategies. This study was designed to check whether the failure of some participants' reading comprehension improvement through reading strategy training was attributed to their unawareness of specific types of syntactic knowledge.

2.9 Assessing Reading Comprehension

Assessment plays an important role in teaching and evaluating and impacts overall progression in reading classes in various ways. Since there are multifarious definitions about what is reading (or what constitutes reading comprehension) and reading is a complex activity which involves a range of different skills, processes and types of knowledge, a variety of approaches and designs have been suggested for reading comprehension assessment (Koda, 2004).

As described in Section 2.2, the nature of reading is typically approached from two perspectives: the process of reading, which refers to various strategies that the reader uses and the result of that process, the product, which refers to the level of understanding (Yamashita, 2004). Accordingly, assessing reading comprehension is typically approached by researchers from these two different views of what is reading (Koda, 2004; Oakley, 2011).

The product-based approach presumes that comprehension occurs only when information in the text is stored in memory and that comprehension and memory cannot be separated distinctly (Koda, 2004). Therefore, the product-based approach expects the reader to demonstrate part of text representation stored in memory (Koda, 2004). This approach is represented by assessment techniques such as multiple-choice questions, summary and free recall (Alderson, 2000; Khan, 2011; Koda, 2004).

The process-based approach emphasizes the importance of clear distinction between the ability to comprehend and the ability to remember, based on the assumption that a delay in comprehension measurement makes it difficult to assess what is being actually comprehended (Koda, 2004). Therefore, assessment based on this approach is designed to capture "ongoing behaviors as they occur during reading" (Koda, 2004, p. 228). The process-based approach is represented by assessment techniques such as think-aloud verbal reports, observation and interviewing (Alderson, 2000; Koda, 2004).

Unlike product-based assessment, it may be difficult to design process-based assessment which can be easily conducted for all students in the class, because of time constraint. In addition, asking the reader to perform an additional task such as think-aloud may change his/her way of decoding and comprehending texts, preventing his/her reading comprehension from being assessed properly (Alderson, 2000; Godfroid, Housen, & Boers, 2010; Koda, 2004). This problem can be further worsened when such an additional task is imposed to L2/FL readers: reading in L2/FL is also an unusual activity for L2/FL readers.

In many cases, purposes of assessment of reading comprehension fall in one of the following three categories: classification, diagnosis and administration (Alderson, 2000; Koda, 2004). Assessment for classification is performed to screen examinees, and outcomes of the test are used to make decisions about issues such as "college/university admissions, employment/promotion qualifications, appropriate academic-program placement, and course grades" (Koda, 2004, p. 232). Typical goals of diagnostic assessment are to identify causes of reading difficulties frequently experienced by unsuccessful readers (Koda, 2004) and to identify effective reading strategies commonly used by successful readers (Saricoban, 2002). Outcomes of diagnostic tests may be used to make decisions about design of programs which aim to overcome specific reading problems (Koda, 2004). Administrative assessment is

performed to evaluate outcomes of specific programs, compare outcomes among different programs or compare achievements among different subgroups (Koda, 2004). Outcomes of administrative tests may be used to make administrative decisions about issues such as fund allocation and policymaking (Koda, 2004).

While there are diverse ways of accessing reading comprehension because of the complexity of its construct, assessment techniques used in classrooms can be broadly categorized into formal techniques and informal techniques (Alderson, 2000; Bell & McCallum, 2008; Koda, 2004). According to Alderson (2000), formal techniques are "pencil-and-paper-based" (p. 257) and are used for assessment of reading whereas informal techniques are "instruction-based" (p. 257) and are used for ongoing assessment of readers. Navarette, Wilde, Nelson, Martinez and Hargett (1990) point out that, unlike formal techniques, informal techniques "can easily be incorporated into classroom routines and learning activities" (p. 2) and "can be used at anytime without interfering with instructional time" (p. 2). Some examples of formal assessment techniques are multiple-choice questions, cloze tests, summary and free recall. These techniques typically represent the product-based approach. The assessment technique used for the reading comprehension tests in this study is categorized as a formal one.

Multiple-choice is probably the most widely used assessment format in standardized reading comprehension tests mainly because of the simplicity of its scoring procedure (Alderson, 2000; Koda, 2004; McNamara, 2007). Koda (2004) points out that "its mechanical nature not only ensures objectivity but also permits machine-mediated mass scoring" (p. 238). However, the validity of multiple-choice questions as a method of assessing comprehension has been concerned in the literature (e.g., Alderson, 2000; Katz, Lautenschlager, Blackburn, & Harris, 1990; Kobayashi, 2002; Koda, 2004; Nevo, 1989). For example, plausible distracters can alter information extracted from the text and stored in memory, adversely affecting examinees' answers (Koda, 2004). In addition, answering questions may resort to task-specific skills which can be improved through training, and thus improvement of test scores may be attributed to the progress of such skills, not the progress of reading comprehension (Alderson, 2000; Kobayashi, 2002; Koda, 2004; Nevo, 1989).

Cloze procedure, which asks students to fill in blanks, is widely used like multiple choice because of its relative ease in preparation, administration and scoring (Ajideh

& Mozaffarzadeh, 2012; Alderson, 2000; Koda, 2004; Sadeghi, 2008). Since students cannot fill in blanks without comprehending the relevant text segments, test outcomes may be regarded as reliable indicators of reading comprehension (Koda, 2004). However, when designing tests, teachers need to keep in mind that, even when their students comprehend the relevant text segments, they may not fill in blanks if the deleted words are not present in their vocabulary (Koda, 2004). It is also important to note that cloze tests may assess students' comprehension of a single sentence (Alderson, 2000; Koda, 2004; Sadeghi, 2008). Deleted words are typically constrained within a single sentence both syntactically and semantically, and analysis of only segments immediately before and/or after the blank may allow students to identify the deleted word (Alderson, 2000; Koda, 2004; Sadeghi, 2008).

Summary tasks ask students to read a text and summarize its main ideas, regarding the whole text or part of the text. Considering that, in real life, people have opportunities to communicate the gist of what they read, summarizing may be close approximation of real-life activities unlike multiple-choice and cloze tests whose tasks are not conducted in real-life reading (Koda, 2004). While preparation and administration of summary tests are relatively easy, scoring is largely time consuming. Furthermore, scoring subjectivity needs to be paid considerable attention (Alderson, 2000; Heinz, 2004; Koda, 2004), and ensuring subjectivity is not easy especially when the quality of summary is rated on some scale (Alderson, 2000). Moreover, what should constitute an ideal summary "remains open to question" (Koda, 2004, p. 242) and may not always be the same. When asked to write a summary in the target language (L2/FL), students' writing skills in L2/FL also greatly affect test outcomes, making it difficult to judge whether poor summaries are attributed to their reading comprehension, writing skills or both of them (Koda, 2004).

Free recall is probably the most straightforward technique for assessing reading comprehension (Alderson, 2000; Brisbois, 1995; Johnston, 1983; Koda, 2004; Szymańska & Kaczmarek, 2011). With this procedure, students are asked to read a text and then communicate everything that they remember from the text, orally or in written form. Whereas preparation and administration of the test are extremely easy compared with other assessment techniques, scoring is extremely demanding and requires an extensive analysis of recall protocols, discouraging teachers to use the technique in teaching contexts (Heinz, 2004; Koda, 2004). Furthermore, since recall protocols do not offer any information on what is not recalled, it is impossible to

know whether omission of any information is attributed to comprehension failure, retention difficulty or any other factors (Koda, 2004). Like summary tasks, when asked to communicate in the target language (L2/FL), speaking or writing skills in L2/FL also greatly affects test outcomes (Alderson, 2000; Heinz, 2004; Koda, 2004).

Informal assessment techniques, which typically represent the process-based approach, utilize observations and other non-standardized procedures to collect anecdotal data and evidence of students' present reading comprehension or progress (Alderson, 2000; Koda, 2004). Examples of informal assessment techniques include think-aloud verbal reports and observations (Alderson, 2000; Bell & McCallum, 2008; Koda, 2004). Informal assessment techniques are not elaborated in this dissertation because it does not concern this study.

Assessment techniques largely differ in terms of factors such as design and administration. However, no matter which technique is used, reading materials need to be chosen taking factors which affect reading comprehension into consideration (Klingner, 2004). These factors may include approximate levels of students' syntactic knowledge, lexical knowledge and knowledge of subject matters. In this study, texts having moderate syntactic complexity, moderate semantic complexity and moderate difficulty of subject matters were chosen for the reading comprehension tests.

2.10 Summary

Reading comprehension is affected by a variety of factors (Feng, 2011a, 2011b; Kendeou & Broek, 2007; Koda, 2004). To investigate how much individual factors affect reading comprehension, many empirical studies (e.g., López, 2008; Shiotsu & Weir, 2007; Yalin & Wei, 2011) have been conducted. Among those factors, especially readers' syntactic awareness and awareness of cognitive and metacognitive reading strategies, as well as lexical knowledge (vocabulary), have drawn significant attention from reading researchers. It has been consistently reported that both syntactic awareness and awareness of cognitive and metacognitive reading strategies have positive relationships with reading comprehension, and many attempts have been made to identify effective cognitive and metacognitive reading strategies. However, almost no attention has been paid to how the relationship between syntactic awareness and reading comprehension is changed by the increase in the awareness of cognitive and metacognitive reading strategies although the relationship may be changed by the increase in the awareness of reading strategies.

The nature of reading can be approached from two perspectives: the process of reading and the result of that process, the product (Yamashita, 2002, 2004). Process of reading, which is the interaction between the reader and the text, can be broadly divided into two components: decoding and comprehension (Cain, 2010; Koda, 2004; López, 2008). In this study, the participants' ways of using cognitive and metacognitive reading strategies in the process of reading (more precisely, in the process of comprehension) were paid attention. However, the study may be categorized as not a process-oriented research but a product-oriented research since the product was examined using reading comprehension tests.

The factors which affect readers' comprehension can be broadly divided into reader-related factors called reader variables and text-related factors called text variables (Alderson, 2000). The two variables especially focused on in this study (i.e., syntactic awareness and use of cognitive and metacognitive reading strategies) fall in the category of reader variables. The reader variables include readers' schemata, reading strategies and purpose and way of reading while the text variables include text content and genre of text. Readers' schemata can be broadly classified into formal schemata, which represent linguistic knowledge (e.g., syntactic knowledge and lexical knowledge), and content schemata, which represent knowledge about the content of text (Carrell, 1983).

Reading strategies, which are significant reader variables to comprehension, can be distinguished between local strategies and global strategies (Abbott, 2006; Plakans, 2009; Radach, Huestegge, & Reilly, 2008) and between cognitive strategies and metacognitive strategies (Carrel, Gajdusek, & Wise, 1998; Cohen, 1998; Koda, 2004). Global strategies share many strategy similarities with cognitive strategies (Hamdan, Ghafar, Sihes, & Atan, 2010; Mokhtari & Reichard, 2002; Plakans, 2009). Successful readers have been found to use both of local and global reading strategies (Hedgcock & Ferris, 2009; Hudson, 2007; Liontas, 2002). A reading model in which both of local and global strategies are used is called an interactive model (Alderson, 2000). It has been also found that successful readers use both of cognitive and metacognitive reading strategies (Carrel, Gajdusek, & Wise, 1998; Dhieb-Henia, 2003; Zhang & Wu, 2009).

For the last several decades, many attempts have been made to identify effective reading strategies used by successful readers (e.g., Kong, 2006; Sheorey & Mokhtari, 2001; Zhang, Gu, & Hu, 2008), design effective reading strategy training models

(e.g., Palincsar & Brown, 1984; Pressley, et al., 1992; Raphael, 1982) and test existing reading strategy training models (e.g., Cummins, Streiff, & Ceprano, 2012; Dhieb-Henia, 2003; Salataci & Akyel, 2002). Among various types of cognitive and metacognitive reading strategy training suggested in previous studies, the five representative models are Question-Answer Relationships (QAR), Reciprocal Teaching Approach (RTA), Experience-Text Relationship (ETR), Cognitive Academic Language Learning Approach (CALLA) and Transactional Strategy Instruction (TSI). All of these models are common in that teachers' scaffolding (and/or modeling) and students' mutual collaboration are valued for students' effective acquisition of reading strategies.

The reading strategy training model adopted for this study is QAR, in which students are expected to locate information and answer questions about the subject matter of the text in accordance with the four kinds of question/answer relationships: "Right There", "Think and Search", "Author and Me" and "On My Own" (Raphael, 1982, p. 188). Locating information in written documents is frequently required in academic contexts, and adults across a range of occupations may spend more time in locating information than reading for any other purposes (Guthrie & Mosenthal, 1987). As administered in this study, QAR is normally used with self-questioning in which students are instructed to generate questions concerning the text on their own, following their teacher's modeling. Compared with when they merely answer questions generated by teachers, students come to think and learn much more actively when they create questions on their own and answer them (Aldridge, 1989; Wagner & Sternberg, 1984).

Cognitive and metacognitive reading strategy training has been found to be helpful to unsuccessful readers if properly instructed and modeled by the teacher, and its effectiveness has been reported in many empirical studies (e.g., Cummins, Streiff, & Ceprano, 2012; Dhieb-Henia, 2003; Sari & Sibarani, 2013). However, it seems that not much attention has been paid to the identification of possible causes which disturb some students from improving their reading comprehension through reading strategy training. If those causes shared by students who fail to gain benefits from training are successfully identified and if effective ways of dealing with these causes are presented, the teacher in a reading class will be able to help more students in his/her class use effective reading strategies to comprehend texts better than before.

This study was motivated by the linguistic threshold hypothesis (LTH). Its notion

suggests that L2/FL readers do not become able to use cognitive and metacognitive reading strategies unless they satisfy a certain level of L2/FL proficiency (i.e., linguistic threshold). The LTH has been supported by many empirical studies (e.g., Jiang, 2011; Pichette, Segalowitz, & Connors, 2003; Schoone, et al., 1998). The interactive-compensatory model presented by Stanovish (1980), on the other hand, suggests that when a reader has difficulty in comprehending a text because of his/her insufficient linguistic knowledge or skills, he/she may be able to compensate for the shortcoming(s) with strength in another area of knowledge or skills such as cognitive and metacognitive skills. If assuming that both of the LTH and interactive-compensatory model are valid, then the following question arises: whether a certain level of L2/FL proficiency needs to be satisfied to be able to compensate for the shortcoming(s) of linguistic knowledge or skills with strength in another area of knowledge or skills. This study concerned whether certain basic syntactic knowledge would be required to be able to use cognitive and metacognitive reading strategies, to compensate for the shortcoming(s) of linguistic knowledge (syntactic knowledge included) and improve reading comprehension.

Chapter 3
Methodology

3.1 Research Design

This study is quasi-experimental research with one-group pre-test/post-test design conducted using regular English language classes in a Japanese university. The results of the pre-test and post-test were analyzed with paired two-sample *t*-tests and correlation calculations (calculations of Pearson product-moment coefficients) to answer the research questions. The results of the *t*-tests and those of the correlation calculations were also verified with effect size measurements and significance tests respectively. In addition, the participants' responses to the questionnaire were analyzed to see which reading strategies the participants frequently used when reading the passages in the post-test. Table 3.1 outlines the overall flow of this study and the instruments and statistical techniques used in the study. All of the procedures in the study were handled by the researcher himself.

Table 3.1
Overall Flow of the Study

Order	Procedural item	Instrument or statistical technique
1	Pre-test	• Reading comprehension test (Appendix A) • Syntactic awareness test (Appendix A)
2	Training	• Cognitive and metacognitive reading strategy training (with reading materials in Appendix G)
3	Post-test	• Reading comprehension test (Appendix B)
4	Questionnaire	• Closed questions (Appendix C) • Open-ended questions (Appendix C)
5	Data analysis	• Paired two-sample *t*-test • Correlation calculation • Effect size measurement • Significance test

A paired two-sample *t*-test was used for the following two reasons to find out whether the difference between the participants' scores of the reading comprehension pre-test and post-test was statistically significant. First, a paired two-sample *t*-test is the most commonly used statistical technique in pre-test/post-test designs which aim to see the effect of treatment (Barnes & Lewin, 2005). Second, a *t*-test can be applied regardless of sample sizes and is generally used in language studies to examine the

existence of statistically significant differences between two sets of data (Brown, 1988).

To verify the results of the *t*-test, effect sizes were calculated with two measures, Cohen's *d* and Pearson product-moment coefficient (*r*). These measures are most commonly used to verify results of a *t*-test in quantitative research (Mizumoto & Takeuchi, 2008, 2011). Both of the two measures were used in this study since their calculation methods differ, possibly presenting conflicting results. Cohen's *d* calculates standardized differences in means between two sets of data, using means and standard deviations as parameters. Pearson product-moment coefficient (*r*), on the other hand, calculates the strength of the relationship between two sets of data, using *t*-values and degrees of freedom as parameters.

Correlational analyses were conducted to examine how the participants' scores of the syntactic awareness test were related to their scores of the reading comprehension pre-test and post-test respectively. In educational studies, correlational approach is "used extensively as a descriptive statistic to describe the relationship between two variables" (Wiersma & Jurs, 2009, p. 392). For this study, Pearson product-moment coefficients (*r*) were also calculated since the both sets of data are on interval scales. To verify the statistical significance of the calculated correlation coefficients, a significance test was conducted using a level of significance of .05.

As for correlational analyses, it has been recognized that the larger the sample size, the better (Brown, 1998; Johnson, 1992; Lewin, 2005) and very large sample sizes may allow very small correlation coefficients to be recognized as being statistically significant (Barnes & Lewin, 2005; Cohen, 2008). The sample size (n = 48) of this study was resulted because it was the best choice for the researcher to use the three regular English classes taught by the researcher himself at the same department in a university, considering that the participants needed to be studied over eight weeks (including the pre-test and post-test). While there is no common agreement on the minimum requirement regarding the sample size of correlational studies, one rule of thumb used in correlational studies is that there should be 30 participants at least (Brown, 1998; Lewin, 2005). According to this rule of thumb, the sample size of this study satisfies the minimum requirement, so that effective results could be presented.

3.2 Participants

Participants in the study were 48 Japanese (39 male and 9 female) second-year

university students from three classes who took a course entitled Scientific English 1 offered by a computer engineering department in a university located in Tokyo, Japan. The objective of the course was to develop students' ability to efficiently read scientific and technical passages as well as their ability to communicate scientific and technical information in plain English. Scientific English 1 was offered once (one and half hours) a week over one semester (15 weeks). The participants were from only classes that were taught by the researcher. Informed consent (Appendix J) was obtained from the participants on a voluntary basis.

Considering that many of the graduates from the department possibly work as engineers who need to have practical English skills, the department has put great importance on English education. The department requires its students to finish nine compulsory English courses until they finish their undergraduate degree program. First-year students at the department are required to enroll in English Expression 1 and English Comprehension 1 in the spring semester (April – July) and English Expression 2 and English Comprehension 2 in the fall semester (September – January). In their second year, the students are required to enroll in Scientific English 1 and Current English 1 in the spring semester and Scientific English 2 and Current English 2 in the fall semester. All of these courses are offered once (one and half hours) a week over one semester (15 weeks).

Since many computer-related companies in Japan include applicants' TOEIC scores in the factors to be considered for recruitment, the department encourages its students to prepare for TOEIC tests outside classrooms. All of the first and second-year students are required to take a TOEIC test in December, and their scores are used to divide the students in the same year into four classes, Level 1 (highest) to Level 4 (lowest), so that students falling in the same range of TOEIC scores can study in the same class for compulsory English courses in the following year. The 48 participants (second-year students) in this study came from Levels 2, 3 and 4 classes divided based on the scores of the TOEIC test taken in the previous year. The range of the TOEIC scores of each class was 465-605 for Level 2, 345-460 for Level 3 and 250-340 for Level 4. These three classes for Scientific English 1 were taught by the researcher himself. The students from Level 1 were excluded from the study because its class was taught by another instructor. Differences between the instructors in way of interacting with the participants might affect the results of the reading strategy training even if best efforts were made by the two instructors to unify the way of administering reading strategy training as much as possible.

From the 1990s, an increasing number of elementary schools in Japan have offered English lessons to their students. However, it was April 2011 when English became a compulsory subject at elementary schools in Japan and started to be formally taught to fifth and sixth year students. The participants in the study started to formally learn English in junior high school and continued for six years in total until they finished senior high school. In the 1990s, the improvement of oral English communication skills was encouraged at junior and senior high schools in Japan. However, when it comes to reading, the grammar-translation method is still prevalent in English classes at Japanese junior and senior high schools (Morita, 2010; Oshita, 2007; Yamaoka, 2013).

3.3 Instruments

The instruments employed for this study were: a pre-test (Appendix A) which measured the participants' English syntactic awareness and their reading comprehension; a post-test (Appendix B) which measured the participants' English reading comprehension only; and questionnaire composed of closed and open-ended questions (Appendix C) which aimed to check whether the participants actually used cognitive and metacognitive reading strategies when reading the passages in the post-test. The post-test was preceded by six 60-minute lessons (one lesson per week) focusing on cognitive and metacognitive reading strategy training and was immediately followed by administration of the questionnaire.

Unlike the pre-test, the post-test did not include an English syntactic awareness section for two reasons. First, the study did not aim to find out the effect of cognitive and metacognitive reading strategy training on the participants' English syntactic awareness. Reading strategy training is administered to improve not students' syntactic awareness but their reading comprehension. Second, the study should be free from a practice effect whose "strongest form occurs when the same test is given repeatedly in a study to determine if there are changes in performance" (Brown, 1988, p. 35). This effect could occur in the study if the participants' English syntactic awareness was measured again even when different clauses were used between the pre-test and the post-test. Because all of the syntactic elements focused on in the English syntactic awareness test are so simple, the participants would be able to easily learn from mistakes which they made with the pre-test and would possess the learned syntactic elements merely as knowledge. The participants then might increase scores on the post-test with the knowledge even though they might not be

able to use the syntactic elements in actual communications. As pointed out by Krashen (1982), possessing learned rules of language as knowledge does not mean that students have acquired them for natural and fluent communications.

The reading comprehension section of the pre-test and post-test was composed of three passages. Each of the passages is followed by four multiple-choice questions. The passages and questions used in the pre-test and post-test came from reading comprehension sections of past Practical English Proficiency Tests (Grade Pre-2) called *Eiken* in Japan. Eiken tests are produced and administered three times a year by the Society for Testing English Proficiency (STEP), which is a nonprofit foundation established in 1963 in cooperation with the Japanese education ministry. The tests are taken by about 2.5 million people annually at about 18,000 test sites in Japan. Eiken has been recognized as the most widely used English proficiency test in Japan, and a number of universities and senior high schools in Japan have admitted certificates of Eiken as official school units (Hasegawa, 2013). Moreover, a number of universities in other countries including Australia, Britain and U.S. have admitted submission of results of Eiken tests as part of admission requirements in place of IELTS or TOEFL scores (Benson, 2013).

Unlike other standardized language tests (such as IELTS, TOEFL and TOEIC) which require test-takers to take the same proficiency tests, Eiken test-takers can choose from seven proficiency levels, depending on their English proficiency: Grade 1 (highest level), Grade Pre-1, Grade 2, Grade Pre-2, Grade 3, Grade 4 and Grade 5 (lowest level). The two bridging grades – Grade Pre-1 (between Grade 1 and Grade 2) and Grade Pre-2 (between Grade 2 and Grade 3) – started to be administered later than the other grades, enabling further accurate proficiency level judgment. Grade Pre-2 tests whose sections were used in this study are intended for English learners who have finished secondary schools. Eiken was chosen in this study because different tests are prepared for different proficiency levels and one of its grades (i.e., Grade Pre-2) is intended for test-takers having similar English learning experience to the participants in the study.

Like other language proficiency tests such as IELTS, TOEFL and TOEIC, Eiken tests' entire composition and their form and number of questions are made consistent from year to year while reviews and revisions are made every several years. The six passages (followed by multiple-choice questions) used for the pre-test and post-test (three passages each) of the study were chosen from three Eiken tests administered in

2009 and three Eiken tests administered in 2010. To increase the validity of the reading comprehension measurement, the chosen six passages were randomly rearranged using the RAND function of Microsoft Excel and were assigned No. 1 to 6 according to the order. No. 1 to 3 were used for the pre-test and No. 4 to 6 were used for the post-test. The reading comprehension sections of the pre-test and post-test were intended to measure the participants' overall reading comprehension.

On the other hand, the syntactic awareness section of the pre-test was intended to measure the participants' awareness about the structure of basic clauses (i.e., rules of word order and intra-sentence syntactic relations). The syntactic awareness section comprised two subsections. One subsection (composed of 14 single clauses) aimed to identify whether the participants were aware of word order of seven basic clause types and asked them to correct word order of declarative sentences of the clause types. The other subsection (composed of 10 single clauses) aimed to identify whether the participants were aware of five basic modification patterns and asked them to point out words modified by other words highlighted in individual sentences. The basic clause types and modification patterns focused on in the study are listed in Table 3.2. To actually measure the participants' syntactic awareness without being adversely affected by semantic ambiguity of clauses, the words composing the individual clauses in the test were chosen from those familiar to the participants and clauses whose meanings are straightforward were adopted for the test (e.g., Suzan gave the cat milk.): the syntactic awareness test used in the study is presented in Appendix A. To further increase the validity of the study, the six passages of the reading comprehension pre-test and post-test were analyzed to verify that the syntactic elements focused on in the syntactic awareness test actually appear in the passages of the pre-test and post-test. The frequency of appearance of the syntactic elements in the passages is shown in Appendix D.

Table 3.2

Basic Clause Types and Modification Patterns Focused on in the Study

Basic clause types	SV clause[1] (e.g., My friend$_{(S)}$ laughed$_{(V)}$.)
	SVO clause[1] (e.g., Tom$_{(S)}$ plays$_{(V)}$ golf$_{(O)}$.)
	SVC clause[1] (e.g., Ken$_{(S)}$ looks$_{(V)}$ happy$_{(C)}$.)
	SVA clause[1] (e.g., Emily$_{(S)}$ is$_{(V)}$ in the garden$_{(A)}$.)
	SVOO clause[1] (e.g., Suzan$_{(S)}$ gave$_{(V)}$ the cat$_{(O)}$ milk$_{(O)}$.)
	SVOC clause[1] (e.g., The children$_{(S)}$ named$_{(V)}$ the dog$_{(O)}$ Taro$_{(C)}$.)
	SVOA clause[1] (e.g., The man$_{(S)}$ put$_{(V)}$ the car$_{(O)}$ in the garage$_{(A)}$.)
Basic modification patterns	Verb modification by adverbs[2] (e.g., Chris usually$_{(adverb)}$ plays$_{(modified\ verb)}$ tennis after school.)
	Verb modification by adverbials[2] (e.g., The boys played$_{(modified\ verb)}$ baseball in the ballpark$_{(adverbial)}$.)
	Verb modification by adverbial complements[2] (e.g., The girl put$_{(modified\ verb)}$ a doll on the sofa$_{(adverbial\ complement)}$.)
	Noun modification by adjectives (e.g., I caught a terrible$_{(adjective)}$ cold$_{(modified\ noun)}$ this winter.)
	Noun modification by adjectival phrases (e.g., Dr. Smith is the best dentist$_{(modified\ noun)}$ in town$_{(adjectival\ phrase)}$.)

Notes:

[1]S stands for subject, V stands for verb, O stands for object, C stands for complement and A stands for adverbial.

[2]Adverbs and adverbials are distinguished from adverbial complements in the sense that elimination of the constituents does not affect the central meaning of the clause.

Since no standardized test assessing such syntactic awareness was available at the time of the study, the test (composed of 24 single clauses) was developed by the researcher himself. The individual words (and word groups) in the 24 clauses were randomly rearranged using the RAND function of Microsoft Excel, and the clauses were also randomly rearranged for each subsection with the same method. For measurement of the participants' awareness about basic clause structure, rules of word order and intra-sentence syntactic relations were assessed in the study since English is a fixed word-order language (Gertner, Fisher, & Eisengart, 2006; Oostdijk & Pieter, 1994), and it relies significantly on word order in determining how words relate to one another (Soderstrom, White, Conwell, & Morgan, 2007). Readers may

not comprehend the central meaning of English sentences unless they are aware of basic rules about English word order and the relationships among main components of an English sentence (Berman, 1984).

To verify the participants' use of cognitive and metacognitive reading strategies when reading passages in the post-test, an anonymous questionnaire composed of seven closed questions and two open-ended questions was administered after the post-test. The seven closed questions were chosen from the Metacognitive Awareness of Reading Strategies Inventory (MARSI), which was designed by Mokhtari and Reichard (2002) to assess young and adolescent readers' metacognitive awareness and use of reading strategies when reading academic materials. According to Mokhtari and Reichard (2002), the MARSI is aimed to "access the degree to which a student is or is not aware of the various processes involved in reading and to make it possible to learn about the goals and intentions he or she holds when coping with academic reading tasks" (p. 251). The closed and open-ended questions of the administered questionnaire are presented in Appendix C.

3.4 Procedures

Before the first implementation of cognitive and metacognitive reading strategy training, the pre-test was given to assess the participants' initial English syntactic awareness and reading comprehension. The participants were asked by the instructor (researcher himself) to complete the syntactic awareness section before starting working on the reading comprehension section. Following six weekly training lessons (one lesson per week), the post-test was given to measure the participants' English reading comprehension again. The length of the training (i.e., six weekly lessons) was determined, considering the necessity for minimizing the extraneous effect caused by the gradual improvement of the participants' lexical knowledge, which might be gained from the training. Immediately after the completion of the post-test, the anonymous questionnaire was administered by the instructor. Table 3.3 summarizes the procedures of the tests and training.

Table 3.3

Procedures of the Tests and Training

Order	Instrument		Time
1	Pre-test	• Reading comprehension test (Appendix A) • Syntactic awareness test (Appendix A)	60 minutes
2	Training	• Six weekly lessons of cognitive and metacognitive reading strategy training (with reading materials in Appendix G)	60 minutes each
3	Post-test	• Reading comprehension test (Appendix B)	45 minutes
		• Questionnaire (Appendix C)	15 minutes

In the beginning of the first lesson, the participants were instructed to discuss in small groups how they had normally processed sentences when reading texts written in English. The instructor was reported from all of the groups that all members had always attempted to comprehend an English text by relying significantly on local reading strategies and translating every single word in the text into English. Then, the participants were explained about the concept of the reading strategy model chosen for this study (i.e., Question-Answer Relationships (QAR)), four kinds of question/answer relationships (listed in Table 3.4) and nine kinds of effective cognitive and metacognitive reading strategies (listed in Table 3.5). The four kinds of question/answer relationships were introduced by Raphael (1982) when he suggested the QAR. QAR with self-questioning was adopted for the following four main reasons: (1) QAR emphasizes the importance of linking students' background knowledge with information in the text (Biggs, 2004-2005); (2) locating information in text is frequently required in academic contexts (Guthrie & Mosenthal, 1987) and other social contexts including workplaces; (3) locating information in text may enable students to think about, regulate and adjust choice and usage of cognitive reading strategies (Biggs, 2004-2005); and (4) self-questioning (i.e., generating questions on one's own) promotes active thinking and learning more than answering questions generated by teachers (Aldridge, 1989; Wagner & Sternberg, 1984).

Table 3.4

Four Kinds of Question/Answer Relationships Classified by Raphael (1982)

Right There	This kind of question allows the reader to directly find the answer in the text. Also, some words in the question are usually found in the sentence which contains the answer.
Think and Search	This kind of question also allows the reader to find the answer in the text. However, the words in the question are "not" usually found in the sentence which contains the answer.
Author and Me	This kind of question asks the reader to combine some information in the text with any information which the reader already possessed, to come up with the answer.
On My Own	This kind of question asks the reader to come up with the answer, only by resorting to his/her thoughts, knowledge and information (without using the text at all).

Table 3.5

Nine Kinds of Cognitive and Metacognitive Reading Strategies

Cognitive reading strategies	• Recall background information relating to the subject matter of the text by reading the title, viewing the accompanying pictures and/or illustrations and skimming the topic sentences. • Consider which of the four kinds of question/answer relationships is applied to each of the questions, and apply the identified question/answer relationships to answer the questions. • Get the main ideas of the text while attempting to comprehend directly in English (without translating from English to Japanese word for word). • Decide what to read closely and what to ignore. • Guess the meaning of unknown words or phrases using context clues. • Avoid to get caught by words and phrases which cannot be guessed even with context clues. Skip them at once.
Metacognitive reading strategies	• In the process of reading, consider whether the currently chosen reading strategy is working well. If it is not working, consider using another reading strategy which may work better. • In the process of reading, consider whether your current guess about the meaning of the text makes sense to your background knowledge. • In the process of reading, consider whether your current way of reading is appropriate (or efficient) to answer the questions.

Following the explanations (in Japanese), the instructor modeled the way of identifying (and applying) the individual kinds of question/answer relationships and choosing (and applying) cognitive and metacognitive reading strategies. For this modeling, a part of an English science article titled "NASA Confirms Aliens Exist – Rights On Our Planet!" (Appendix E) was shown on the overhead screen in the classroom. The article was chosen from a website (named DOGO news: http://www.dogonews.com/2010/12/8/nasa-confirms-aliens-exist-right-on-our-planet) which presented school children with fascinating articles about current events, science, sports and others. The procedure of the modeling by the researcher is detailed in Table 3.6. Also for modeling, all instructions to the participants were given in Japanese to ensure that the participants correctly understood the instructions.

Table 3.6

Modeling Procedure Used by the Instructor

Step	Description
1	The instructor asked the participants to discuss in small groups how they had normally processed sentences when reading texts written in English.
2	The instructor showed a part of an English science article on the overhead screen in the classroom.
3	The instructor asked the participants to recall background knowledge of the subject matter by reading the title of the article and viewing the illustration shown in the article.
4	The instructor asked the participants to skim through the entire text.
5	The instructor briefed the story of the article to help the students comprehend the text.
6	The instructor orally gave the participants a couple of Right There questions and asked them to find their answers from the text.
7	The instructor directly pointed to the text to show the sentences which contained the answers.
8	The instructor orally gave the participants a couple of Think and Search questions and asked them to find information directly related to their answers from the text.
9	The instructor directly pointed to the text to show the sentences which contained information directly related to the answers.
10	The instructor orally gave the participants a couple of Author and Me questions and asked them to locate and combine any related information in the text with their own knowledge to answer the questions.
11	The instructor directly pointed to the text to show the sentences which contained information directly related to the answers and orally presented them with examples of background knowledge which needed to be recalled to answer the questions.
12	The instructor orally gave the participants a couple of On My Own questions and asked them to come up with answers only by resorting to their own thoughts, knowledge and information.
13	The instructor orally presented examples of the answers and explained the process of coming up with the answers.

When the instructor demonstrated how to find answers to the questions, he also demonstrated the way of choosing and using cognitive and metacognitive reading strategies. Following the completion of the procedure in Table 3.6, six lessons (60-minutes each) for cognitive and metacognitive reading strategy training were conducted by the instructor. All of these lessons had the same configuration and aimed to develop the participants' skills of using cognitive reading strategies – mainly, scanning, skimming, activating background knowledge, predicting, guessing and skipping – and skills of monitoring their appropriate choice and use of effective cognitive strategies.

At the beginning of each lesson, the cognitive and metacognitive reading strategies listed in Table 3.5 were shown on the overhead screen in the classroom and were read aloud in Japanese by the instructor to remind the participants of the significance of the strategies. After the participants were reminded of the significance of the strategies, each of the lessons was conducted with the procedure described in Table 3.7. During the lessons, all instructions were given in Japanese to ensure that the participants correctly understood what they were expected to do. The participants were allowed to use Japanese in group discussions, so that they would smoothly communicate their ideas and actively participate in discussions.

Table 3.7

Procedure of Each Cognitive and Metacognitive Reading Strategy Training Lesson

Step	Description
1	The participants were divided into small groups (three or four members in each group).
2	On the overhead screen, the participants were shown a title and one or two pictures (Appendix F) extracted from the reading material (Appendix G) to be distributed later.
3	The participants were encouraged to activate their background knowledge by looking at the title and pictures.
4	The participants were instructed to discuss and come up with five questions in groups about what they wanted to explore through the reading material.
5	A worksheet (Appendix H) composed of question and answer columns was distributed to each of the participants.
6	The participants were instructed to write down their groups' questions (in English) in the question columns on their respective worksheets.
7	The representatives of the individual groups were instructed to write down the groups' questions (in English) on the blackboard in the front of the classroom.
8	The reading material was distributed to the participants. (The reading materials used in the six lessons are presented in Appendix G.)
9	The participants were instructed to skim the passage to find answers to their groups' questions.
10	The participants were instructed to write down their answers (in English) in the answer columns on the worksheets.
11	The participants were instructed to discuss the answers with other group members.
12	The representatives of the individual groups were instructed to write down the answers agreed among their group members in designated space on the blackboard.
13	The participants were told correct answers by the instructor.
14	The participants were encouraged to ask any questions to the instructor about information, words, phrases and sentences in the reading material.
15	The participants were shown an English video related to the content of the reading material.
16	The participants were encouraged to ask any questions to the instructor about the content of the video.

All of the reading materials used for the reading strategy training lessons (instructed in Japanese) came from the aforementioned website (named DOGO news: http://www.dogonews.com/). Considering that engineering students who took a course entitled Scientific English 1 were used as the participants, only articles about science were chosen. All of the chosen articles were written about unique subject matters which would make the participants read the texts with interest and would activate their background knowledge related to the subject matters. The articles used are presented in Appendix G, and the titles of the individual articles are listed below:

Table 3.8

Titles of the Science Articles Used for the Reading Strategy Training Lessons

	Titles of the articles
1st week	Robot Teachers Roll into South Korean Classrooms
2nd week	The REAL Life Mermaid
3rd week	Taking an Elevator to Space
4th week	Oh to Be Able to Fly (and Land) Like a Bird!
5th week	Flying Car is One Step Closer to Lift Off!
6th week	How about Swim in My New Car?

Since this study was conducted in regular university classes where every student's equal right to receive quality education must be assured, a control group could not be set which would successfully isolate the effect of the cognitive and metacognitive reading strategy training. To deal with this problem and increase the validity of the results of the study, the participants were not given any reading exercises other than the reading strategy training in the classes during the period of the training.

Chapter 4
Results

4.1 Overview

This chapter reports on the results of descriptive analyses that were conducted to respond to the research questions. Statistical analyses were performed with three sets of data: scores of the reading comprehension pre-test, scores of the reading comprehension post-test and scores of the syntactic awareness test.

The techniques used for the statistical analyses in this study are a paired two-sample *t*-test (with a level of significance of .01) and correlational analysis. The *t*-tests were conducted to see whether the difference between two sets of data was statistically significant. To verify the results of the *t*-tests, effect sizes were calculated with two measures: Cohen's *d* and Pearson product-moment coefficient (*r*). Also, as a technique for correlational analyses, Pearson product-moment coefficients (*r*) were calculated to see how two sets of data were related to each other. To verify the results of the correlation calculations, a significance test was conducted at a level of significance of .05. Quantitative analyses were also conducted for the anonymous questionnaire administered to examine how often the participants used individual cognitive and metacognitive reading strategies when reading the passages in the reading comprehension post-test. Table 4.1 outlines what were measured with the statistical analyses and what were the purposes of the measurements.

Table 4.1

Items Measured with Statistical Analyses and Purposes of the Measurements

	Items measured	Purposes of the measurements	Tables showing the results
1	Presence/absence of a statistically significant difference between the participants' reading comprehension pre-test scores and post-test scores	To look at whether the reading comprehension of the participants was improved through the reading strategy training	4.2, 4.3
2	Strength of the relationships between the participants' syntactic awareness test scores and reading comprehension pre-test scores and between their syntactic awareness test scores and reading comprehension post-test scores	To examine in which way the strength of the relationship between the participants' syntactic awareness and reading comprehension was changed through the reading strategy training	4.4, 4.5
3	Presence/absence of a statistically significant difference between the reading comprehension pre-test scores and post-test scores of participants who were aware of a specific syntactic element	To see whether awareness of a specific syntactic element was concerned with improvement of the participants' reading comprehension	4.6 to 4.9
4	Presence/absence of a statistically significant difference between the reading comprehension pre-test scores and post-test scores of participants who were "unaware" of a specific syntactic element	To see whether unawareness of a specific syntactic element was concerned with improvement of the participants' reading comprehension	4.10, 4.11
5	Frequency of the participants' use of individual reading strategies	To check how often the participants used individual reading strategies	4.12 to 4.14

4.2 Results from the Reading Comprehension Tests

This section describes the results of the statistical analyses performed to examine whether the reading comprehension of the participants was improved through the reading strategy training. The total number of questions for the pre-test and post-test was 12 respectively, and each correct answer was given one point. The bar graphs in Figures 4.1 and 4.2 show the number of participants for each different score on the reading comprehension pre-test and the reading comprehension post-test.

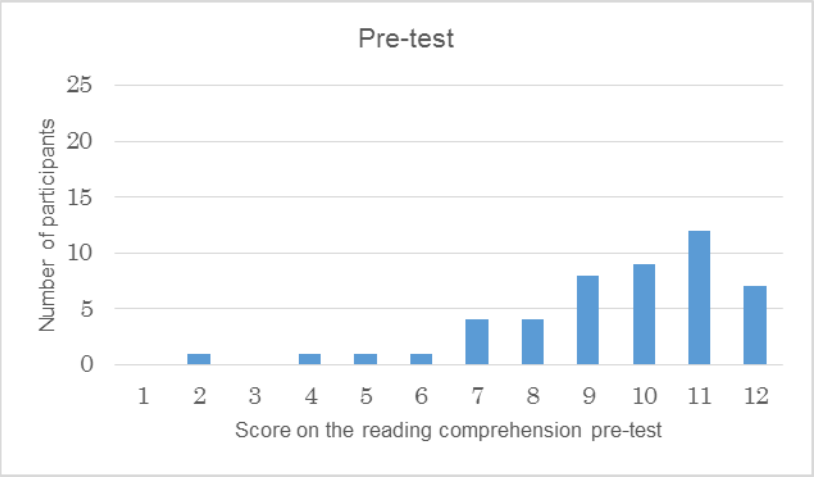


Figure 4.1. Number of participants for each different score on the reading comprehension pre-test.

Figure 4.2. Number of participants for each different score on the reading comprehension post-test.

To check whether the difference between the reading comprehension pre-test and post-test scores of all participants was statistically significant, a paired two-sample *t*-test was conducted at a level of significance of .01. Table 4.2 presents the results of

the descriptive statistics of the scores of the pre-test and post-test.

Table 4.2
Descriptive Statistics of the Reading Comprehension Pre-test and Post-test Scores

	N	M	SD	Min	Max	*t*	*p*
Pre-test	48	9.48	4.85	2	12	4.76	< .001
Post-test		10.92	1.87	7	12		

The results of the *t*-test indicated that the difference between the two test scores was statistically significant. The difference in means between the two test scores was statistically significant at the .01 probability level in terms of the pre-test (M = 9.48, SD = 4.85) and post-test (M = 10.92, SD = 1.87), t = 4.76, df = 47, p < .001 (one-tailed). The results imply that the participants' reading comprehension improved through the cognitive and metacognitive reading strategy training. To verify the results of the *t*-test, effect sizes were calculated with two measures: Cohen's *d* and Pearson product-moment coefficient (*r*). The results of the calculations are shown in Table 4.3.

Table 4.3
Effect Sizes of the t-test Results of the Reading Comprehension Pre-test and Post-test Scores

N	Effect size	
	Cohen's *d*	Pearson product-moment coefficient (*r*)
48	.39 (small effect)	.57 (large effect)

The results of the *t*-test were supported by the two effect size measures. Cohen's *d* showed that the mean score on the reading comprehension post-test was greater than the mean score of the pre-test by the standard deviation (SD) value of 0.39 (effect size = .39); where the SD value of 1 equals the mean of the standard deviations of the pre-test and post-test scores. This indicates a small effect of the cognitive and metacognitive reading strategy training. On the other hand, Pearson's product-moment coefficient (*r*), which also indicated the participants' significantly better performance on the post-test than on the pre-test (effect size = .57), showed a large effect of the cognitive and metacognitive reading strategy training. This difference in magnitudes of effect between the two effect size measures is attributed to the different ways of calculating effect sizes between the two measures. Cohen's *d* obtains effect sizes by calculating standardized differences in means between two

groups of data, using means and standard deviations of the two groups of data as parameters. Pearson product-moment coefficient (*r*), however, obtains effect sizes by calculating the strength of the relationship between two groups of data, using *t*-values and degrees of freedom as parameters.

The American Psychological Association (APA) (2001) encourages researchers to provide effect size information together with probability values when reporting the significance of statistical tests. It states that probability values obtained with statistical tests vary depending on the sample size. However, APA has not presented any guideline about which effect size measure is to be chosen for which analysis and about which effect size data is to be valued when results conflict among multiple effect size measures. While effect size information has been provided in an increasing number of statistical studies, discussions are hardly made and there is no consensus among researchers, about which effect size measure is superior to another (Mizumoto & Takeuchi, 2008, 2011). Therefore, in this study it seems to be reasonable to merely report that the cognitive and metacognitive reading strategy training had some positive effect on the participants' English reading comprehension, rather than making a judgment about whether the effect of the cognitive and metacognitive reading strategy training was small (as Cohen's *d* indicated) or large (as Pearson product-moment coefficient (*r*) indicated).

4.3 Results from the Syntactic Awareness Tests

This section presents the results of the descriptive statistics which analyzed the relationships among the participants' scores on the syntactic awareness test, reading comprehension pre-test and reading comprehension post-test. For the syntactic awareness test, each of the basic clause word orders and modification patterns was measured by using two clauses (questions). In the case where both questions were answered correctly, the awareness of the clause word order or modification pattern was considered to be present and one point was added to the score. In the case where either or none of the two questions was answered correctly, on the other hand, the awareness of the clause word order or modification pattern was considered to be absent and zero point was added to the score. Words composing individual clauses were chosen from those well familiar to the participants, and the meaning of the individual clauses was straightforward. The clauses would be comprehendible to even participants who were unaware of the syntactic elements used in the clauses. Therefore, participants who were actually aware of the specific syntactic element would be able to correctly answer both of the two questions for the syntactic element.

The bar graph in Figure 4.3 shows the number of participants for each different score on the syntactic awareness test. The table in Appendix I shows the number of participants whose awareness was judged as being present and absent in terms of the individual syntactic elements.

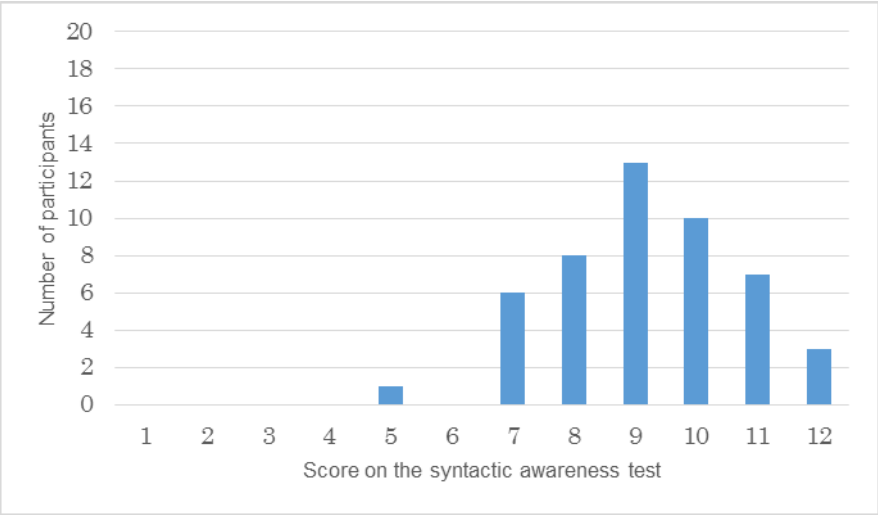


Figure 4.3. Number of participants for each different score on the syntactic awareness test.

4.3.1 Relationship between syntactic awareness and reading comprehension

The findings in Section 4.2 did not provide any information on how the participants' syntactic awareness was concerned with the improvement of their reading comprehension through the reading strategy training. To look at how the participants' syntactic awareness was related to the improvement of their reading comprehension, the relationships between their scores of the syntactic awareness test and scores of the reading comprehension tests were examined. The scatter diagrams (with best-fit lines) in Figures 4.4 and 4.5 show how the participants' scores of the syntactic awareness test were related to their scores of the reading comprehension pre-test and post-rest, respectively.

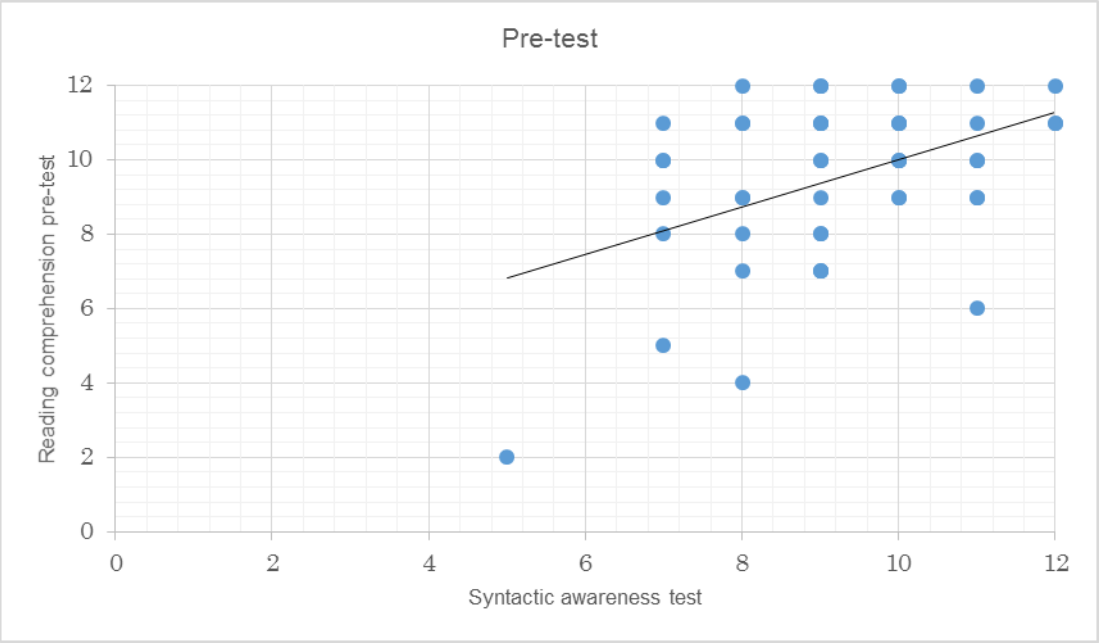


Figure 4.4. Relationship between the syntactic awareness test scores and reading comprehension pre-test scores.

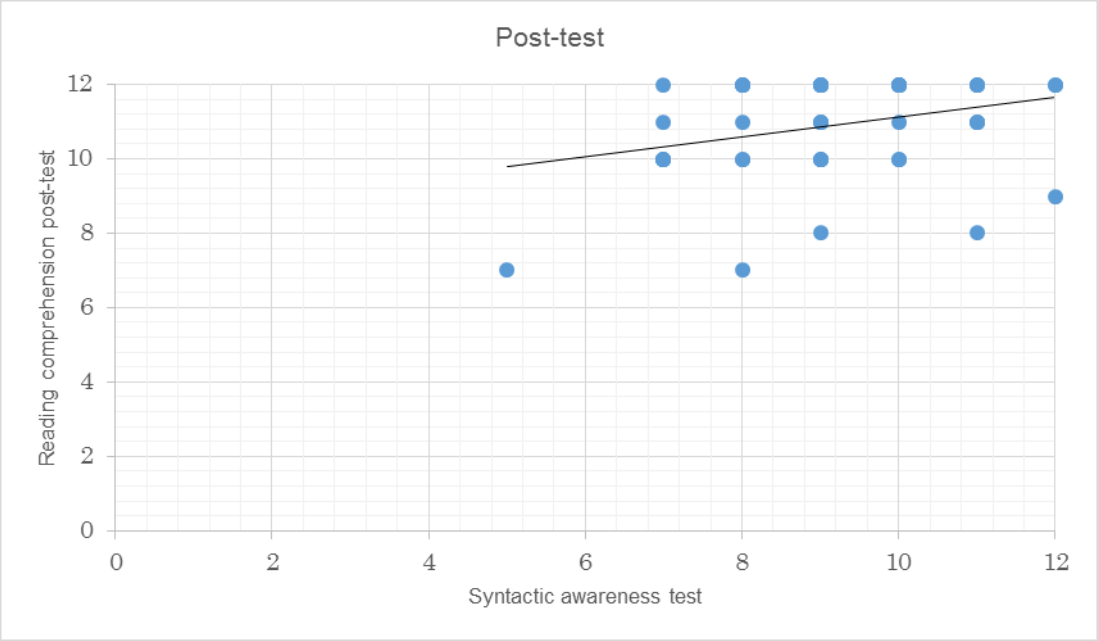


Figure 4.5. Relationship between the syntactic awareness test scores and reading comprehension post-test scores.

The scatter diagrams indicate that the participants' scores of the syntactic awareness test were positively related to theirs scores of the reading comprehension pre-test and post-rest respectively and also that the strength of the relationship between the

participants' syntactic awareness and reading comprehension decreased over the period of the reading strategy training. To statistically examine the change of the relationship over the period, correlational analyses were performed. Pearson product-moment coefficients (*r*) were calculated to look at how the participants' scores of the syntactic awareness test were related to their scores of the reading comprehension pre-test and post-test respectively. To verify the statistical significance of the calculated coefficients, also, a significance test was conducted using a level of significance of .05. Table 4.4 presents the results of the correlational analyses.

While correlational analyses are found to be helpful for a variety of correlational studies, there exists no standard criterion for judging the strength of relationships based on calculated correlation coefficients. According to Barnes and Lewin (2005), *r* below 0.33, *r* in the range between 0.34 and 0.66, and *r* between 0.67 and 0.99 indicate a weak relationship, a moderate relationship and a strong relationship respectively. In this study, the criterion suggested by Barnes and Lewin was followed to judge about the magnitude of the calculation results.

Table 4.4

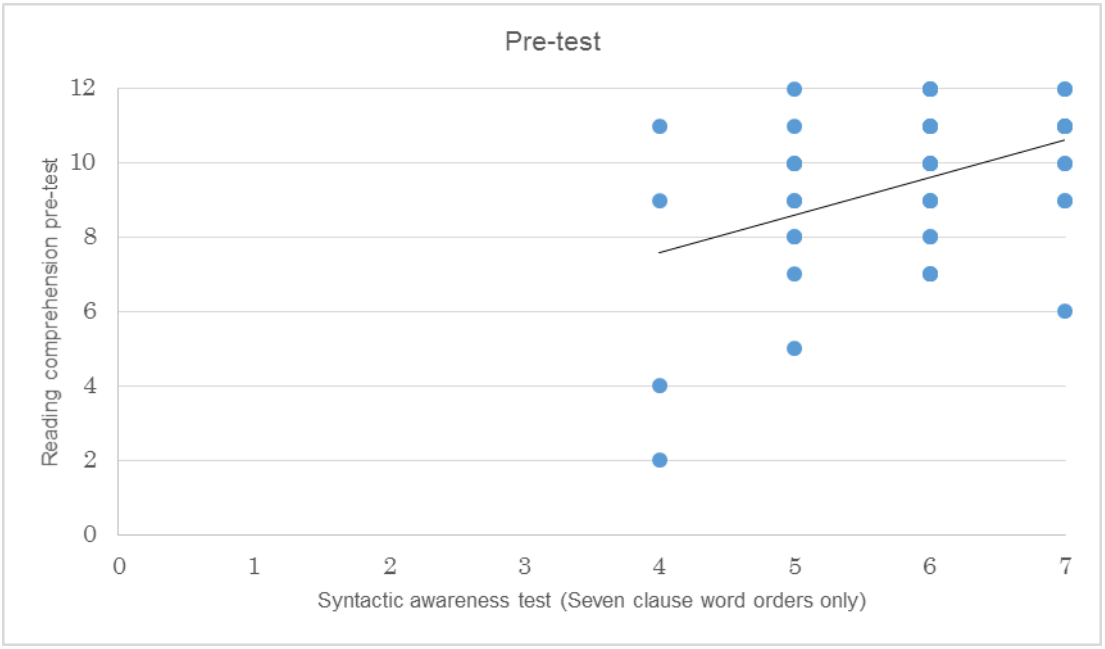
Correlational Analyses of the Participants' Syntactic Awareness Test Scores and Reading Comprehension Pre-test/Post-test Scores

	N	*r*	*t*	*p*
Reading comprehension pre-test	48	.44 (moderate)	3.36	.001
Reading comprehension post-test	48	.30 (weak)	2.14	.037

Correlational analyses showed that the strength of the relationship between the participants' syntactic awareness and reading comprehension decreased from "moderate" to "weak" over the period of the reading strategy training. There existed a positive moderate relationship between the participants' scores of the syntactic awareness test and reading comprehension pre-test (r (46) = .44), and there existed a positive weak relationship between the participants' scores of the syntactic awareness test and reading comprehension post-test (r (46) = .30). The change of the strength of the relationship implies that the significance of the participants' syntactic awareness to their reading comprehension decreased through the reading strategy training. The results of the correlational analyses were supported by the results of a significance test using a level of significance of .05. The significance test judged the calculated

correlation coefficients as being statistically significant at the .05 probability level in terms of the relationship with the reading comprehension pre-test scores (p = .001) and with the reading comprehension post-test scores (p = .037).

It might differ between the clause word orders and modification patterns as to the strength of the relationship with reading comprehension and as to how the strength was changed through the reading strategy training. Correlational analyses were also performed to examine these differences between the two groups. The scatter diagrams in Figure 4.6 show how the participants' scores of the seven clause word orders were related to their scores of the reading comprehension pre-test and post-test respectively. The scatter diagrams in Figure 4.7 show how the participants' scores of the five modification patterns were related to their scores of the reading comprehension pre-test and post-test respectively.



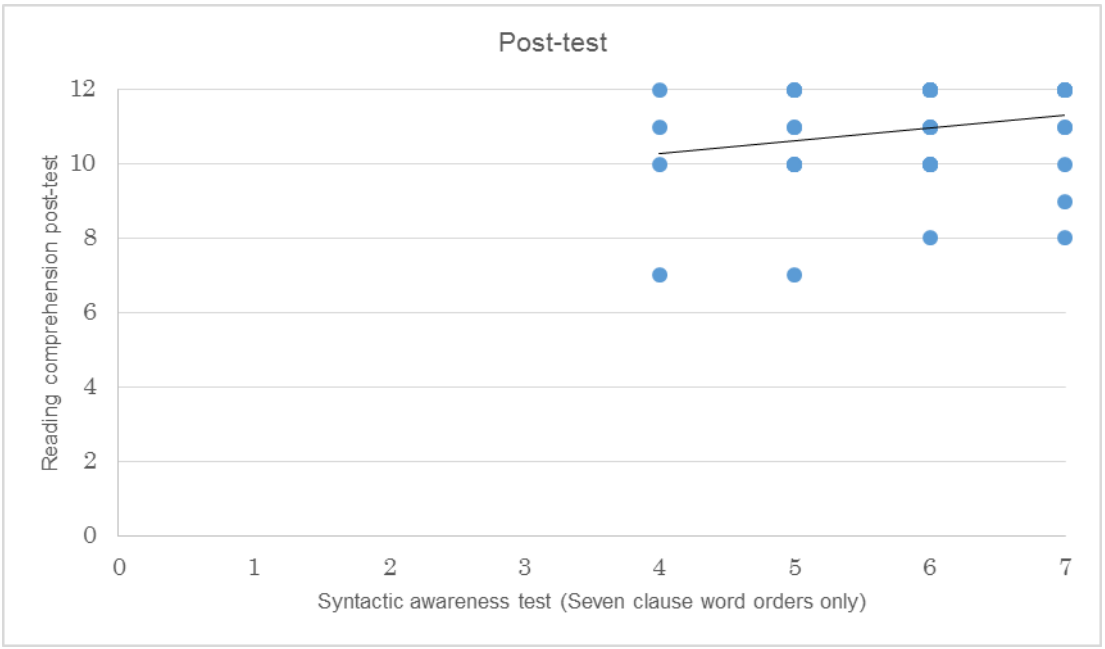
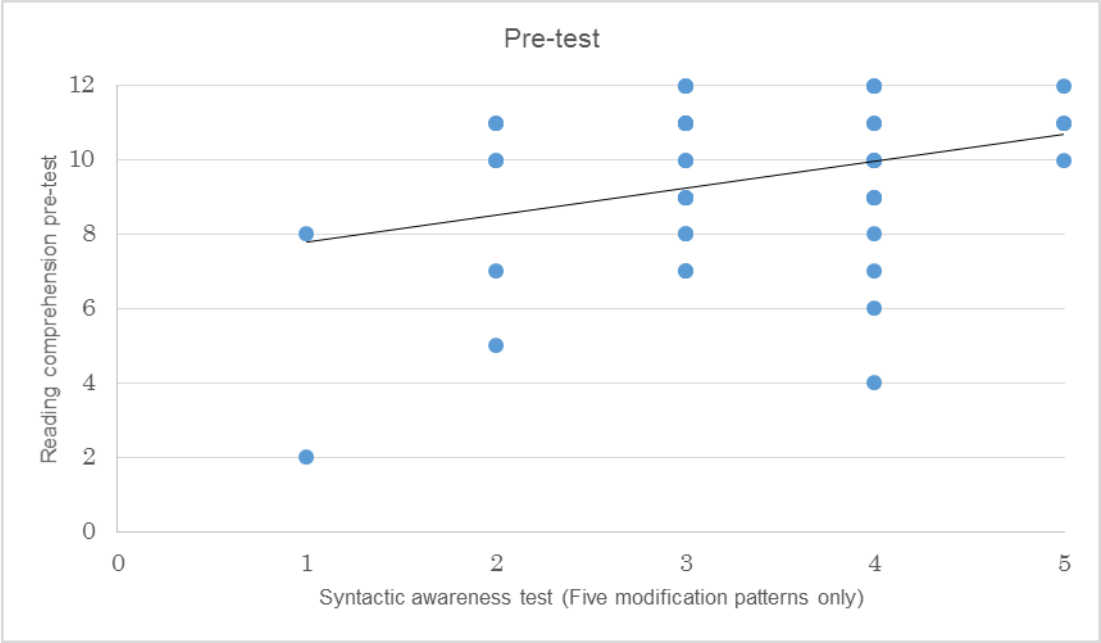


Figure 4.6. Relationships between the scores of the clause word orders and scores of the reading comprehension pre-test/post-test.



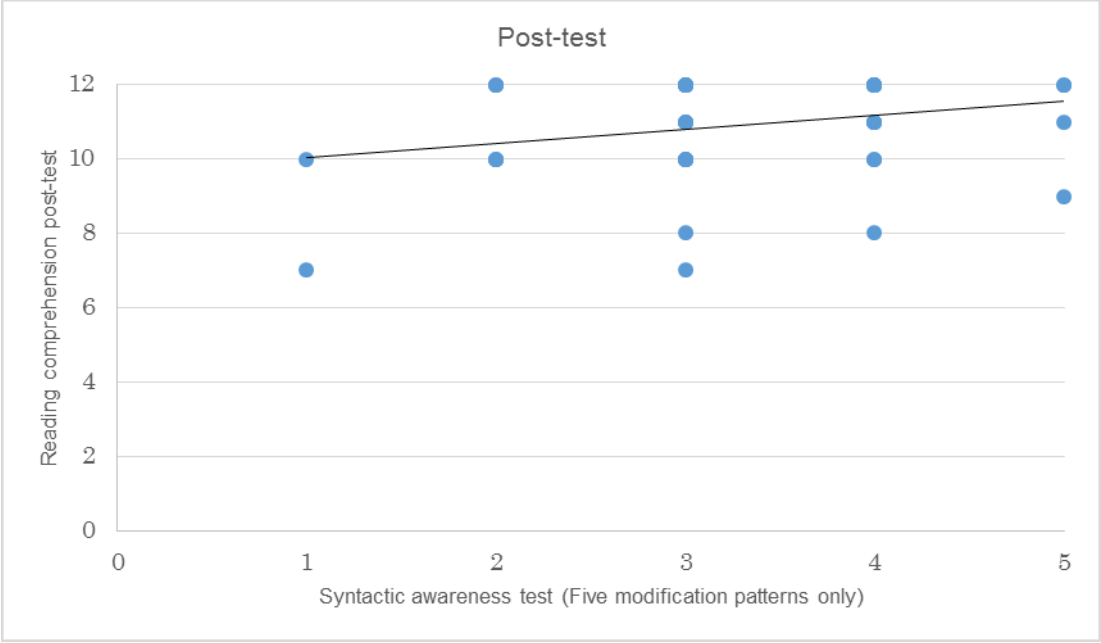


Figure 4.7. Relationships between the scores of the modification patterns and scores of the reading comprehension pre-test/post-test.

The scatter diagrams in Figures 4.6 and 4.7 show that the degree of the change of the relationship with the scores of the reading comprehension tests differed between the clause word orders and modification patterns. Compared with the modification patterns, the strength of the relationship of the clause word orders decreased more largely. Table 4.5 presents the results of correlational analyses separately conducted

with the total points on the seven clause orders and with the total points on the five modification patterns.

Table 4.5

Correlational Analyses for Each of the Clause Word Order Section and the Modification Pattern Section

		N	*r*	*t*	*p*
Clause word orders	Reading comprehension pre-test	48	.42 (moderate)	3.15	.002
	Reading comprehension post-test	48	.23 (weak)	1.60	.115
Modification patterns	Reading comprehension pre-test	48	.31 (weak)	2.24	.030
	Reading comprehension post-test	48	.26 (weak)	1.88	.067

The correlational analyses also showed that the strength of the relationship with the scores of the reading comprehension pre-test differed between the clause word orders and modification patterns. The degree of the change of the relationship with reading comprehension over the training period also differs between the two. On the clause word orders, there existed a positive moderate relationship between the participants' scores of the syntactic awareness test and scores of the reading comprehension pre-test (r (46) = .42), and there existed a positive weak relationship between the participants' scores of the syntactic awareness test and scores of the reading comprehension post-test (r (46) = .23). The significance test judged the calculated correlation coefficients as being statistically significant at the .05 probability level in terms of the relationship with the reading comprehension pre-test scores (p = .002) but not with the reading comprehension post-test scores (p = .115). Regarding the modification patterns, on the other hand, there existed a positive weak relationship both between the participants' scores of the syntactic awareness test and scores of the reading comprehension pre-test (r (46) = .31) and between the participants' scores of the syntactic awareness test and scores of the reading comprehension post-test (r (46) = .26). The significance test judged the calculated correlation coefficients as being statistically significant at the .05 probability level in terms of the relationship with the reading comprehension pre-test scores (p = .030) but not with the reading comprehension post-test scores (p = .067).

4.3.2 Relationship between awareness of a specific syntactic element and improvement of reading comprehension

Statistical analyses were performed to examine whether awareness of a specific syntactic element was concerned with improvement of the participants' reading comprehension. Figures 4.8 and 4.9 show how the mean scores differed between the reading comprehension pre-test and reading comprehension post-test in terms of the participants who were aware of each specific syntactic element. For each of the syntactic elements, a paired two-sample *t*-test was conducted to see whether there existed a statistically significant difference between the reading comprehension pre-test and reading comprehension post-test scores of participants who were aware of the specific syntactic element. The *t*-test examined whether the difference in mean scores between the reading comprehension pre-test and post-test was statistically significant.

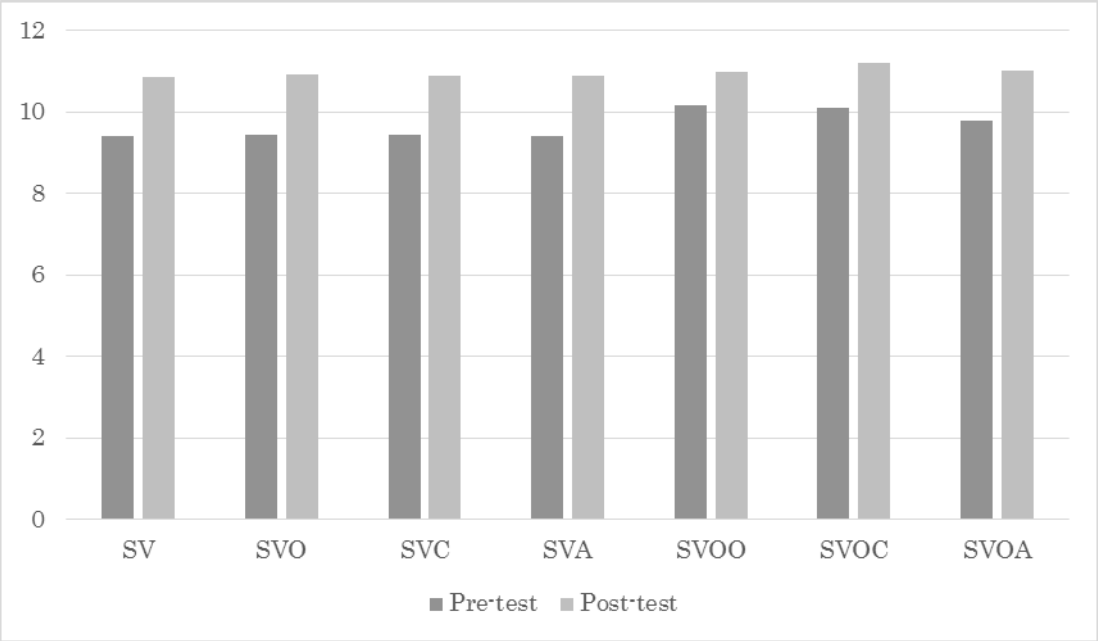


Figure 4.8. Mean scores of the reading comprehension pre-test and post-test of participants who were aware of a specific clause word order.

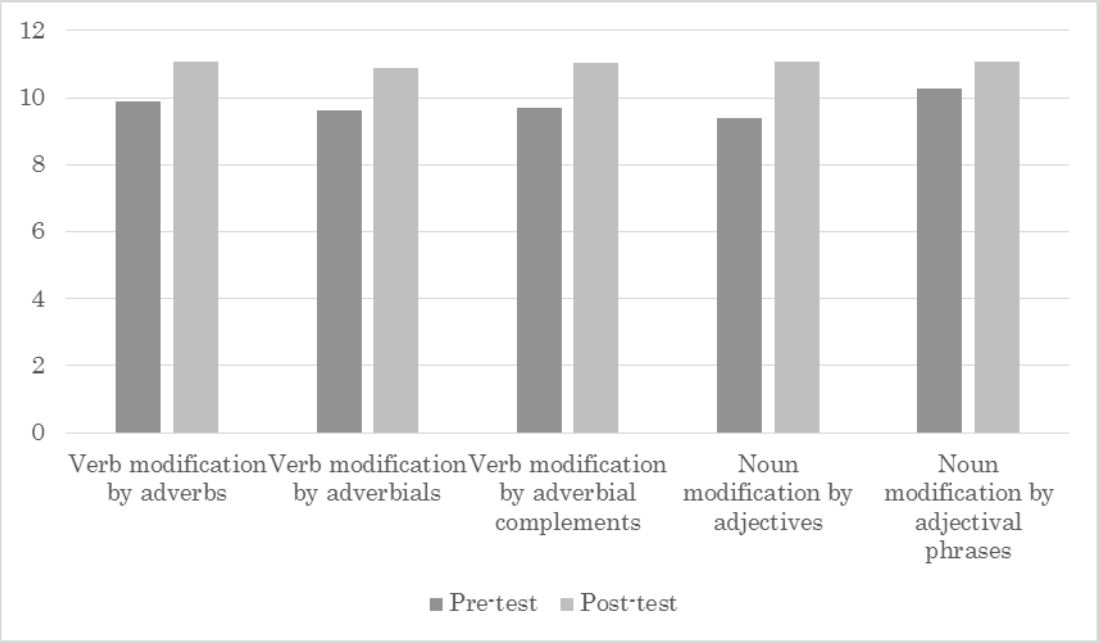


Figure 4.9. Mean scores of the reading comprehension pre-test and post-test of participants who were aware of a specific modification pattern.

To see whether reading comprehension of the participants who were aware of a specific syntactic element was improved, a paired two-sample *t*-test was conducted with a level of significance of .01, for each of the 12 syntactic elements. The *t*-test was intended to determine whether a statistically significant difference existed between the scores of the reading comprehension pre-test and post-test with respect to the participants who were aware of a specific syntactic element. The descriptive statistics of the *t*-test results are presented in different tables between the seven cause word orders (Table 4.6) and the five modification patterns (Table 4.7).

Table 4.6

Descriptive Statistics of the Reading Comprehension Pre-test and Post-test Scores of the Participants Who Were Aware of a Specific Clause Word Order

		N[1]	M	SD	Min	Max	*t*	*p*
SV clause word order	Pre-test	45	9.42	5.11	2	12	4.49	< .001
	Post-test		10.87	1.93	7	12		
SVO clause word order	Pre-test	47	9.45	4.90	2	12	4.90	< .001
	Post-test		10.94	1.89	7	12		
SVC clause word order	Pre-test	47	9.45	4.90	2	12	4.78	< .001
	Post-test		10.91	1.91	7	12		
SVA clause word order	Pre-test	46	9.41	4.91	2	12	4.81	< .001
	Post-test		10.91	1.90	7	12		
SVOO clause word order	Pre-test	24	10.16	2.49	6	12	2.68	.006
	Post-test		11.00	1.65	8	12		
SVOC clause word order	Pre-test	30	10.10	2.58	6	12	3.57	< .001
	Post-test		11.20	1.20	8	12		
SVOA clause word order	Pre-test	43	9.79	3.17	5	12	4.43	< .001
	Post-test		11.02	1.64	7	12		

Note: [1]N designates the number of the participants (out of 48) who were considered as being aware of the specific syntactic element.

Regarding all of the seven clause word orders, the participants who were aware of the specific syntactic awareness improved their reading comprehension. On each of the clause word orders, the difference in means between the reading comprehension pre-test and post-test scores was found to be statistically significant at the .01 probability level. The increases in means were statistically significant among the participants who were aware of the clause word orders: for the SV clause word order, $t = 4.49$, $df = 44$, $p < .001$ (one-tailed); for the SVO clause word order, $t = 4.90$, $df = 46$, $p < .001$ (one-tailed); for the SVC clause word order, $t = 4.78$, $df = 46$, $p < .001$ (one-tailed); for the SVA clause word order, $t = 4.81$, $df = 45$, $p < .001$ (one-tailed); for the SVOO clause word order, $t = 2.68$, $df = 23$, $p = .006$ (one-tailed); for the SVOC clause word order, $t = 3.57$, $df = 29$, $p < .001$ (one-tailed); for the SVOA clause word order, $t = 4.43$, $df = 42$, $p < .001$ (one-tailed). To verify the results of the *t*-test, effect sizes were calculated with two measures: Cohen's *d* and Pearson product-moment coefficient (*r*). The results of the calculations are shown in Table 4.7.

Table 4.7

Effect Sizes of the t-test Results of the Reading Comprehension Pre-test and Post-test Scores of the Participants Who Were Aware of a Specific Clause Word Order

	N[1]	Effect size	
		Cohen's *d*	Pearson product-moment coefficient (*r*)
SV clause word order	45	.37 (small)	.56 (large)
SVO clause word order	47	.40 (small)	.59 (large)
SVC clause word order	47	.40 (small)	.58 (large)
SVA clause word order	46	.40 (small)	.58 (large)
SVOO clause word order	24	.40 (small)	.49 (medium)
SVOC clause word order	30	.55 (medium)	.55 (large)
SVOA clause word order	43	.49 (small)	.57 (large)

Note: [1]N designates the number of the participants (out of 48) who were considered as being aware of the specific syntactic element.

On each of the seven clause word orders, the results of the *t*-test were supported by the effect sizes calculated with the two measures. For all of the seven clause word orders other than the SVOC clause word order (effect size = .55, meaning a medium effect), as shown in Table 4.7, Cohen's *d* indicated a small effect of the cognitive and metacognitive reading strategy training: for the SV clause word order, effect size equals .37; for the SVO clause word order, effect size equals .40; for the SVC clause word order, effect size equals .40; for the SVA clause word order, effect size equals .40; for the SVOO clause word order, effect size equals .40; for the SVOA clause word order, effect size equals .49. On the other hand, for all of the seven clause word orders other than the SVOO clause word order (effect size = .49, meaning a medium effect), Pearson's product-moment coefficient (*r*) indicated a large effect of the cognitive and metacognitive reading strategy training; for the SV clause word order, effect size equals .56; for the SVO clause word order, effect size equals .59; for the SVC clause word order, effect size equals .58; for the SVA clause word order, effect size equals .58; for the SVOC clause word order, effect size equals .55; for the SVOA clause word order, effect size equals .57.

While both of the Cohen's *d* and Pearson's product-moment coefficient (*r*) support the results of the *t*-test, the indicated magnitude of effect differed between the two measures. As described in Section 4.2, Pearson's product-moment coefficient (*r*) showed a larger magnitude than Cohen's *d* in terms of the differences between the reading comprehension pre-test and post-test scores of all participants: for Pearson's

product-moment coefficient (*r*), effect size equals .57, meaning a large effect; for Cohen's *d*, effect size equals .39, meaning a small effect. Similarly, Pearson's product-moment coefficient (*r*) overall showed larger magnitudes than Cohen's *d* with respect to the individual groups of participants who were aware of the specific clause word orders. Also, for the five modification patterns, a paired two-sample *t*-test was conducted with a level of significance of .01. Table 4.8 shows the descriptive statistics of the *t*-test results regarding each of the five modification patterns.

Table 4.8

Descriptive Statistics of the Reading Comprehension Pre-test and Post-test Scores of the Participants Who Were Aware of a Specific Modification Pattern

		N[1]	M	SD	Min	Max	*t*	*p*
Verb modification by adverbs	Pre-test	33	9.88	4.11	4	12	3.21	.001
	Post-test		11.06	1.37	8	12		
Verb modification by adverbials	Pre-test	33	9.61	3.93	4	12	3.24	.001
	Post-test		10.88	1.92	7	12		
Verb modification by adverbial complements	Pre-test	42	9.69	3.54	4	12	4.23	< .001
	Post-test		11.02	1.68	7	12		
Noun modification by adjectives	Pre-test	40	9.38	5.21	2	12	5.17	< .001
	Post-test		11.08	1.87	7	12		
Noun modification by adjectival phrases	Pre-test	11	10.27	1.42	8	12	1.69	.060
	Post-test		11.09	0.99	9	12		

Note: [1]N designates the number of the participants (out of 48) who were considered as being aware of the specific syntactic element.

Regarding the modification patterns other than noun modification by adjectival phrases, the participants who were aware of the specific syntactic awareness improved their reading comprehension. For these four modification patterns, the difference in means between the reading comprehension pre-test and post-test scores was statistically significant at the .01 probability level. On each of the four modification patterns, the achieved significance was less than .01 and thus the means of the pre-test and post-test scores were significantly different: for verb modification by adverbs, $t = 3.21$, $df = 32$, $p = .001$ (one-tailed); for verb modification by

adverbials, $t = 3.24$, $df = 32$, $p = .001$ (one-tailed); for verb modification by adverbial complements, $t = 4.23$, $df = 41$, $p < .001$ (one-tailed); for noun modification by adjectives, $t = 5.17$, $df = 39$, $p < .001$ (one-tailed). As for noun modification by adjectival phrases, the difference in means between the reading comprehension pre-test and post-test scores was not statistically significant at the .01 probability level. This suggests that the reading comprehension of the participants who were aware of the modification pattern did not improve their reading comprehension. As the achieved significance was more than .01, the means on the pre-test and post-test scores were not significantly different: $t = 1.69$, $df = 10$, $p = .060$ (one-tailed). For noun modification by adjectival phrases, the small number of the relevant participants (11) might adversely affect the result of the *t*-test.

To verify the results of the *t*-test, effect sizes were calculated with two measures: Cohen's *d* and Pearson product-moment coefficient (*r*). The results of the calculations are shown in Table 4.9.

Table 4.9

Effect Sizes of the t-test Results of the Reading Comprehension Pre-test and Post-test Scores of the Participants Who Were Aware of a Specific Modification Pattern

	N[1]	Effect size	
		Cohen's *d*	Pearson product-moment coefficient (*r*)
Verb modification by adverbs	33	.39 (small)	.49 (medium)
Verb modification by adverbials	33	.41 (small)	.50 (large)
Verb modification by adverbial complements	42	.48 (small)	.55 (large)
Noun modification by adjectives	40	.44 (small)	.64 (large)
Noun modification by adjectival phrases	11	.69 (medium)	.47 (medium)

Note: [1]N designates the number of the participants (out of 48) who were considered as being aware of the specific syntactic element.

On all of the five modification patterns, other than noun modification by adjectival phrases, the results of the *t*-test were supported by the effect sizes calculated with the two measures. For all of the four modification patterns, Cohen's *d* indicated a small effect of the cognitive and metacognitive reading strategy training: for verb

modification by adverbs, effect size equals .39; for verb modification by adverbials, effect size equals .41; for verb modification by adverbial complements, effect size equals .48; for noun modification by adjectives, effect size equals .44. On the other hand, Pearson's product-moment coefficient (*r*) indicated a large effect of the cognitive and metacognitive reading strategy training, in terms of verb modification by adverbials (effect size = .50), verb modification by adverbial complements (effect size = .55) and noun modification by adjectives (effect size = .64) and a medium effect size of the training, in terms of verb modification by adverbs (effect size = .49). As for noun modification by adjectival phrases, both of the two measures indicated a medium effect of the reading strategy training (for Cohen's *d*, effect size = .69; for Pearson's product-moment coefficient (*r*), effect size = .47). These results distinctly conflicted with the *t*-test result ($t = 1.69$, $df = 10$, $p = .060$ (one-tailed)), which indicated no improvement of the relevant participants' reading comprehension. However, it is presumable that the reading strategy training had a positive effect on the improvement of the participants who were aware of noun modification by adjectival phrases since the small number of the relevant participants (11) might adversely affect the *t*-test result.

4.3.3 Relationship between unawareness of a specific syntactic element and improvement of reading comprehension

If participants who were unaware of a specific syntactic element failed to improve their reading comprehension through the reading strategy training, the unawareness of the syntactic element might be concerned with the failure of improvement. Figure 4.10 shows how the mean scores differed between the reading comprehension pre-test and reading comprehension post-test in terms of participants who were unaware of each specific modification pattern. For each of the modification patterns, a paired two-sample *t*-test was conducted to see whether there existed a statistically significant difference between the reading comprehension pre-test and reading comprehension post-test scores of participants who were unaware of the specific modification pattern.

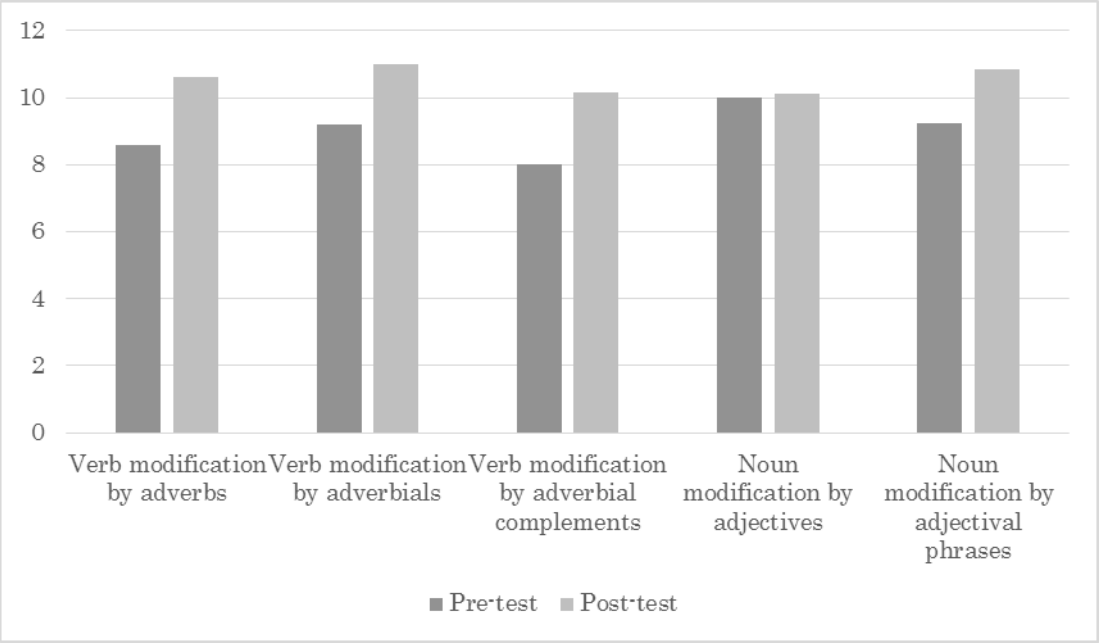


Figure 4.10. Mean scores of the reading comprehension pre-test and post-test of participants who were unaware of a specific modification pattern.

To see whether the reading comprehension of the participants who were unaware of a specific syntactic element improved through the reading strategy training, a paired two-sample *t*-test was also used with a level of significance of .01. The *t*-test was conducted only for each of the five modification patterns. The seven clause word orders were not subjected to the *t*-test since the number of the relevant participants and/or the number of appearances of the syntactic element in the pre-test and post-test passages was excessively small. The descriptive statistics of the *t*-test results are shown in Table 4.10.

Table 4.10

Descriptive Statistics of the Pre-test and Post-test Scores of the Participants Who Were Unaware of a Specific Modification Pattern

		N[1]	M	SD	Min	Max	*t*	*p*
Verb modification by adverbs	Pre-test	15	8.60	5.69	2	11	3.87	< .001
	Post-test		10.60	2.97	7	12		
Verb modification by adverbials	Pre-test	15	9.20	7.17	2	12	4.10	< .001
	Post-test		11.00	1.86	7	12		
Verb modification by adverbial complements	Pre-test	6	8.00	13.60	2	11	2.14	.043
	Post-test		10.17	2.97	7	12		
Noun modification by adjectives	Pre-test	8	10.00	3.14	7	12	0.20	.422
	Post-test		10.13	1.27	8	12		
Noun modification by adjectival phrases	Pre-test	37	9.24	5.69	2	12	4.48	< .001
	Post-test		10.86	2.18	7	12		

Note: [1]N designates the number of the participants (out of 48) who were considered as being unaware of the specific syntactic element.

For verb modification by adverbs, verb modification by adverbials and noun modification by adjectival phrases, the participants who were unaware of the specific modification pattern improved their reading comprehension. On each of these three modification patterns, the difference in means between the reading comprehension pre-test and post-test scores was statistically significant at the .01 probability level. The increases in means were statistically significant among the participants who were unaware of the modification patterns: for verb modification by adverbs, $t = 3.87$, $df = 14$, $p < .001$ (one-tailed); for verb modification by adverbials, $t = 4.10$, $df = 14$, $p < .001$ (one-tailed); for noun modification by adjectival phrases, $t = 4.48$, $df = 36$, $p < .001$ (one-tailed). Considering that the *t*-test indicated the existence of statistically significant differences in terms of verb modification by adverbs, verb modification by adverbials and noun modification by adjectival phrases, it seems that the relevant participants were able to use cognitive and metacognitive reading strategies although they were unaware of the modification patterns.

As for verb modification by adverbial complements and noun modification by adjectives, the participants who were unaware of the specific modification pattern

did not improve their reading comprehension. On each of these two modification patterns, the difference in means between the reading comprehension pre-test and post-test scores was not statistically significant at the .01 probability level: the achieved significance was more than .01. The increase in means was not statistically significant among the participants who were unaware of the specific modification patterns: for verb modification by adverbial complements, $t = 2.14$, $df = 5$, $p = .043$ (one-tailed); for noun modification by adjectives, $t = 0.20$, $df = 7$, $p = .422$ (one-tailed). For these two modification patterns, the small number of the relevant participants might adversely affect the results of the *t*-test: for verb modification by adverbial complements, the number of the relevant participants was 6, and for noun modification by adjectives, the number was 8.

To verify the results of the *t*-test, effect sizes were calculated with two measures: Cohen's *d* and Pearson product-moment coefficient (*r*). The results of the calculations are shown in Table 4.11.

Table 4.11

Effect Sizes of the t-test Results of the Reading Comprehension Pre-test and Post-test Scores of the Participants Who Were Unaware of a Specific Modification Pattern

	N[1]	Effect size	
		Cohen's *d*	Pearson product-moment coefficient (*r*)
Verb modification by adverbs	15	.44 (small)	.72 (large)
Verb modification by adverbials	15	.34 (small)	.74 (large)
Verb modification by adverbial complements	6	.22 (small)	.69 (large)
Noun modification by adjectives	8	.05 (almost no)	.08 (almost no)
Noun modification by adjectival phrases	37	.37 (small)	.60 (large)

Note: [1]N designates the number of the participants (out of 48) who were considered as being unaware of the specific syntactic element.

On all of the five modification patterns other than verb modification by adverbial complements, the results of the *t*-test were supported by the effect sizes calculated with the two measures while the presented magnitudes of effect differed between these measures. Cohen's *d* indicated a small effect of the cognitive and metacognitive

reading strategy training, in terms of verb modification by adverbs (effect size = .44), verb modification by adverbials (effect size = .34), verb modification by adverbial complements (effect size = .22) and noun modification by adjectival phrases (effect size = .37). On the other hand, Pearson's product-moment coefficient (*r*) indicated a large effect of the cognitive and metacognitive reading strategy training, in terms of verb modification by adverbs (effect size = .72), verb modification by adverbials (effect size = .74), verb modification by adverbial complements (effect size = .69) and noun modification by adjectival phrases (effect size = .60). For noun modification by adjectives, both of the two measures indicated almost no effect of the reading strategy training: for Cohen's *d*, effect size equals .05; for Pearson's product-moment coefficient (*r*), effect size equals .08. As for verb modification by adverbial complements, the results of both the Cohen's *d* measure (effect size = .22, meaning a small effect) and Pearson's product-moment coefficient (*r*) measure (effect size = .69, meaning a large effect) conflicted with the *t*-test result ($t = 2.14$, $df = 5$, $p = .043$ (one-tailed)), which suggested that the reading comprehension of the participants who were unaware of this modification pattern was not improved through the reading strategy training. For verb modification by adverbial complements, the mean value of the scores of the reading comprehension test largely increased from 8.00 (pre-test) to 10.17 (post-test), and the standard deviation of the scores largely decreased from 13.60 (pre-test) to 2.97 (post-test). Considering also that the *t*-test result might be adversely affected by the small number of the relevant participants (6), it is presumable that the reading strategy training had a positive effect on the improvement of the participants who were unaware of verb modification by adverbial complements.

4.4 Results from the Questionnaire

The anonymous questionnaire administered for the study aimed to look at how often and in which way the participants used individual reading strategies when reading the passages in the post-test. The questionnaire was composed of seven closed questions and two open-ended questions. The instructions and questions on the distributed questionnaire form (Appendix C) were written in Japanese, so that all participants were able to comprehend them fully: the English translations of the instructions and questions are also presented in Appendix C.

4.4.1 Closed questions

The closed questions were asked to see how often the participants used cognitive and

metacognitive reading strategies when reading the passages in the reading comprehension post-test. While a 5-point scale (i.e., “never”, “only occasionally”, “sometimes”, “usually” and “always”) is used for the Metacognitive Awareness of Reading Strategies Inventory (MARSI) designed by Mokhtari and Reichard (2002), a 4-point scale (i.e., “never”, “rarely”, “sometimes” and “often”) was used for this study since Japanese people cannot distinguish between “occasionally” and “sometimes”. Japanese language does not have equivalent words to distinguish between them, and in English-Japanese dictionaries, the same Japanese translation *tokidoki* is given to both of them as the translation equivalent. When the means and standard deviations of the responses to the individual statements were calculated, the ranks on the scale, “never”, “rarely”, “sometimes” and “often” were assigned 1, 2, 3 and 4 points respectively. Table 4.12 shows the analysis results of the responses to the closed questions.

Table 4.12

Summary of Analyses of the Responses to the Closed Questions (n = 48)

	Strategies	Number (percentage) of the relevant participants				M	SD
		Never	Rarely	Some-times	Often		
1	I think about what I know to help me understand what I read.	3 (6.3%)	10 (20.8%)	24 (50.0%)	11 (22.9%)	2.90	0.12
2	I preview the text to see what it's about before reading it.	5 (10.4%)	15 (31.2%)	14 (29.2%)	14 (29.2%)	2.77	0.14
3	I decide what to read closely and what to ignore.	3 (6.3%)	10 (20.8%)	24 (50.0%)	11 (22.9%)	2.90	0.12
4	I use context clues to help me better understand what I'm reading.	1 (2.1%)	3 (6.2%)	21 (43.8%)	23 (47.9%)	3.38	0.10
5	I try to guess what the material is about when I read.	0 (0.0%)	5 (10.4%)	14 (29.2%)	29 (60.4%)	3.50	0.10
6	I check to see if my guesses about the text are right or wrong.	3 (6.2%)	14 (29.2%)	17 (35.4%)	14 (29.2%)	2.88	0.13
7	I try to guess the meaning of unknown words or phrases.	1 (2.1%)	5 (10.4%)	16 (33.3%)	26 (54.2%)	3.40	0.11

The results showed that the participants on the whole were conscious of the seven reading strategies when reading the passages in the comprehension post-test. Table 4.12 shows that the means of the responses fall in the range from 2.77 to 3.40 and the deviations of the responses fall in the range from 0.10 to 0.14. Among the seven reading strategies listed in Table 4.12, the frequency of the use of the following three strategies was outstanding: (1) I use context clues to help me better understand what I'm reading (Strategy 4, $M = 3.38$, $SD = 0.10$); (2) I try to guess what the material is about when I read (Strategy 5, $M = 3.50$, $SD = 0.10$); (3) I try to guess the meaning of

unknown words or phrases (Strategy 7, M = 3.40, SD = 0.11). For these three strategies, the percentages of participants who marked for "often" on the scale were fairly high: 47.9% for Strategy 4; 60.4% for Strategy 5; and 54.2% for Strategy 7.

4.4.2 Open-ended questions

Besides the closed questions, open-ended questions were asked to enrich data about the participants' ways of using reading strategies. On the questionnaire form, the following two open-ended questions came after the seven closed questions: (1) Describe which strategies you mainly used in which ways to read and understand the passages; (2) Describe how you tried to solve problems when you had problems to understand any sentences.

Both open-ended questions were responded to by all of the 48 participants. The responses to the two questions were analyzed using a content analysis technique. Content analysis is generally known as a data reduction technique which breaks down written texts into meaningful units for better analysis and interpretation (Stemler, 2001). For this study, the different strategies mentioned in the participants' responses were classified into three categories: global reading strategies (GLOB), problem-solving strategies (PROB) and support reading strategies (SUP). This categorization follows the one employed in the MARSI designed by Mokhtari and Reichard (2002). Global reading strategies are techniques related to the whole text, such as deciding what to pay close attention to and what to ignore (Mokhtari & Reichard, 2002). Problem-solving strategies refer to approaches that a reader may take when comprehension difficulties arise, such as decreasing reading speed, rereading the text and guessing the meaning of unknown words (Mokhtari & Reichard, 2002). Support reading strategies involve other possible techniques intended to help a reader comprehend the text, such as using a dictionary, taking notes and underlining important information (Mokhtari & Reichard, 2002). The summary of the analyses is presented in English in Tables 4.13 and 4.14.

Table 4.13

Summary of Analysis of the Responses to Question 1 (Presented in Japanese)

Used strategy	Category[1]	Number of responses[2] (n = 58)
I preview the text to see what it's about before reading it.	GLOB	4
I try to locate information which I think important.	GLOB	2
I decide what to read closely and what to ignore.	GLOB	2
I read the titles first to help me understand what I read.	GLOB	1
I read the topic sentences of the text first to help me understand what I read.	GLOB	2
I try to get the main idea of the text.	GLOB	6
I try to get the main idea of the text before reading it carefully.	GLOB	3
I try to get the main idea of the text without being fixated on unknown words.	GLOB	3
I try to process the text paragraph by paragraph.	GLOB	4
I try to picture or visualize information to help me better understand what I'm reading.	GLOB	1
I try to read the text without translating it into Japanese.	GLOB	3
I try to guess the meaning of unknown words or phrases from the context.	PROB	10
I try to skip unknown words or difficult sentences without being fixated on them.	PROB	2
I read the questions first to know to what I should pay closer attention.	SUP	6
I read the questions first and then try to locate relevant sentences in the text.	SUP	6
I read the questions first to help me understand what I read.	SUP	3

Notes:

[1]GLOB, PROB and SUP stands for global reading strategies, problem-solving strategies and support reading strategies respectively.

[2]Some participants mentioned more than one strategy.

Table 4.13 shows that 31 out of the 58 responses to Question 1 fall in the category of global reading strategies. This result seems to support the results of the closed question section which indicated that the majority of the participants actively attempted to take some effective actions so that they would better comprehend the

meaning of sentences, phrases or words. The total number of responses was 58 (not 48) since the questionnaire did not ask the participants to mention only a single reading strategy and some participants mentioned more than one strategy. For example, one of the participants responded like “I tried to get the main idea of the text before reading it carefully, and also I tried to guess the meaning of unknown words from the context”.

While global reading strategies (GLOB) mentioned by the participants are diverse, the total number of responses which involve trying to get the main idea of the text is relatively large (n = 12). Since the participants were expected to read the passages in order to correctly answer the given questions, relatively large number of responses (n = 15) involve strategies in which the questions are read first. Some strategies mentioned by the participants are not found among the seven closed questions. Those strategies include “I try to locate information which I think important” and “I read the titles first to help me understand what I read”: both of them are categorized as GLOB.

Table 4.14

Summary of Analysis of the Responses to Question 2 (Presented in Japanese)

Used strategy	Category[1]	Number of responses[2] (n = 58)
I merely skip the sentence.	GLOB	7
I skip the sentence if guessing their meaning does not help.	GLOB	4
I skip the sentence, move on and come back to it later.	GLOB	4
I skip the sentence if it seems not to include important information.	GLOB	5
I try to get the main idea of the sentence without being fixated on unknown words.	GLOB	1
I try to guess the meaning of the sentence from the context.	PROB	28
I try to guess the meaning of the sentence from the context if it seems to include important information.	PROB	3
I try to guess the meaning of the sentence from known words.	PROB	4
I try to guess the meaning of the sentence from the questions.	PROB	1
I read the sentence several times.	PROB	1

Notes:
[1]GLOB, PROB and SUP stands for global reading strategies, problem-solving strategies and support reading strategies respectively.
[2]Some participants mentioned more than one strategy.

Table 4.14 shows that 28 out of the 58 responses to Question 2 involve strategies by which the participants try to guess the meaning of the sentence from the context. The number of responses that involve any kinds of meaning guessing strategies totals 36. This indicates that when having encountered incomprehensible sentences, many participants took positive problem-solving actions rather than merely skipping such sentences.

4.5 Summary

This section summarizes the results of the statistical analyses which were conducted to respond to the research questions. First, analyses were conducted to see whether the difference between the reading comprehension pre-test and post-test scores of all participants was statistically significant. A paired two-sample *t*-test with a level of significance of .01 indicated the existence of a significant difference between them,

thus suggested that the cognitive and metacognitive reading strategy training improved the participants' reading comprehension. The result of the *t*-test was supported by effect sizes calculated with two measures: Cohen's *d* and Pearson product-moment coefficient (*r*). However, since the magnitudes of effect presented by the two measures were not identical, it is not possible to report how much effect the reading strategy training had on the participants' reading comprehension.

Second, analyses were performed to look at how the participants' scores of the syntactic awareness test were related to their scores of the reading comprehension pre-test and post-test respectively. Correlational analyses indicated the existence of a positive moderate correlation between the participants' scores of the syntactic awareness test and scores of the reading comprehension pre-test. On the other hand, the analyses indicated the existence of a positive weak correlation between the participants' scores of the syntactic awareness test and scores of the reading comprehension post-test. That is, the strength of the relationship between the participants' syntactic awareness and reading comprehension decreased over the period of the cognitive and metacognitive reading strategy training: this decrease implied that, through the reading strategy training, the participants' syntactic awareness came to play a less important role in their reading comprehension than before. The statistical significance of the calculated correlation coefficients was supported by a significance test using a level of significance of .05, in terms of both the reading comprehension pre-test scores and post-test scores.

Moreover, with respect to the seven clause word orders and five modification patterns respectively, correlational analyses were conducted to see how the participants' scores of the syntactic awareness test were related to their scores of the reading comprehension pre-test and post-test. The analyses indicated that there was a positive moderate relationship between the scores of the clause word orders and scores of the reading comprehension pre-test and that there was a positive weak relationship between the scores of the clause word orders and scores of the reading comprehension post-test. Regarding the scores of the modification patterns, on the other hand, the analyses indicated that both of the relationship with the scores of the reading comprehension pre-test and the relationship with the scores of the reading comprehension post-test were weak. These findings imply that the improvement of the participants' reading comprehension through the reading strategy training was more closely related to the participants' awareness of the clause word orders than their awareness of the modification patterns.

Third, analyses were conducted to see whether a statistically significant difference existed between the reading comprehension pre-test and post-test scores of the participants who were aware of a specific syntactic element. On each of all seven clause word orders, the *t*-test with a level of significance of .01 indicated the existence of a significant difference between them, thus suggested that the participants with the specific syntactic awareness improved their reading comprehension through the cognitive and metacognitive reading strategy training. These results were supported by effect sizes calculated for Cohen's *d* and Pearson product-moment coefficient (*r*) while the magnitudes of effect presented by the two measures conflicted. On the other hand, for all five modification patterns other than noun modification by adjectival phrases, the *t*-test indicated the existence of a significant difference between the reading comprehension pre-test and post-test scores of the participants who were aware of the modification pattern, and the results of the *t*-test were supported by effect sizes calculated with the two measures. As for noun modification by adjectival phrases, however, the small number of the relevant participants (11) might adversely affect the *t*-test result. Mizumoto and Takeuchi, (2008, 2011) point out that an extremely small sample size tends to increase *p* values of a *t*-test. It is presumable that, also on the five modification patterns, the participants with the specific syntactic awareness improved their reading comprehension through cognitive and metacognitive reading strategy training.

Fourth, analyses were conducted to examine whether a statistically significant difference existed between the reading comprehension pre-test and post-test scores of the participants who were unaware of a specific syntactic element. This examination was conducted only for the five modification patterns. For verb modification by adverbs, verb modification by adverbials and noun modification by adjectival phrases, the *t*-test indicated the existence of a significant difference between the reading comprehension pre-test and post-test scores, and the results of the *t*-test were supported by effect sizes calculated with the two measures. This suggests that, on the three modification patterns, the relevant participants improved their reading comprehension through the cognitive and metacognitive reading strategy training although they were unaware of the specific syntactic awareness. Also for verb modification by adverbial complements, it is presumable that the relevant participants improved their reading comprehension through the reading strategy training even though the *t*-test did not indicate the existence of a significant difference between the reading comprehension pre-test and post-test scores.

Regarding verb modification by adverbial complements, not only the two effect size measures indicated a positive effect of the training but also the mean value of the scores of the reading comprehension test largely increased and the standard deviation of the scores largely decreased. The *t*-test result might be adversely affected by the small number of the relevant participants (6).

The results of statistical analyses of the responses to the closed questions in the questionnaire showed that the participants on the whole were conscious of all seven reading strategies when reading the passages in the comprehension post-test. This result upheld the view that the participants' conscious use of cognitive and metacognitive reading strategies helped them improve their reading comprehension. Among the seven reading strategies, the frequency of the use of the following three strategies was outstanding: (1) I use context clues to help me better understand what I'm reading; (2) I try to guess what the material is about when I read; (3) I try to guess the meaning of unknown words or phrases. The frequent use of these three strategies indicates that the majority of the participants actively attempted to use effective global reading strategies to increase their comprehension. The results of the closed question section were supported by the results of content analyses of the responses to the open-ended questions. The content analyses showed that the participants actively attempted to take global reading strategies and problem-solving strategies to better comprehend the meaning of sentences, phrases or words.

Chapter 5
Discussion

5.1 Overview

This chapter discusses how the results reported in Chapter 4 can be interpreted to respond to the research questions. Discussions are made about each of the following seven significant findings. The sections which discuss the respective findings are indicated in the parentheses. First, the participants' awareness of basic syntactic knowledge was positively related to their reading comprehension (Section 5.2.1). Second, the strength of the relationship between the participants' syntactic awareness and their reading comprehension was moderate before the cognitive and metacognitive reading strategy training and was weak after the reading strategy training (Section 5.2.2). Third, the significance to reading comprehension before the reading strategy training was moderate in terms of awareness of the clause word orders but was weak in terms of awareness of the modification patterns (Section 5.2.2). Fourth, on each of the five modification patterns other than noun modification by adjectives, participants who were unaware of the specific modification pattern improved their reading comprehension through the reading strategy training (Sections 5.3.1 and 5.4.2). Fifth, on each of the seven clause word orders and five modification patterns, participants who were aware of the specific syntactic element improved their reading comprehension through the reading strategy training (Section 5.3.2). Sixth, the magnitude of the effect of the reading strategy training conflicted between the two effect size measures: one measure showed a large effect but the other measure showed a small effect (Section 5.3.2). Seventh, the participants used some reading strategies more frequently than the other reading strategies when reading the passages in the comprehension post-test (Section 5.5).

5.2 Relationship between Syntactic Awareness and Reading Comprehension

This section discusses the findings about in which way and how closely the participants' awareness of basic syntactic knowledge was related to their reading comprehension. Regarding the relationship between readers' syntactic awareness and comprehension, one of the controversial issues is the strength of the relationship.

5.2.1 A positive relationship between syntactic awareness and reading comprehension

The participants' awareness of basic syntactic knowledge was found to be positively related to their reading comprehension. This finding is similar to results of previous studies (e.g., August, 2006; López, 2008; Morvay, 2012; Shiotsu & Weir, 2007; van Gelderen, et al., 2007) that reported the existence of a positive relationship between adolescent L2/FL readers' syntactic awareness and reading comprehension. It seems that general consensus has been made among reading researchers about the importance of the role played by syntactic awareness in the process of comprehension whereas the recognition of the magnitude of such a role differs among researchers. No other skills or knowledge may entirely take over the role of syntactic awareness.

It may be self-evident that readers' syntactic awareness plays an important role in reading comprehension. In order to comprehend the meaning of text, readers certainly need to extract various types of content information from the text and combine it with what they already knew from the text and/or from their background knowledge (Koda, 2004). Each of the sentences (or phrases) which compose a text is usually made up with multiple words, and the order of words in a sentence (or phrase) is determined based on certain syntactic rules (generally called grammar) shared by people who use the same language (Berman, 1984; Jung, 2009; López, 2008; Nuttall, 1996; Rivas, 1999). Therefore, awareness of such rules (i.e., syntactic awareness) is important for the reader to identify the syntactic relations among words in a sentence (or phrase) to comprehend its meaning (Berman, 1984; Jung, 2009; López, 2008; Nuttall, 1996; Rivas, 1999). Goodman (1967) described the process of reading as a psycholinguistic guessing game. However, when reading a text having syntactic and/or semantic complexity or a text written about an unfamiliar topic, readers may have difficulty identifying the syntactic relations among words in many sentences in the text without drawing on their syntactic awareness.

Despite accumulated empirical evidence and general consensus about the significance of syntactic awareness to reading comprehension, it was necessary in this study to verify that there existed an evident positive relationship between the participants' syntactic awareness and reading comprehension, because only a small number of empirical studies have been reported about the relationship between Japanese adolescent learners' syntactic awareness of English and their English reading comprehension.

5.2.2 Strength of the relationship between syntactic awareness and reading comprehension

As for the relationship between readers' syntactic awareness and comprehension, the strength of the relationship has been controversial. Regarding the relationship between them, a strong relationship was reported by many previous studies (e.g., August, 2006; López, 2008; Mokhtari & Thompson, 2006; Shiotsu & Weir, 2007; van Gelderen et al., 2007). In this study, however, the strength of the relationship between the participants' syntactic awareness and reading comprehension was found to be moderate before the cognitive and metacognitive reading strategy training and be weak after the reading strategy training.

It may be inappropriate to compare the strength of the relationships that were reported in different studies. The relationship between readers' syntactic awareness and reading comprehension is affected by many reader and text variables (Alderson, 2000; Feng, 2011a, 2011b; Kendeou & Broek, 2007; Koda, 2004; Shin, 2002), and those variables might differ significantly among previous reading studies. The relationship between syntactic awareness and reading comprehension has not yet drawn enough attention from researchers to build consensus about research methods, including assessment techniques and statistical techniques.

The strength of the relationship between the participants' syntactic awareness and reading comprehension decreased over the period of the training. This indicates that the relationship between readers' syntactic awareness and comprehension should be recognized as being dynamic. This view differs from previous studies which report the existence of a positive relationship between syntactic awareness and reading comprehension on the assumption that the relationship is static. Although the diversity of factors which affect reading comprehension has been frequently discussed in the reading literature, only the correlation between syntactic awareness and reading comprehension has been paid attention without appropriately considering other factors which might affect reading comprehension. This narrow-sighted approach may have refrained the relationship between syntactic awareness and reading comprehension from being properly clarified.

As for the strength of the relationship with the participants' reading comprehension before the training, a noteworthy difference was found between their awareness of the clause word orders and the modification patterns. For the awareness of the clause word orders, the strength of the relationship was moderate. As for the awareness of

the modification patterns, the strength of the relationship was weak. This difference between the clause word orders and the modification patterns implied that, before the training, the participants' awareness of the clause word orders played a more important role in their reading comprehension than their awareness of the modification patterns. Unlike the clause word orders, in most cases participants might not need to rely significantly on their awareness of the modification patterns to get the main idea of the passage. The following two sentences may explain the difference in necessity of accurate awareness between the clause word orders and modification patterns. The two sentences were extracted from the first passage in the reading comprehension pre-test (Appendix A).

- Edinburgh Festival Fringe began in the summer of 1947.
- The organizers of the Edinburgh International Festival had invited artists.

In the first sentence, "began" (verb) is modified by "in the summer of 1947" (adverbials). Without being precisely aware of this syntactic relation, readers having low language proficiency may get the gist of the sentence by combining familiar words (i.e., festival, began and summer) in the sentence with their background knowledge about festivals. The second sentence follows the SVO clause word order: where "the organizers of the Edinburgh International Festival" is S, "had invited" is V and "artists" is O. Readers who are not aware of the SVO word order may have trouble to identify which is the subject and predicate of the sentence and may not smoothly get the gist of the sentence. English is one of the languages in which the subject-predicate form is predominant, and thus it is important for readers to identify a subject and predicate in a sentence to comprehend the meaning of the sentence (Han, 2009).

5.3 Effect of Reading Strategy Training on Reading Comprehension

In this section, the focus of discussions is placed on the effect of the cognitive and metacognitive reading strategy on the participants' reading comprehension. If the notion of the linguistic threshold hypothesis (LTH) was valid, the reading strategy training might not improve the participants who were unaware of basic syntactic knowledge and the magnitude of the effect of the training might differ depending on which syntactic knowledge the participants were aware of.

5.3.1 A positive effect of reading strategy training on reading comprehension

It is presumable that the reading strategy training administered in this study helped the participants improve their reading comprehension. This presumption was supported by the results of the *t*-test, effect size measurements and anonymous questionnaire. As demonstrated in this study, reading strategy training is effective to improve L2/FL learners' reading comprehension if properly instructed and modeled by the teacher. However, not all L2/FL learners necessarily improve their reading comprehension through reading strategy training. The LTH posits that L2/FL readers who do not satisfy a linguistic threshold (syntactic threshold included) are not able to use cognitive and metacognitive reading strategies. Also in this study, some of the participants did not improve their reading comprehension through the training. One possible primary cause was their low syntactic awareness. The syntactic awareness test revealed that the syntactic awareness of some participants was significantly low. If participants who were unaware of any specific syntactic element did not improve their reading comprehension, the unawareness of the syntactic element might be the primary cause which hindered the participants from using reading strategies. In this case, the syntactic element can be considered as being required to use reading strategies (i.e., as being a component of the syntactic threshold).

Noteworthy statistical results were presented about the modification patterns. The statistical analyses revealed that even participants who were unaware of extremely basic syntactic knowledge improved their reading comprehension through the reading strategy training. The findings implied that even participants having low syntactic awareness became able to use cognitive and metacognitive reading strategies: that is, L2/FL readers may become able to use reading strategies irrespective of their level of syntactic awareness. The analyses showed that, on the five modification patterns other than noun modification by adjectives, participants who were unaware of the specific modification pattern improved their reading comprehension. Using verb modification by adverbs and verb modification by adverbials as examples, interpretations of the finding are presented below.

The following two sentences were used in the syntactic awareness test to examine the participants' awareness of verb modification by adverbs. On each sentence in the syntactic awareness test, participants were asked to choose a term or phrase which the highlighted term or phrase modified.

- (1)Chris **usually** (2)plays (3)tennis (4)after school.
- The (1)man (2)erased the (3)important (4)file **accidentally**.

Each of the two sentences contains only a single verb, and thus unlike a confusing sentence with multiple verbs as below, participants had no chance to hover between verbs to answer the questions.

- The man who downloaded$_{(verb)}$ the file accidentally$_{(adverb)}$ erased$_{(verb)}$ the file.

The participants who did not answer correctly about verb modification by adverbs might be unaware of an adverb's basic role as a modifier of a verb. Even on these participants who have significantly low syntactic awareness, the average score of the reading comprehension test increased from 8.60 (pre-test) to 10.60 (post-test), and the standard deviation of the scores decreased from 5.69 (pre-test) to 2.97 (post-test).

As for verb modification by adverbials, the following two sentences were used in the syntactic awareness test to examine the participants' awareness:

- The $_{(1)}$boys $_{(2)}$played $_{(3)}$baseball **in the ballpark**.
- The $_{(1)}$family $_{(2)}$eats $_{(3)}$at the restaurant **every weekend**.

Like verb modification by adverbs, verb modification by adverbials may be considered as an extremely basic syntactic element. Even though much less time has been spent to grammar instruction at Japanese junior and senior high schools than before (Morita, 2010; Oshita, 2007; Yamaoka, 2013), the majority of participants (33 out of 48) could answer the questions correctly because of the syntactic simplicity of the modification pattern. The participants who answered the questions wrong may be considered as having low syntactic awareness. Regarding these participants, however, the average score of the reading comprehension test increased from 9.20 (pre-test) to 11.00 (post-test). The standard deviation of their scores largely decreased from 7.17 (pre-test) to 1.86 (post-test).

If the commonly recognized notion of the LTH was appropriate, the participants who were unaware of basic syntactic knowledge such as verb modification by adverbs and verb modification by adverbials might not become able to use cognitive and metacognitive reading strategies and might not improve their reading comprehension through the reading strategy training. The findings of this study contested the validity of the commonly recognized notion of the LTH. For this issue, further discussions are made in Section 5.4.2.

5.3.2 Magnitude of the effect of reading strategy training on reading comprehension

When the effect of any language training is measured, the magnitude of the effect needs to be discussed. In this study, however, effect sizes calculated with the two measures distinctly conflicted in terms of the magnitude of the effect of the cognitive and metacognitive reading strategy training on all participants' reading comprehension. One measure indicated a large effect, but the other measure indicated a small effect. Therefore it is possible to merely report that the cognitive and metacognitive reading strategy training had some positive effects on the participants' reading comprehension and that the training decreased the significance of the participants' syntactic awareness to their reading comprehension. It may be also worth mentioning that the magnitude of the effect of reading strategy training may differ depending on the relationship between L1 and L2/FL: for example, how much the word orders of L1 resemble those of the target L2/FL.

Most of previous studies adopted only a single statistical technique and merely reported about whether or not the effectiveness of cognitive and metacognitive reading strategy training was found among their participants. They did not adopt any additional statistical technique such as effect size measurement to verify the results of statistical analyses and/or to measure the magnitude of the identified effect. As revealed in this study, however, the result of a statistical test may differ from the result of effect size measurement, and also conflicting results may be presented by two different kinds of effect size measurement. Reporting research findings based on only probability value calculations may mislead educators who are not properly informed of research methods which use statistical techniques.

The magnitude of the effect of reading strategy training on L2/FL readers' comprehension may vary depending on the basic syntactic knowledge which they are aware of. The linguistic threshold hypothesis (LTH) suggests that L2/FL readers' L2/FL proficiency significantly affects their use of cognitive and metacognitive reading strategies. This implies that the magnitude of the effect of reading strategy training may vary among L2/FL readers having different level of syntactic awareness. If this implication is appropriate, the magnitude of the effect of the training might vary depending on which specific syntactic element the participants were aware of. In the study, this possible difference among the syntactic elements was examined with the results of the *t*-tests and effect size measurements.

On all of the clause word orders and modification patterns, the descriptive statistics showed that the reading strategy training had a positive effect on the improvement of reading comprehension of participants who were aware of the specific syntactic element. Then, if effect size measurements revealed evident differences in effect size among the syntactic elements, it was presumable that the magnitude of the effect of the reading strategy training varied depending on the syntactic element which the participants were aware of. In the discussion on this issue, the SVOO, SVOC and SVOA clause word orders were excluded since the number of appearances of these clause word orders in the pre-test and post-test passages was excessively small.

On the SV, SVO, SVC and SVA clause word orders, neither of the effect size measures revealed any difference in the magnitude of the effect of the training. As for the five modification patterns, one measure (i.e., Cohen's *d*) indicated that the effect of the training on the participants who were aware of noun modification by adjectival phrases was larger than the effect on the participants who were aware of any of the other four modification patterns. This result implied that, among the five modification patterns, awareness of noun modification by adjectival phrases most significantly helped participants use reading strategies. However, only 11 out of the 48 participants answered the questions correctly, and thus the sample size (11) was much smaller than the sample sizes on the other four modification patterns (ranging from 33 to 42). Even though effect size measurements are recognized as not being affected by sample sizes (Mizumoto & Takeuchi, 2008, 2011), the small sample size on noun modification by adjectival phrases might affect the effect size calculation. Moreover, for noun modification by adjectival phrases, the increase of the mean score (10.27 to 11.09) of the reading comprehension test and the decrease of the standard deviation of the scores (1.42 to 0.99) were small. Therefore, awareness of noun modification by adjectival phrases might not be superior to awareness of the other modification patterns, in terms of the effect of the reading strategy training on the participants' reading comprehension.

Among the syntactic elements focused on in this study, any evident difference was not found in terms of the effect of the reading strategy training on the participants' reading comprehension. For the SV, SVO, SVC and SVA clause word orders, most of the participants (41 out of 48) were aware of all of the four clause word orders, thus only small statistical differences among the clause word orders were resulted. As for the modification patterns, the following two interpretations are possible. First, a single syntactic element was too small as a unit which might differentiate the effect

of the reading strategy training. Second, the participants' use of reading strategies was not affected by their level of syntactic awareness. For these interpretations, discussions are made in Section 5.4.2.

5.4 Relationship between Syntactic Awareness and Use of Reading Strategies

The statistical analyses revealed that the significance of the participants' syntactic awareness to reading comprehension decreased through the cognitive and metacognitive reading strategies and implied that the role of their syntactic awareness was partially taken over by their use of reading strategies. The LTH, on the other hand, implies that L2/FL readers need a certain level of syntactic knowledge to be able to use reading strategies. This section discusses this unclarified relationship between L2/FL readers' syntactic awareness and their use of reading strategies.

5.4.1 Transfer of the role of syntactic awareness to reading strategies

The findings of this study implied that the reading strategy training changed the role of the participants' syntactic awareness in reading comprehension. It is presumable that, through the training, participants came to rely significantly on their cognitive and metacognitive strategies and came to draw on their syntactic awareness less frequently than before. It appears that since participants changed the frequency and timing of drawing on their syntactic awareness, the significance of their syntactic awareness to reading comprehension decreased. The frequency and timing of drawing on syntactic awareness may differ depending on various reader and text variables. These reader variables include readers' knowledge of subject matters, syntactic knowledge, lexical knowledge, and purpose and way of reading, and these text variables include syntactic complexity of text, semantic complexity of text, difficulty of a subject matter and genre of text.

The role which the participants' use of cognitive and metacognitive reading strategies might take over from their syntactic awareness was to provide clues for identifying the syntactic relations among words in each sentence. In a case where readers are familiar with key words in a sentence and has sufficient content schemata, they may be able to properly guess the syntactic relations among words in the sentence by combining meaning of words with their content schemata. Among cognitive and metacognitive reading strategies, especially, activating appropriate content schemata

may effectively play the role of syntactic awareness. Schemata enhance reading comprehension through facilitation of inference (Guthrie & Mosenthal, 1987). Kong (2006) states, successful readers "use cues from text to initiate appropriate schemata to form hypotheses, and as they read on, they test these hypotheses and make appropriate adjustments as needs arise" (p. 22). The reading strategy training in this study might enable most of the participants to use reading strategies to identify the relations among words in a sentence. This seems to be evident in the statement "I use context clues to help me better understand what I'm reading" in the anonymous questionnaire (closed question section) to which 47.9 percent of the participants responded "often" and 43.8 percent responded "sometimes".

Readers' use of reading strategies do not necessarily take over the entire role of their syntactic awareness. Even while actively using reading strategies, readers may occasionally draw on their syntactic awareness, to locate context cues from syntactically-simple sentences and activate more schemata through the context cues. In a case where readers read a text written about an unfamiliar topic, they may rely significantly on their syntactic awareness throughout the process of reading because they are not able to guess the central meaning of sentences using their knowledge about the subject matter.

Moreover, readers' cognitive and metacognitive strategies are not always able to take over the role of syntactic awareness. It is impossible for readers to identify all syntactic relations of words in a text merely relying on cognitive and metacognitive reading strategies, without drawing on their syntactic awareness at all. When reading strategies do not function to comprehend the meaning of a sentence, readers may resort to their syntactic awareness. The following sentence may explain the importance of the role which readers' syntactic awareness plays. The sentence was extracted from the second passage of the reading comprehension pre-test (Appendix A).

- Franklin hoped that this$_{(S)}$ would make$_{(V)}$ travel between Europe and Asia$_{(O)}$ faster$_{(C)}$.

The sentence above contains a clause which follows the SVOC clause word order. The clause is made of only words which are familiar to most Japanese university students: in the clause, "this" refers to "a new route to Asia through the Arctic Ocean" in the preceding sentence. Even though Japanese university students have abundant background knowledge about travel, Europe and Asia, they may not

smoothly comprehend the meaning of the sentence, if they are unaware of the SVOC clause word order and the function of "make" as a causative verb. If the clause does not contain "make", it may be easy for most students to guess the meaning of the sentence by combing the meanings of "travel between Europe and Asia" and "faster" with information which they already knew from the preceding sentences. However, the presence of "make" may confuse and cause many students to wonder how they should link the verb with other words in the clause. Since "make" is a verb, many students may think that the word is too important to ignore and thus may not exclude the verb from the clause when attempting to guess the meaning of the clause.

5.4.2 Basic syntactic knowledge required to be able to use reading strategies

One of the research questions of this study was, which basic syntactic knowledge was required for the participants to be able to use cognitive and metacognitive reading strategies. This question originated from the commonly recognized notion of the linguistic threshold hypothesis (LTH). The statistical analyses of this study, however, revealed findings which were inconsistent with the notion. Even the participants who were unaware of extremely basic syntactic knowledge such as verb modification by adverbs and verb modification by adverbials improved their reading comprehension through the reading strategy training. This finding suggested that even the participants who might not satisfy the syntactic threshold assumed by the LTH became able to use cognitive and metacognitive reading strategies. The finding implies that L2/FL readers may become able to use cognitive and metacognitive reading strategies irrespective of their level of syntactic awareness: satisfying a certain level of syntactic awareness may not be required to be able to use reading strategies. Therefore, assuming that the validity of this study is satisfactory, the commonly recognized notion of the LTH may be invalid.

The finding of the study, however, is consistent with the notion of the short circuit hypothesis presented by Clarke (1979, 1980). As mentioned in Section 2.5.1, the short circuit hypothesis and the LTH do not share the same notion. It is inappropriate to consider Clarke (1979, 1980) and Cziko (1980) as the originators of the LTH. One description which Clarke (1980) made about participants in his study is meaningful to properly interrupt his assertion about L2 reading. He attributed unsuccessful L2 reading of two Spanish-speaking participants (Reader 1 and Reader 2) having low L2 proficiency to different causes: Reader 1 was much more successful L1 reader than Reader 2 while the two readers' L2 proficiency level was almost the same. Clarke

(1980) said, “Reader 1 is a good reader in his native language; perhaps all he needs is to be ‘reminded’ of reading strategies which he uses in Spanish” (p. 208). He then added “Reader 2, on the other hand, would seem to require more fundamental instruction in how to read effectively” (p. 208). This description is inconsistent with the commonly recognized notion of the LTH. The description explicitly suggests that even L2/FL readers having low L2/FL proficiency can improve their reading comprehension through reading strategy training.

As discussed in Section 5.4.1, readers’ cognitive and metacognitive strategies are not always able to take over the role of syntactic awareness. In a case where the reader’s cognitive and metacognitive strategies do not function to comprehend the meaning of a sentence, the reader may need to resort to his/her syntactic awareness. However, drawing on the syntactic awareness may not help the reader identify the relations among words in the sentence if his/her level of syntactic awareness is lower than the level which is required to properly interpret the syntactic relations among the words. This required level of syntactic awareness may be referred to as a syntactic threshold. The notion of this syntactic threshold is completely different from the commonly recognized notion of a linguistic threshold, which means a certain level of language proficiency to be satisfied by L2/FL readers to become able to use reading strategies.

The syntactic threshold proposed in this study does not concern enabling/disabling L2/FL readers to use reading strategies. Without satisfying this threshold, L2/FL readers may become able to use reading strategies through reading strategy training and may improve their reading comprehension. Readers may use their phonological awareness (e.g., skill for segmentation of words in sentences and skill for identifying sounds in words) rather than their syntactic awareness to identify words in a sentence and activate their content schemata through the identified words. Word recognition is much more strongly affected by phonological awareness than syntactic awareness (Blackmore & Pratt, 1997; Durgunoğlu, 2002; Mokhtari & Thompson, 2006; Pascale & Francoise, 2003; Tunmer & Hoover, 1993). Therefore, having basic phonological awareness (not syntactic awareness) seems to be enough to become able to use reading strategies.

The syntactic threshold proposed in this study is not absolute, and its components vary depending on various reader and text variables. Among these variables, especially text content, genre of text and readers’ purpose and way of reading may significantly affect the threshold’ components: text content can be classified into

syntactic complexity of text, semantic complexity of text and difficulty of a subject matter. Depending on genres of texts, syntactic structures which are frequently used differ (Knapp & Watkins, 2005). Depending on syntactic complexity of text (Koda, 2004; López, 2008), semantic complexity of text (López, 2008), difficulty of a subject matter (Chan, 2003) and readers' purpose and way of reading (Shiotsu & Weir, 2007), different levels of syntactic awareness are required for readers.

When choosing reading materials for reading lessons or reading comprehension tests, teachers in L2/FL reading classes should assume a syntactic threshold which results from combinations of the above-mentioned variables. In a case where L2/FL readers do not satisfy the required syntactic threshold, they may not be able to draw on their syntactic awareness at all when their reading strategies do not function. When administering reading strategy training, it may be also important for the teacher to give his/her students instructions on the timing and way of resorting to syntactic awareness. If a reading material chosen by the teacher imposes a syntactic threshold which is beyond the students' level of syntactic awareness, the students cannot practice the timing and way of resorting to syntactic awareness: they may skip all sentences which they cannot comprehend with reading strategies.

Table 5.1 shows combinations of the parameters of the main variables which may determine the syntactic threshold. In this study, a syntactic threshold which might result from the following combination was assumed when reading materials for the reading strategy training and reading comprehension tests were chosen: skimming, search reading, scanning, moderate syntactic complexity/ semantic complexity/ difficulty of a subject matter (text content) and description (genre of text). Regarding the purpose and way of reading, all of skimming, search reading and scanning were applied to the study.

Table 5.1

Combinations of the main variables which affect a syntactic threshold

Main variables	Purpose and way of reading[1]	Text content			Genre of text
		Syntactic complexity	Semantic complexity	Difficulty of a subject matter	
Parameters	• Skimming • Search reading • Scanning • Careful reading • Browsing	• High • Moderate • Low	• High • Moderate • Low	• High • Moderate • Low	• Description • Explanation • Instruction • Exposition • Narration • Argumen-tation

Note: [1]The classification follows the one suggested by Urquhart and Weir (1998).

5.5 Choice and Use of Reading Strategies

The findings of this study implied that the role of the participants' syntactic awareness in reading comprehension was partially taken over by the use of cognitive and metacognitive strategies. The role of syntactic awareness is to allow readers to identify the syntactic relations among words in a sentence (Berman, 1984; Jung, 2009; López, 2008; Nuttall, 1996; Rivas, 1999). Therefore, when reading the passages in the reading comprehension post-test, participants might frequently choose and use reading strategies which allowed them to identify the syntactic relations among words in the passages.

The results of the statistical analyses of the responses to the closed questions in the anonymous questionnaire showed that the participants on the whole were making an effort to use all of the seven reading strategies (listed as statements in the closed-question section) when reading the passages in the comprehension post-test. Among the seven reading strategies, however, the frequency of the use of the following three strategies was outstanding: (1) I use context clues to help me better understand what I'm reading; (2) I try to guess what the material is about when I read; (3) I try to guess the meaning of unknown words or phrases. All of these three are global reading strategies.

Among the above-mentioned three strategies, the first two strategies might serve functions similar to syntactic awareness. It is probable that participants frequently used context clues to identify the syntactic relations among words in a sentence while combining the context clues with the words in the sentence and with their content

schemata. Participants also might frequently guess the meaning of sentences by combining words in a sentence with their content schemata both to comprehend a sentence which they are currently reading and to predict information which the subsequent sentence would include. It is also probable that to identify the syntactic relations among words in a sentence, even participants having high language proficiency attempted to use their cognitive and metacognitive strategies before resorting to their syntactic awareness because using these strategies might enable them to comprehend the meaning of a sentence more smoothly than drawing on syntactic awareness.

The frequency of use of the other four strategies listed in the 7-statement questionnaire (close question section) was comparatively low. These strategies were "I think about what I know to help me understand what I read", "I preview the text to see what it's about before reading it", "I decide what to read closely and what to ignore" and "I check to see if my guesses about the text are right or wrong". The first three are pre-reading cognitive strategies and the last one is a while-reading metacognitive reading strategy. All of the four strategies are common in that readers do not choose the strategy as the one for locating specific information. These four strategies might be used less frequently because participants were required to comprehend the passages within the limited period of time to answer the questions which were given in the reading comprehension post-test: they might not want to spend time to the pre-reading process nor to quit the comprehension process halfway and use a metacognitive reading strategy. In a case where the reader decides to use the strategy "I think about what I know to help me understand what I read", he/she needs to interrupt the comprehension process and then spend time in thinking about his/her background knowledge.

The findings of Martinez's (2008) study agreed with this study in that the frequency of the use of the three strategies aforementioned is higher than that of the other four strategies. He conducted a survey with 157 Spanish-speaking university students taking English for Specific Purposes (ESP) classes, using all of the 30 statements listed in the Metacognitive Awareness of Reading Strategies Inventory (MARSI) designed by Mokhtari and Reichard (2002). 56.7% of the participants were from an engineering department and 43.3% were from a chemistry department. In regular ESP classes, the participants were instructed to read each of the statements and circle the number (which best represents the frequency of use for reading academic materials) on a 5-point Likert scale ranging from 1 (I never or almost never use this

strategy) to 5 (I always or almost always use this strategy). Martinez's (2008) study and this study were common in that the participants were taking ESP classes. One typical objective of an ESP class for scientific or engineering students is enabling them to develop abilities for efficiently locating needed information in scientific or technical texts and correctly comprehending the meaning of sentences which may include needed information (Rao, 2014). The three strategies more frequently used by the participants in Martinez's (2008) study and this study might serve for this reading purpose.

The results of the content analyses of the participants' responses to the open-ended questions in the questionnaire also indicated that the majority of the participants actively attempted to take effective actions in order to better comprehend the meaning of sentences, phrases or words. The analyses of the participants' responses to Question 1 (i.e., Describe which strategies you mainly used in which ways to read and understand the passages) showed that the large majority of the participants used strategies classified as global reading strategies. Considering also the results of the closed question section, it is presumable that the cognitive and metacognitive reading strategy training successfully motivated most of the participants to use global reading strategies found to be effective in previous studies (e.g., Hardin, 2001; Kong, 2006; Pearson & Gallagher, 1983; Sheorey & Mokhtari, 2001; Zhang, Gu, & Hu, 2008). The participants who had entirely or mostly relied on local reading strategies might come to acknowledge the effectiveness of global reading strategies through the reading strategy training and might become conscious of using global reading strategies which they found effective. On the other hand, the analyses of the participants' responses to Question 2 (i.e., Describe how you tried to solve problems when you had problems to understand any sentences) showed that the majority of the participants tried to guess the meaning of the sentence from the context rather than instantly skipping incomprehensive sentences. Those participants made such an attempt possibly because (1) they improved the skill of guessing the meaning of a sentence from the context, through the reading strategy training and (2) they needed to answer the questions given in the reading comprehension post-test.

5.6 Summary

The participants' awareness of basic syntactic knowledge was found to be positively related to their reading comprehension. Considering the important role of syntactic awareness in reading comprehension (i.e., helping readers identify the syntactic relations among words in a sentence), this finding may be a predictable result. The

finding, however, was meaningful because only a small number of empirical studies have been conducted with Japanese adolescent learners to examine the relationship between their syntactic awareness of English and their English reading comprehension.

Regarding the relationship between the participants' syntactic awareness and reading comprehension, its strength before the reading strategy training was moderate and the strength after the training was small. These levels of the strength of the relationship were inconsistent with some previous studies (e.g., López, 2008; Shiotsu & Weir, 2007; van Gelderen et al., 2007) which reported a strong relationship. However, since the relationship is affected by many reader and text variables (Feng, 2011a, 2011b; Kendeou & Broek, 2007; Koda, 2004), it is inappropriate to compare the strength of the relationships that were reported in different studies. The reader and text variables differed significantly among previous reading studies. The revealed decrease of the strength of the relationship indicates that the relationship between readers' syntactic awareness and comprehension should be recognized as being dynamic, not being statistic.

Through the examination of the relationship of the participants' reading comprehension with their awareness of the clause word orders and with their awareness of the modification patterns, a noteworthy difference (between the two groups of syntactic elements) was found in terms of the strength of the relationship before the training. The strength of the relationship was moderate for the clause word orders but was weak for the modification patterns. This difference implied that, before the training, the participants' awareness of the clause word orders played a more important role than the modification patterns in the process of comprehension. When reading the passages of the reading comprehension pre-test, participants may have drawn on their awareness of the clause word orders more frequently than that of the modification patterns.

It is presumable that the improvement of the participants' reading comprehension has been attributed to the cognitive and metacognitive reading strategy training. The magnitude of the effect of the training, however, cannot be reported in this study. The effect sizes calculated with the two measures distinctly conflicted in terms of the magnitude of the effect of the training on all participants' reading comprehension. The study, on the other hand, revealed that the training decreased the significance of the participants' syntactic awareness to their reading comprehension. This finding

implied that the role of the participants' syntactic awareness was partially taken over by their use of cognitive and metacognitive reading strategies.

The linguistic threshold hypothesis (LTH) assumes that L2/FL readers' level of syntactic awareness significantly affects their abilities of using reading strategies and implies that the magnitude of the effect of reading strategy training varies among L2/FL readers having different levels of syntactic awareness. If this implication was appropriate, the magnitude of the effect of the reading strategy training might vary depending on which specific syntactic element the participants were aware of. However, on the clause word orders and modification patterns focused on in this study, no evident difference in magnitude of the effect of the training was found among different groups of participants who were aware of the specific syntactic element. For this result, the following two interpretations are possible: (1) a single syntactic element was too small as a unit which might differentiate the effect of the reading strategy training; (2) participants' use of reading strategies was not affected by their level of syntactic awareness.

This study was motivated by the notion of the LTH and was designed to identify basic syntactic knowledge which was required for the participants to be able to use cognitive and metacognitive reading strategies. The study's findings, however, were inconsistent with the notion. The findings revealed that even the participants who were unaware of extremely basic syntactic knowledge improved their reading comprehension through the reading strategy training and implied that even participants having low syntactic awareness became able to use cognitive and metacognitive reading strategies. This implication contests the validity of the commonly recognized notion of the LTH. Readers may use their phonological awareness (not syntactic awareness) to identify words in a sentence, so that they activate their content schemata through the identified words. Therefore, having basic phonological awareness (not syntactic awareness) seems to be enough to become able to use reading strategies.

The findings of this study also implied that the reading strategy training changed the role of the participants' syntactic awareness in reading comprehension and that the role was partially taken over by the use of cognitive and metacognitive reading strategies. It is presumable that, through the training, participants came to rely significantly on their cognitive and metacognitive reading strategies and came to draw on their syntactic awareness less frequently than before. The role taken over by

the use of reading strategies was to provide readers with clues for identifying the syntactic relations among words in each sentence. The reading strategy training in this study might enable most of the participants to effectively use reading strategies to identify the relations among words in a sentence.

Using reading strategies does not necessarily take over the entire role of syntactic awareness. Even while actively using reading strategies, readers may draw on their syntactic awareness to locate context cues from syntactically-simple sentences and activate more schemata through the context cues. In a case where readers read a text written about an unfamiliar topic, they may rely significantly on syntactic awareness from the beginning because they are not able to guess the central meaning of sentences using their knowledge about the subject matter.

Moreover, readers' cognitive and metacognitive reading strategies are not always able to take the place of syntactic awareness. When cognitive and metacognitive reading strategies do not function to comprehend the meaning of a sentence, the reader may resort to his/her syntactic awareness. The timing and frequency of drawing on syntactic awareness may differ depending on various factors such as the reader's knowledge of subject matters, semantic complexity of text and difficulty of subject matters. Drawing on the syntactic awareness, however, may not help the reader identify the relations among words in the sentence if his/her level of syntactic awareness is lower than the level which is required to properly interpret the syntactic relations among the words. This required level of syntactic awareness is a syntactic threshold which is proposed in this study. The notion of this syntactic threshold completely differs from the commonly recognized notion of a linguistic threshold, which needs to be satisfied to be able to use reading strategies.

The components of the syntactic threshold proposed in this study vary depending on many reader and text variables. Among those variables, especially text content (i.e., syntactic complexity of text, semantic complexity of text and difficulty of a subject matter), genre of text and readers' purpose and way of reading may significantly affect the threshold' components. When choosing reading materials for reading lessons or reading comprehension tests, the teacher in an L2/FL reading class should assume a syntactic threshold which may result from combinations of these main variables. If chosen reading materials impose a syntactic threshold which exceeds students' level of syntactic awareness, the students may skip all sentences which they cannot comprehend with reading strategies, without practicing the timing and way of

resorting to their syntactic awareness.

The participants' active attempts to use reading strategies were confirmed by the results of the anonymous questionnaire. Their responses to the closed questions in the questionnaire revealed that the participants on the whole made an effort to use all of the seven reading strategies (listed as statements in the questionnaire) when reading the passages in the comprehension post-test. Among the seven reading strategies, the frequency of the use of the following three strategies was outstanding: (1) I use context clues to help me better understand what I'm reading; (2) I try to guess what the material is about when I read; (3) I try to guess the meaning of unknown words or phrases. All of these three are global reading strategies. Among the three strategies, the first two strategies might help the participants identify relations among the words in a sentence in place of their syntactic awareness. The results of the participants' responses to the open-ended questions also confirmed the participants' active attempts to take effective actions in order to better comprehend the passages.

Chapter 6
Conclusions and Implications

6.1 Conclusions

The main aim of this study was to explore the relationship between Japanese university students' English syntactic awareness and their use of cognitive and metacognitive reading strategies. To achieve the aim, the study was designed to answer the three research questions described in Section 1.2 through a quasi-experimental approach (pre-test/post-test design) and quantitative analyses. These research questions are as follows:

1. What is the relationship between Japanese university students' basic syntactic knowledge of English and their English reading comprehension?
2. In which way does cognitive and metacognitive reading strategy training affect the relationship between the students' basic syntactic knowledge of English and their English reading comprehension?
3. Which basic syntactic knowledge is required for the students to be able to use cognitive and metacognitive reading strategies?

Regarding Question 1, this study concludes that Japanese university students' awareness of basic syntactic knowledge is positively related to their reading comprehension and also that the strength of the relationship decreases through reading strategy training. This decrease of the strength indicates that the relationship should be recognized as being dynamic, not being statistic. The strength of the relationship may change as any other factors which affect reading comprehension change. These factors may include syntactic complexity of text, semantic complexity of text, difficulty of a subject matter, genre of text and readers' purpose and way of reading. The degree of the change may differ depending on which factors change and how much these factors change. On Question 1, it was also found that, before the reading strategy training, participants' reading comprehension was more closely related with their awareness of the clause word orders than that of the modification patterns. When Japanese university students attempt to comprehend texts by relying significantly on local strategies, their awareness of the clause word orders may play a more important role than that of the modification patterns.

For Question 2, this study concludes that cognitive and metacognitive reading

strategy training decreases the significance of Japanese university students' syntactic awareness to their reading comprehension. It is presumable that, through reading strategy training, the role of students' syntactic awareness (i.e., helping students identify the relations among words in a sentence) is partially taken over by the use of reading strategies. The role of students' syntactic awareness may be taken over not entirely but partially for the following two reasons. First, using reading strategies is not always able to take the place of syntactic awareness. In a case where students read a text written about an unfamiliar topic, they may need to actively draw on their syntactic awareness because they can hardly activate their content schemata. Second, even while actively using reading strategies, students may draw on their syntactic awareness to locate context cues from syntactically-simple sentences and activate more content schemata through the context cues. The frequency and timing of drawing on syntactic awareness may differ depending on various factors including syntactic complexity of text, semantic complexity of text and difficulty of a subject matter.

As for Question 3, this study concludes that any specific basic syntactic knowledge is not required for Japanese university students to be able to use cognitive and metacognitive reading strategies. Even the participants who were unaware of extremely basic syntactic knowledge such as verb modification by adverbs and verb modification by adverbials improved their reading comprehension through the reading strategy training. This finding suggests that even students who have low level of English language proficiency and do not satisfy the linguistic threshold assumed by the LTH become able to use cognitive and metacognitive reading strategies. Since basic phonological awareness helps readers identify words in a sentence to activate content schemata, the finding implies that having basic phonological awareness (not syntactic awareness) is enough to become able to use reading strategies. This conclusion is inconsistent with the widely recognized notion of the LTH.

According to the commonly recognized notion of the LTH, L2/FL readers need to satisfy a syntactic threshold (part of a linguistic threshold) to be able to use cognitive and metacognitive reading strategies. The findings of this study, however, propose a syntactic threshold whose notion is inconsistent with the widely recognized notion of the LTH. The syntactic threshold proposed in the study is a threshold which needs to be satisfied to be able to draw on syntactic awareness when reading strategies do not function to comprehend the meaning of a sentence.

Using cognitive and metacognitive reading strategies is not always able to take over the role of syntactic awareness. When cognitive and metacognitive reading strategies are ineffective to comprehend the meaning of a sentence, the L2/FL reader may need to resort to his/her syntactic awareness. However, even drawing on syntactic awareness may not help the L2/FL reader if his/her level of syntactic awareness is lower than the level which is required to properly identify the syntactic relations among words in the sentence. This study concludes that this required level of syntactic awareness is a syntactic threshold, which teachers in L2/FL reading classes should consider when choosing reading materials.

6.2 Implications

The widely recognized notion of the LTH motivated this study to examine which basic syntactic knowledge was required for Japanese students to be able to use cognitive and metacognitive reading strategies. The findings of the study, however, did not support this notion. It is presumable that L2/FL learners become able to use reading strategies irrespective of their level of L2/FL proficiency, by being reminded of reading strategies which they use for L1 reading and/or by learning new reading strategies, through reading strategy training. It appears that teachers' ways of administering reading strategy training (not students' L2/FL proficiency) determine whether or not their students become able to use reading strategies. Students use not syntactic awareness but phonological awareness to identify words in a sentence, so that content schemata are activated through the identified words. Reading strategy training may enable even students having low L2/FL proficiency to use reading strategies if appropriate reading strategies are modeled for students and students are given opportunities to practice them and also if reading strategy training matches students' ability levels and leads them to understand when and how to use the strategies.

Verification of the LTH may not have been properly conducted by empirical studies. Previous studies (e.g., Jiang, 2011; Pichette, Segalowitz, & Connors, 2003; Schoone, et al., 1998) which supported the LTH merely examined the relative significance of participants' reading comprehension in L1 and their L2/FL proficiency to their reading comprehension in L2/FL. Those studies did not attempt to identify the level of language proficiency which might determine whether participants were able to use reading strategies. One possible reason of this problem is that the components of a linguistic threshold have not been clarified by empirical studies. The complex nature

of the process of reading may have disturbed reading researchers from attempting to clarify the components of a linguistic threshold: linguistic skills and knowledge which concern reading comprehension are interrelated one another, and the interrelations are variable.

It may also be necessary to throw doubt on the theoretical basis on which the notion of the LTH was initially devised. As mentioned in Section 2.5.1, the widely recognized notion of the LTH can be traced back to the literature of Alderson (1984). It is questionable whether Alderson devised the notion on a firm theoretical basis. He presented the notion as one of the four hypotheses which would respond to his own question (i.e., Is L2/FL reading a reading problem or a language problem?). To address the notion of the LTH, Alderson combined the following two different hypotheses without a valid reason and his own empirical evidence: short circuit hypothesis presented by Clarke (1979, 1980) and threshold hypothesis presented by Cummins (1979). Clarke's hypothesis posits that low L2/FL proficiency makes L2/FL readers rely significantly on local reading strategies. Cummins's hypothesis, on the other hand, states that if bilingual children who have not attained a certain level of cognitive skills in L1 are exposed to intensive L2 instructions, the development of their cognitive skills in L1 will be delayed and accordingly, little progress will be made on their L2 proficiency. Clarke's hypothesis is based on his study with university students having low L2 proficiency. Cummins's hypothesis, however, is based on his study with bilingual children. It might be inappropriate to combine the two hypotheses as Alderson (1984) did since problems on L2 reading might differ significantly between the two groups of participants: university students who started to acquire L2 much later than L1 and bilingual children who started to acquire L1 and L2 almost the same time.

The syntactic threshold which this study proposes is based on the notion that is different from the widely recognized one. When choosing reading materials, L2/FL reading teachers need to consider the syntactic threshold proposed in the study. Since using reading strategies is not always able to take the place of syntactic awareness, it may be important for teachers to recognize which syntactic knowledge is required for their students to be able to resort to their syntactic awareness when their reading strategies do not function. The components of the threshold may vary depending on various factors including syntactic complexity of text, semantic complexity of text, difficulty of a subject matter, genre of text, and students' purpose and way of reading. When administering reading strategy training, the teacher may increase the effect of

training by also instructing and modeling the timing and way of drawing on syntactic awareness.

The relationship between readers' syntactic awareness and comprehension has not been properly clarified by previous studies mainly because the relationship has been considered as being static, not dynamic. Even when triangular relationships (e.g., relationships among syntactic awareness, lexical knowledge and reading comprehension) were investigated, the main aim of the study was to find out which of syntactic awareness and the other factor (e.g., lexical knowledge) was a better predictor of successful reading by examining how much the relative significance to reading comprehension differed between the two factors. One possible reason which prevents reading researchers from paying attention to the dynamic nature of the relationship is as follows. When attempting to examine, using the same group of participants, how the relationship between one variable (variable A) and reading comprehension is affected by the change of another variable (variable B), it may be extremely difficult to change variable B without changing variable A. For example, if examining how the relationship between participants' syntactic awareness and reading comprehension is affected by the change of their vocabulary size, the participants' level of syntactic awareness needs to be kept unchanged. However, increasing participants' vocabulary size may also increase the level of their syntactic awareness. Vocabulary learning depends significantly on reading since the precise meaning of individual words is determined by the contexts in which they appear (Koda 2004). As participants are asked to read more texts to increase their vocabulary size, they may also unconsciously improve their syntactic awareness by recognizing syntactic structures in the texts.

The question which Alderson (1984) presented is straightforward and has motivated many researchers to investigate which of reading comprehension in L1 and L2/FL proficiency is a better predictor of success and failure of L2/FL reading. Alderson's question provided a meaningful foundation for investigating what are the actual causes of unsuccessful L2/FL reading. His question, on the other hand, might lead many researchers to have simplistic ideas about possible causes of unsuccessful L2/FL reading. Causes of unsuccessful reading are too diverse to be broadly classified into only two problems (i.e., L1 reading comprehension and L2/FL proficiency). Among the reader variables which may affect reading comprehension, the significance of the following four variables have found to be outstanding: syntactic awareness, lexical knowledge, content schemata and awareness of cognitive

and metacognitive strategies. Among these four variables, only the first two ones concern language problems (L2/FL proficiency): this indicates that it is unreasonable to attribute unsuccessful L2/FL reading to either of the two problems.

The findings of this study suggest that being able to use cognitive and metacognitive strategies does not require a certain level of syntactic awareness to be satisfied. This, however, does not mean that syntactic knowledge is not needed for successful reading. The relative significance of students' syntactic awareness and their use of reading strategies to reading comprehension varies depending on various factors. Even after becoming able to effectively use reading strategies, L2/FL readers may need to rely significantly on their syntactic awareness when they read a text written about an unfamiliar topic. Therefore, it is important for L2/FL teachers to design a program which will improve both of students' syntactic awareness and their ways of using reading strategies.

6.3 Limitations and Recommendations

This study had three main limitations owning to its design and participants. First, on some clause word orders, the number of the participants who were unaware of the specific clause word order was too small to conduct a paired two-sample *t*-test. If a larger number of participants had joined the study, it would have been possible to conduct a *t*-test on all of the clause word orders, in terms of the participants who were unaware of the specific clause word order. In a case where a study is conducted with much more participants, treatment and assessment tests may need to be administered to participants by multiple instructors. If this is the case, best efforts should be made by all of the instructors to unify the way of administering treatment and assessment tests as much as possible. Especially for a study which is conducted over a long period of time, all instructors who involve in the study should frequently get together to confirm the ways of instructing reading strategies, giving opportunities to practice reading strategies, leading group discussions and administering assessment tests. Otherwise, differences in way of interacting with the participants may largely affect the results of assessment tests and deteriorate the validity of the study.

Second, a control group could not be set which would successfully isolate the effect of the cognitive and metacognitive reading strategy training since this study was conducted in regular university classes where every student's equal right to receive quality education must be assured. To prevent participants' reading comprehension

from being affected by exercises not related to the study, the participants were not given any other exercises which might increase their reading comprehension during the period of the reading strategy training.

Third, if more number of lessons were given for reading strategy training, the effect of the training may have been revealed more distinctly. However, as the length of reading strategy training is increased, the study may be subject to a larger extraneous effect. The length of the training (i.e., six weekly lessons) was determined, considering the necessity for minimizing the extraneous effect caused by the gradual improvement of the participants' lexical knowledge, which might be gained from the training. Since readers' lexical knowledge also is known as a factor which significantly affects readers' comprehension, the improvement of their lexical knowledge through the training must have been minimized.

Nevertheless, this study presents recommendations for further studies on L2/FL reading, in terms of the following two aspects: (1) investigation of the dynamic relationship among reading comprehension, syntactic awareness and another factor which also affects comprehension and (2) identification of a syntactic threshold depending on various factors.

The relationship between reading comprehension and factors which affect comprehension needs to be investigated so that the dynamic nature of the process of reading is clarified. When the relationships among reading comprehension and two or more factors were investigated by previous studies, the relative significance of each of those factors to reading comprehension was examined. This research method, however, cannot properly clarify the dynamic nature of the process of reading. Since the relationships among reading comprehension and factors which affect comprehension are dynamic, it is important to investigate how the relationship between reading comprehension and one factor is affected by the change of another factor.

The dynamic relationship among syntactic awareness, lexical knowledge and reading comprehension is a typical example which has not been properly clarified by empirical studies. As mentioned in Section 6.2, it is not easy to change one variable without changing another variable, on the same group of participants. Managing two or more variables in this way is difficult, but not impossible. In a case where the change of the relationship between reading comprehension and syntactic awareness

through the change of vocabulary size is examined, implementation of the following three steps may enable the two variables to be properly managed. First, the relationship between participants' syntactic awareness and reading comprehension is examined. Second, the participants are led to learn new words through pictures and/or syntactically simple sentences presented by the instructor. Using pictures and/or syntactically simple sentences whose syntactic structures have already been known by participants may increase participants' vocabulary size without improving their syntactic awareness. Third, the relationship between the participants' syntactic awareness and reading comprehension is examined again. Among many factors which affect reading comprehension, those which are known to significantly affect reading comprehension are syntactic awareness, lexical knowledge, content knowledge and use of cognitive and metacognitive strategies. Since these four factors closely interrelate with each other, it is meaningful to clarify the dynamic relationships among these factors by implementing a procedure such as the one exemplified above.

6.4 Pedagogical Suggestions

Regarding a syntactic threshold, this study suggested a new notion. The syntactic threshold proposed in the study is composed of syntactic knowledge which is required for L2/FL readers to be able to draw on their syntactic awareness when their reading strategies do not function to comprehend the meaning of a sentence. This threshold may vary depending on various reader and text variables. Among these variables, the ones which may significantly affect the threshold are syntactic complexity of text, semantic complexity of text, difficulty of a subject matter, genre of text and readers' purpose and way of reading. It will be meaningful to identify the components of a syntactic threshold for each different combination of parameters of these main variables. For syntactic complexity of text, semantic complexity of text and difficulty of a subject matter, parameters may be chosen from "low", "moderate" and "high". For genre of text, parameters may be chosen from description, explanation, instruction, exposition, narration and argumentation, which are known as the representatives of the genre. For readers' purpose and way of reading, parameters may be chosen from skimming, scanning, careful reading and browsing which follow the classification by Urquhart and Weir (1998). Depending on the language proficiency of students and requirements in academic contexts, a combination of parameters of the five variables may be determined to find out syntactic knowledge which is required for the determined combination.

Identifying the components of the syntactic threshold proposed in this study may increase the effect of cognitive and metacognitive reading training. If students who are unaware of the identified syntactic knowledge are given an opportunity to learn the knowledge before reading strategy training, these students also may be able to experience and learn timing for resorting to their syntactic awareness. Both syntactic awareness and awareness of reading strategies are important for successful reading in academic contexts and other social contexts including workplaces.

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Appendices

Appendix A

Syntactic Awareness and Reading Comprehension Tests (Pre-test)

Part 1. Rearrange the order of the given words to make complete sentences, and write the rearranged numbers on your answer sheet.

(1) 1 on the table 2 the book 3 is

(2) 1 the teacher 2 the joke 3 angry 4 made

(3) 1 is 2 in the garden 3 Emily

(4) 1 became 2 a singer 3 the girl

(5) 1 the cat 2 milk 3 gave 4 Suzan

(6) 1 my 2 laughed 3 friend

(7) 1 plays 2 golf 3 Tom

(8) 1 showed 2 the kitty 3 Jim 4 a toy

(9) 1 the children 2 to the station 3 the woman 4 drove

(10) 1 the dog 2 Taro 3 the children 4 named

(11) 1 put 2 in the garage 3 the car 4 the man

(12) 1 looks 2 Ken 3 happy

(13) 1 agreed 2 the 3 teacher

(14) 1 science 2 likes 3 the student

Part 2. Each of the bold-faced words or phrases is a modifier. Choose a word or phrase which it modifies, and then write its number on your answer sheet.

(1) The 1 boys 2 played 3 baseball **in the ballpark**.

(2) The 1 lady 2 came 3 home **from a long trip**.

(3) The 1 man 2 erased the 3 important 4 file **accidentally**.

(4) 1 Chris **usually** 2 plays 3 tennis 4 after school.

(5) 1 John 2 found a **great** 3 teaching 4 job 5 in Australia.

(6) 1 Dr. Smith 2 is the 3 best 4 dentist **in town**.

(7) The 1 family 2 eats 3 at the restaurant **every weekend**.

(8) 1 I 2 caught a **terrible** 3 cold 4 this winter.

(9) The 1 girl 2 put 3 a doll **on the sofa**.

(10) 1 She 2 is 3 answering a 4 call **from her client**.

1

Part 3. Each of the three passages is followed by five questions. Choose the most accurate response found in the text from among the four choices, and then write its number on your answer sheet.

The Edinburgh Festival Fringe

Edinburgh, the capital city of Scotland, is famous for its festivals. The city's largest festival, called the Edinburgh Festival Fringe, is held in August every year. It is the largest arts festival in the world. There are many types of performances at the Edinburgh Festival Fringe, such as comedy, theater, music, and dance. In 2008, there were over 2,000 different shows.

The Edinburgh Festival Fringe began in the summer of 1947, when the city was holding an arts festival called the Edinburgh International Festival. The organizers of the Edinburgh International Festival had invited artists to perform at some of the city's theaters. However, some groups of artists who had not been invited also went to the city, and they performed their shows in other theaters. The same thing happened at the International Festival in the following years, and these shows at other theaters became known as the Fringe.

One unusual thing about the Fringe is that performers can do any type of show they choose. They just have to pay some money to the Fringe's organizers. As a result, there are always a lot of strange and interesting shows at the Fringe. However, some people say that the quality of many of the shows is poor.

Although performers at the Fringe sell tickets for their shows, many of them lose money. This is because they must pay for advertising and a place to perform, as well as give money to the organizers. But if their shows are popular, they can become better known and get the chance to do their shows in other places. Many actors and comedians who have performed at the Fringe have later appeared in movies and on television. This is one reason why it seems likely that the Fringe will continue to grow.

(1) What happens in Edinburgh every August?
- 1 A concert is given by 2,000 people.
- 2 Scotland's largest food festival is held.
- 3 Comedians, musicians, and dancers perform.
- 4 People come to see the city's famous castle.

(2) What happened at the Edinburgh International Festival in 1947?
- 1 Some people who were not invited came to do shows.
- 2 Many people asked to change the name of the festival.
- 3 All of the festival's tickets sold out on the first day.
- 4 People started to visit shows in other cities.

(3) What do some people say about the Fringe?
- 1 Many performers do the same show every year.
- 2 Many of the shows are not very good.
- 3 It costs a lot of money to see.
- 4 It is becoming less popular every year.

(4) Many performers want to join the Fringe because
- 1 it is a way to meet other performers.
- 2 it is sometimes shown on television.
- 3 it is free to perform there.
- 4 it is a chance to become famous.

(Source: *Eiken* Grade Pre-2 test, 2009 (winter test))

A Famous Desk

One of the most famous pieces of furniture in the United States is a large desk, known as the *Resolute* desk. This wooden desk belongs to the White House, and it has been used by many American presidents. The *Resolute* desk is over 120 years old and has a very interesting history. In 1845, an English explorer named Sir John Franklin set out from England with two ships to look for a new route to Asia through the Arctic Ocean. Franklin hoped that this would make travel between Europe and Asia faster. However, Franklin and his ships disappeared. In 1848, several ships, including a ship called the *Resolute* that belonged to the British navy, were sent to the Arctic to search for them.

The captain of the *Resolute* planned to spend two years searching for the missing ships. However, he failed to find them. Then the *Resolute* itself became trapped in ice. The captain waited for the ice to melt, but he eventually gave up and decided to return to Britain, leaving his ship behind. He and his crew walked over the ice and sailed home in the other ships that had been sent to the Arctic. Later, the *Resolute* was discovered by an American fishing boat and taken to a port in Connecticut.

At that time, the relationship between Britain and the United States was not very good, but the American government decided to repair and return the ship. In 1856, it arrived back in Britain. For the next 23 years, the *Resolute* was used by the British navy. After the navy stopped using the ship, Queen Victoria ordered a desk to be made from its wood. She sent the desk to President Rutherford B. Hays to thank the Americans. Today, the *Resolute* desk continues to be an important symbol of the friendship between the Unites States and Britain.

(5) Why did the *Resolute* leave Britain in 1848?

1 To search for a ship that belonged to the American navy.

2 To take a gift to the president of the United States.

3 To look for two ships that had become lost.

4 To find a faster route between Europe and Asia.

(6) The captain of the *Resolute*

1 took his crew back to Britain without his ship.

2 decided to leave his ship in a port in Connecticut.

3 found an American fishing boat that was trapped in the ice.

4 hoped to improve Britain's relationship with the United States.

(7) What happened to the *Resolute* in 1856?

1 It was broken up to make furniture.

2 It was found near the United States.

3 It was repaired by the British navy.

4 It was returned to the British.

(8) What is one thing we learn about the *Resolute* desk?

1 It was made using wood from an American fishing boat.

2 It was given to President Rutherford B. Hayes by Queen Victoria.

3 The American government bought it from the British navy.

4 The British still hope that the Americans will return it.

(Source: *Eiken* Grade Pre-2 test, 2010 (fall test))

The Muppet Maker

Most people in the United States are familiar with the puppets that Jim Henson created for his TV shows. Henson got his first part-time job in 1954, while he was still a high school student. He worked for a TV station in Washington, D.C., making puppets for a children's show. Henson had been making puppets as hobby since he was a child, so he was happy to get this job.

Later, when Henson was in college, he worked on another children's show called *Sam and Friends*. The puppets that Henson created for *Sam and Friends* were different from the ones that were usually seen on television at that time. Most puppets on television were made of wood, but Henson used materials like rubber and cloth to make his. Because these materials are soft, the puppets that Henson created could be used to show a lot of different feelings. He called these puppets "Muppets."

After Henson graduated from college, he continued to make Muppets for TV shows and commercials. Then, in 1969, he was asked to work on a new show called *Sesame Street* that taught English, math, and everyday skills to young children. The Muppets sang, danced, and had conversations with the actors. The show was very successful, and the Muppets became famous all over the United States.

Henson enjoyed working on *Sesame Street*, but he wanted to create shows that would be watched by people of all ages. He achieved this in 1976, when he started a family variety show called *The Muppet Show*. By 1978, it had over 235 million viewers in 106 countries. Henson also made many other shows and several movies. Jim Henson died in 1990, but he will always be remembered for his Muppets, which are loved by both children and adults around the world.

(9) Before Jim Henson started working at a TV station in Washington, D.C.,

1 he created many TV shows.

2 he made puppets in his free time.

3 a local high school offered him a job.

4 most people knew who he was.

(10) How were Henson's Muppets different from most puppets used on television?

1 They could move without the help of people.

2 They had names chosen by television viewers.

3 They were made of a different type of wood.

4 They were created from soft materials.

(11) How did the Muppets become famous all over the United States?

1 Henson took them to schools to teach children.

2 They were used instead of actors in commercials.

3 They appeared on a TV show for children.

4 Henson wrote a song about them.

(12) What was Henson able to do in 1976?

1 Teach young children how to make their own puppets.

2 Start a show that could be enjoyed by adults and children.

3 Build a school with the money he made from *Sesame Street*.

4 Make a movie using actors from many different countries.

(Source: *Eiken* Grade Pre-2 test, 2009 (fall test))

Answer Sheet for the Pre-test

Student No.	Name

Part 1			
(1)		(8)	
(2)		(9)	
(3)		(10)	
(4)		(11)	
(5)		(12)	
(6)		(13)	
(7)		(14)	

Part 2			
(1)		(6)	
(2)		(7)	
(3)		(8)	
(4)		(9)	
(5)		(10)	

Part 3			
(1)		(7)	
(2)		(8)	
(3)		(9)	
(4)		(10)	
(5)		(11)	
(6)		(12)	

Correct Answers of the Pre-test

Q1			
(1)	2 3 1	(8)	3 1 2 4
(2)	2 4 1 3	(9)	3 4 1 2
(3)	3 1 2	(10)	3 4 1 2
(4)	3 1 2	(11)	4 1 3 2
(5)	4 3 1 2	(12)	2 1 3
(6)	1 3 2	(13)	2 3 1
(7)	3 1 2	(14)	3 2 1

Q2			
(1)	2	(6)	4
(2)	2	(7)	2
(3)	2	(8)	3
(4)	2	(9)	2
(5)	4	(10)	4

Q3			
(1)	3	(7)	4
(2)	1	(8)	2
(3)	2	(9)	2
(4)	4	(10)	4
(5)	3	(11)	3
(6)	1	(12)	2

Appendix B

Reading Comprehension Test (Post-test)

Each of the three passages is followed by five questions. Choose the most accurate response found in the text from among the four choices, and then write its number on your answer sheet.

Mary Anning

At the beginning of the 19th century, people's ideas about the natural world were different from those that are common today. Most people in Europe did not believe that animal species died out. When the remains of unknown animals were found, it was thought that the animals must be living somewhere in the world. By the end of the century, however, people understood that the Earth had once been full of dinosaurs and other strange animals. An important reason for this change was the discovery of many dinosaur fossils. One person who played a big part in these discoveries was Mary Anning.

Mary was born in 1799 in Lyme Regis, a small port in the south of England. The seashore at Lyme Regis has many fossils in its rocks. Mary's father, Richard Anning, was a carpenter, but he also collected fossils and sold them to visitors. He taught Mary and her brother, Joseph, how to find fossils and sell them.

Richard died in 1810, and Mary's family became very poor. They continued hunting for fossils to make some money. Then, when Mary was 12 years old, she and her brother made a great discovery. This was the complete fossil of a strange creature with teeth like a crocodile's and a body like a dolphin's. Many scientists went to see the fossil. An expert at the British Museum named the animal an "ichthyosaur," which means "fish lizard."

Mary began to buy books so that she could learn more about dinosaurs. Later, she made many more important discoveries. However, although she knew more about fossils than most professors, she did not become famous until the end of the life. This was because she was poor and because she was a woman. A few months before she died in 1847, though, she was honored by the government, and since then she has been known as one of the first experts in the study of dinosaurs.

(1) The discovery of dinosaur fossils in the 19th century
- 1 helped people find dinosaurs living in Europe.
- 2 made it seem unlikely that animals could die out.
- 3 changed people's ideas about the natural world.
- 4 caused people to believe in animals that never existed.

(2) What is one thing Mary Anning learned from her father?
- 1 How to collect fossils from the seashore.
- 2 How to paint pictures on rocks.
- 3 The names of the fossils he found.
- 4 The history of the port of Lyme Regis.

(3) When Mary Anning was 12 years old, she and her brother
- 1 started to visit the British Museum.
- 2 met a scientist who gave them a job.
- 3 saw a strange animal in the sea.
- 4 found a very important fossil.

(4) Which of the following statements about Mary Anning is true?
- 1 She became a famous university professor.
- 2 She was not well known for most of her lifetime.
- 3 She worked for the government at the end of her life.
- 4 She was not able to sell the fossils she found.

1

(Source: *Eiken* Grade Pre-2 test, 2009 (spring test))

Camels in Australia

When people think of animals in Australia, they usually think of kangaroos or koala bears. So it is surprising to learn there are also many wild camels living in the country. In fact, there are more wild camels living in Australia than in any other country in the world.

Camels were first taken to Australia in the middle of the 19th century. They were brought from places like Africa and India. Camels can travel up to 70 kilometers a day and survive without water for a long time. Because of this, people often used them in the deserts of central and western Australia, where the weather is very hot and dry. They rode the camels and used them to carry goods over long distances.

This changed in the 1920s. At that time, cars and trucks were becoming more common, so the camels were no longer needed. Most of them were set free in the desert by their owners. Because there were no local animals that killed camels for food, their number grew very quickly. According to some experts, there are now about 1 million wild camels living in Australia, and their number is increasing rapidly each year.

In the past, when there were fewer camels, they did not cause many problems. Now, however, they have begun to harm trees and plants. Also, when they move to areas of farmland, they drink water and eat grass that is used for cows and sheep. For these reasons, the Australian government wants to control their number. One way to do this is to catch them so that they can be kept on farms and sold for their meat. However, many of the camels will remain in the desert and continue to remind people of Australia's interesting history.

(5) People are usually surprised to learn that
1 camels originally came from Australia.
2 there are not enough camels in the world.
3 there are a lot of wild camels in Australia.
4 kangaroos belong to the same family as camels.

(6) Why were camels used in central and western Australia?
1 They were able to live without food for 70 days.
2 They were able to work in hot and dry weather.
3 They could easily be found in the desert.
4 They could be taken to Africa and India safely.

(7) After the 1920s, the number of camels grew quickly because
1 no other animals killed them for food.
2 they were cheaper than cars and trucks.
3 experts said they should be protected.
4 many people kept them as pets.

(8) What is one reason the Australian government wants to control the number of camels?
1 It worries that camels may attack cows and sheep.
2 It wants to improve the quality of camel meat.
3 The camels are bad for the image of the country.
4 The camels are causing damage to trees and plants.

(Source: *Eiken* Grade Pre-2 test, 2010 (spring test))

Horses to the Rescue

There are many search-and-rescue teams in North America that help people who become lost or hurt in forests and mountains. In places that are difficult to reach with cars or other vehicles, members of search-and-rescue teams sometimes use horses. Rescuers can travel further on horseback than they can on foot, and the horses can also carry equipment and injured people.

Recently, though, a horse trainer named Terry Nowacki has been showing that horses can be used for more than just transportation. Nowacki says that horses–just like dogs–can be trained to use their sense of smell to find people. Several years ago, Nowacki heard that there was a shortage of search-and-rescue dogs in his area, so he decided to try to train his horse Stormy to do the same type of work.

Nowacki says that training Stormy was surprisingly easy because horses find it easy to recognize the smell of humans. They also seem to enjoy looking for them. Nowacki would ask a stranger to hide on his farm, and then Stormy would look for him. When Stormy led Nowacki to the stranger, Nowacki gave the horse something to eat as a reward. Nowacki says that looking for people seems like a game to horses.

Since then, Nowacki has taught his methods to a number of search-and-rescue teams. He says that the people on the teams always need more training than their horses. The most important thing is for riders to learn about their horses' body language. For example, a horse might move its head in a certain way when it has picked up the smell of a human. Then the rider must allow the horse to follow the smell. Nowacki is confident that his techniques will help rescuers to save many lives in the future.

(9) Search-and-rescue teams in North America sometimes

1 buy horses because they are cheaper than cars.

2 help horses that have been injured in accidents.

3 ride on horses to reach people who are in trouble.

4 look for horses that are lost in forests and mountains.

(10) Why did Terry Nowacki start training his horse Stormy to help search-and-rescue teams?

1 One of his friends has become lost.

2 There were not enough trained dogs.

3 It had a better sense of smell than his other horses.

4 He had already trained other animals to find people.

(11) What is one reason that training Stormy was easier than Nowacki had expected?

1 Stormy remembered the area around the farm very well.

2 Stormy was happy to find people without getting extra food.

3 Stormy knew the people he was searching for.

4 Stormy seemed to enjoy doing the work.

(12) When Nowacki trains search-and-rescue teams, he tells riders to

1 learn the meaning of their horses' movements.

2 move their heads in the same way their horses do.

3 teach the people they rescue about his techniques.

4 help their horses recognize the smells of other horses.

(Source: *Eiken* Grade Pre-2 test, 2010 (winter test))

Answer Sheet for the Post-test

Student No,	Name

(1)		(7)	
(2)		(8)	
(3)		(9)	
(4)		(10)	
(5)		(11)	
(6)		(12)	

Correct Answers of the Post-test

(1)	3	(7)	1
(2)	1	(8)	4
(3)	4	(9)	3
(4)	2	(10)	2
(5)	3	(11)	4
(6)	2	(12)	1

Appendix C

Questionnaire

以下のそれぞれの項目について、このたびの試験で英語の長文を理解しようとした過程において該当するもの（1～4）を丸で囲んでください。

	項目	1：まったくしなかった 2：ほとんどしなかった 3：時々した 4：頻繁にした			
1	内容を理解しやすくするために、周辺知識を呼び起こそうとした。	1	2	3	4
2	細かい内容を理解しようとする前に、長文にざっと目を通した。	1	2	3	4
3	注意深く読むべき箇所と読み飛ばす箇所とを判別しようとした。	1	2	3	4
4	内容を理解しやすくするために、文脈から得られる手がかりを利用しようとした。	1	2	3	4
5	何が書かれているのかについて推測しようとした。	1	2	3	4
6	書かれている内容について推測したことが正しいのか間違っているのかをチェックしようとした。	1	2	3	4
7	意味を知らない単語や語句の意味を推測しようとした。	1	2	3	4

このたびの試験で英語の長文を理解しようとする過程において、主に、どのような手法をどのように用いたのかを説明してください。

このたびの試験で理解できない英文にでくわした際にどのようにそれに対処しようとしたのかを説明してください。

English Translation of the Questionnaire

After reading each statement, circle the number (1, 2, 3 or 4) that applies to you using the scale provided.

	Statement	Scale			
		N	R	S	O
1	I think about what I know to help me understand what I read.	1	2	3	4
2	I preview the text to see what it's about before reading it.	1	2	3	4
3	I decide what to read closely and what to ignore.	1	2	3	4
4	I use context clues to help me better understand what I'm reading.	1	2	3	4
5	I try to guess what the material is about when I read.	1	2	3	4
6	I check to see if my guesses about the text are right or wrong.	1	2	3	4
7	I try to guess the meaning of unknown words or phrases.	1	2	3	4

Note: N: Never; R: Rarely; S: Sometimes; O: Often

Describe which strategies you mainly used in which ways to read and understand the passages.

Describe how you tried to solve problems when you had problems to understand any sentences.

Appendix D

Frequency of Appearance of Syntactic Elements

		Reading comprehension pre-test			Reading comprehension post-test		
		Passage 1	Passage 2	Passage 3	Passage 4	Passage 5	Passage 6
1	SV clause word order	3	2	3	4	4	1
2	SVO clause word order	8	2	7	7	7	11
3	SVC clause word order	7	3	5	11	2	2
4	SVA clause word order	3	7	4	2	5	1
5	SVOO clause word order	0	0	0	1	0	1
6	SVOC clause word order	0	1	1	1	0	0
7	SVOA clause word order	2	1	2	1	0	2
8	Verb modification by adverbs	2	5	6	3	7	6
9	Verb modification by adverbials	12	7	7	8	11	5
10	Verb modification by adverbial complements[2]	7	24	15	8	18	15
11	Noun modification by adjectives	7	14	4	10	7	2
12	Noun modification by adjectival phrases	12	10	7	19	5	7

The syntactic elements focused in this study are underlined in the passages below. The marked syntactic elements are assigned element Nos. 1 to 12.

Passage 1 (Clause types)

The Edinburgh Festival Fringe

Edinburgh, the capital city of Scotland, is famous(3) for its festivals. The city's largest festival, called the Edinburgh Festival Fringe, is held in August every year. It is the largest arts festival(3) in the world. There are many types of performances at the Edinburgh Festival Fringe, such as comedy, theater, music, and dance. In 2008, there were over 2,000 different shows.

The Edinburgh Festival Fringe began(1) in the summer of 1947, when the city was holding an arts festival(2) called the Edinburgh International Festival. The organizers of the Edinburgh International Festival had invited artists(2) to perform at some of the city's theaters. However, some groups of artists who had not been invited also went to the city(4), and they performed their shows(2) in other theaters. The same thing happened(1) at the International Festival in the following years, and these shows at other theaters became known as the Fringe.

One unusual thing about the Fringe is that(3) performers can do any type of show(2) they choose. They just have to pay some money to the Fringe's organizers(7). As a result, there are always a lot of strange and interesting shows at the Fringe. However, some people say that(2) the quality of many of the shows is poor(3).

Although performers at the Fringe sell tickets(2) for their shows, many of them lose money(2). This is because they must pay for advertising and a place to perform(4), as well as give money to the organizers(7). But if their shows are popular(3), they can become better known and get the chance(2) to do their shows in other places. Many actors and comedians who have performed(1) at the Fringe have later appeared in movies and on television(4). This is one reason(3) why it seems likely that(3) the Fringe will continue to grow.

(Source: *Eiken* Grade Pre-2 test, 2009 (winter test))

Passage 1 (Modification patterns)

The Edinburgh Festival Fringe

Edinburgh, the capital city of Scotland(12), is famous for its festivals. The city's largest(11) festival, called the Edinburgh Festival Fringe, is held in August(9) every year(9). It is the largest(11) arts festival in the world. There are many types of performances(12) at the Edinburgh Festival Fringe(9), such as comedy, theater, music, and dance. In 2008(9), there were over 2,000 different(11) shows.

The Edinburgh Festival Fringe began in the summer of 1947(9), when the city was holding an arts festival called the Edinburgh International Festival. The organizers of the Edinburgh International Festival(12) had invited artists to perform at some of the city's theaters(9). However, some groups of artists(12) who had not been invited also went to the city(10), and they performed their shows in other theaters(9). The same(11) thing happened at the International Festival(9) in the following(11) years(9), and these shows at other theaters(12) became known as the Fringe(10).

One unusual(11) thing about the Fringe(12) is that performers can do any type of show(12) they choose. They just have to pay some money to the Fringe's organizers(10). As a result, there are always a lot of strange(11) and interesting(11) shows at the Fringe(9). However, some people say that the quality of many(12) of the shows(12) is poor.

Although performers at the Fringe(12) sell tickets for their shows(12), many of them(12) lose money. This is because they must pay for advertising and a place to perform(10), as well as give money to the organizers(10). But if their shows are popular, they can become better(8) known and get the chance to do their shows in other places(9). Many actors and comedians who have performed at the Fringe(9) have later(8) appeared in movies(10) and on television(10). This is one reason why it seems likely that the Fringe will continue to grow.

(Source: *Eiken* Grade Pre-2 test, 2009 (winter test))

Passage 2 (Clause types)

A Famous Desk

One of the most famous pieces of furniture in the United States is a large desk(3), known as the *Resolute* desk. This wooden desk belongs to the White House(4), and it has been used by many American presidents. The *Resolute* desk is over 120 years old(3) and has a very interesting history(2). In 1845, an English explorer named Sir John Franklin set out from England(4) with two ships to look for a new route to Asia through the Arctic Ocean. Franklin hoped that(2) this would make travel between Europe and Asia faster(6). However, Franklin and his ships disappeared(1). In 1848, several ships, including a ship called the *Resolute* that belonged to the British navy(4), were sent to the Arctic to search for them.

The captain of the *Resolute* planned to spend two years searching for the missing ships. However, he failed to find them. Then the *Resolute* itself became trapped in ice. The captain waited for the ice(4) to melt, but he eventually gave up(1) and decided to return to Britain(4), leaving his ship behind. He and his crew walked over the ice(4) and sailed home(4) in the other ships that had been sent to the Arctic. Later, the *Resolute* was discovered by an American fishing boat and taken to a port in Connecticut.

At that time, the relationship between Britain and the United States was not very good(3), but the American government decided to repair and return the ship. In 1856, it arrived back in Britain(4). For the next 23 years, the *Resolute* was used by the British navy. After the navy stopped using the ship, Queen Victoria ordered a desk to be made from its wood. She sent the desk to President Rutherford B. Hays(7) to thank the Americans. Today, the *Resolute* desk continues to be an important symbol of the friendship between the Unites States and Britain.

(Source: *Eiken* Grade Pre-2 test, 2010 (fall test))

Passage 2 (Modification patterns)

A Famous Desk

One of the most famous(11) pieces(12) of furniture(12) in the United States(12) is a large(11) desk, known as the *Resolute* desk(10). This wooden(11) desk belongs to the White House(10), and it has been used by many American presidents(10). The *Resolute* desk is over 120 years old and has a very interesting(11) history. In 1845(9), an English(11) explorer named Sir John Franklin set out from England(10) with two ships(9) to look for a new(11) route(10) to Asia(12) through the Arctic Ocean(12). Franklin hoped that this would make travel between Europe and Asia(10) faster(8). However, Franklin and his ships disappeared. In 1848(9), several ships, including a ship called the *Resolute* that belonged to the British(11) navy(10), were sent to the Arctic(10) to search for them(10).

The captain of the *Resolute*(12) planned to spend two years searching for the missing(11) ships(10). However, he failed to find them. Then(8) the *Resolute* itself became trapped in ice(10). The captain waited for the ice to melt(10), but he eventually(8) gave up and decided to return to Britain(10), leaving his ship behind(10). He and his crew walked over the ice(10) and sailed home(10) in the other ships(9) that had been sent to the Arctic(10). Later(8), the *Resolute* was discovered by an American(11) fishing boat(10) and taken to a port(10) in Connecticut(12).

At that time(9), the relationship between Britain and the United States(12) was not very good, but the American(11) government decided to repair and return the ship. In 1856(9), it arrived back(10) in Britain(10). For the next(11) 23 years(9), the *Resolute* was used by the British(11) navy(10). After the navy stopped using the ship, Queen Victoria ordered a desk to be made from its wood(10). She sent the desk to President Rutherford B. Hays(10) to thank the Americans. Today(8), the *Resolute* desk continues to be an important(11) symbol of the friendship(12) between the Unites States and Britain(12).

(Source: *Eiken* Grade Pre-2 test, 2010 (fall test))

Passage 3 (Clause types)

The Muppet Maker

Most people in the United States are familiar with the puppets that Jim Henson created for his TV shows. Henson got his first part-time job(2) in 1954, while he was still a high school student(3). He worked for a TV station(4) in Washington, D.C., making puppets for a children's show. Henson had been making puppets(2) as hobby since he was a child(3), so he was happy to get this job.

Later, when Henson was in college(4), he worked on another children's show(4) called Sam and Friends. The puppets that Henson created for Sam and Friends were different from the ones that were usually seen on television at that time. Most puppets on television were made of wood, but Henson used materials(2) like rubber and cloth to make his. Because these materials are soft(3), the puppets that Henson created could be used to show a lot of different feelings. He called these puppets "Muppets."(6)

After Henson graduated from college(4), he continued to make Muppets for TV shows and commercials. Then, in 1969, he was asked to work on a new show called Sesame Street that taught English, math, and everyday skills to young children(7). The Muppets sang(1), danced(1), and had conversations with the actors(7). The show was very successful(3), and the Muppets became famous(3) all over the United States.

Henson enjoyed working on Sesame Street, but he wanted to create shows that would be watched by people of all ages. He achieved this(2) in 1976, when he started a family variety show(2) called The Muppet Show. By 1978, it had over 235 million viewers(2) in 106 countries. Henson also made many other shows and several movies(2). Jim Henson died(1) in 1990, but he will always be remembered for his Muppets, which are loved by both children and adults around the world.

(Source: *Eiken* Grade Pre-2 test, 2009 (fall test))

Passage 3 (Modification patterns)

The Muppet Maker

Most people in the United States(12) are familiar with the puppets that Jim Henson created for his TV shows(10). Henson got his first part-time job in 1954(9), while he was still(8) a high school student. He worked for a TV station(10) in Washington, D.C.(12), making puppets for a children's show(12). Henson had been making puppets as hobby(10) since he was a child, so he was happy to get this job.

Later(8), when Henson was in college(10), he worked on another children's show(10) called Sam and Friends. The puppets that Henson created for Sam and Friends(10) were different from the ones that were usually(8) seen on television(10) at that time(9). Most puppets on television(11) were made of wood(10), but Henson used materials like rubber and cloth to make his. Because these materials are soft, the puppets that Henson created could be used to show a lot of different(11) feelings. He called these puppets "Muppets."

After Henson graduated from college(10), he continued to make Muppets for TV shows and commercials(12). Then(8), in 1969(9), he was asked to work on a new(11) show(10) called Sesame Street that taught English, math, and everyday skills to young(11) children(10). The Muppets sang, danced, and had conversations with the actors(12). The show was very successful, and the Muppets became famous all over the United States.

Henson enjoyed working on Sesame Street(10), but he wanted to create shows that would be watched by people(10) of all ages(12). He achieved this in 1976(9), when he started a family variety show called The Muppet Show. By 1978(9), it had over 235 million viewers in 106 countries(9). Henson also(8) made many other shows and several movies. Jim Henson died in 1990(9), but he will always(8) be remembered for his Muppets(10), which are loved by both children and adults(10) around the world(12).

(Source: *Eiken* Grade Pre-2 test, 2009 (fall test))

Passage 4 (Clause types)

Mary Anning

At the beginning of the 19th century, people's ideas about the natural world were different from those that are common(3) today. Most people in Europe did not believe that(2) animal species died out(1). When the remains of unknown animals were found, it was thought that the animals must be living(1) somewhere in the world. By the end of the century, however, people understood that(2) the Earth had once been full of dinosaurs and other strange animals. An important reason for this change was the discovery of many dinosaur fossils(3). One person who played a big part(2) in these discoveries was Mary Anning(3).

Mary was born in 1799 in Lyme Regis, a small port in the south of England. The seashore at Lyme Regis has many fossils(2) in its rocks. Mary's father, Richard Anning, was a carpenter(3), but he also collected fossils(2) and sold them to visitors(7). He taught Mary and her brother, Joseph, how(5) to find fossils and sell them.

Richard died(1) in 1810, and Mary's family became very poor(3). They continued hunting for fossils to make some money. Then, when Mary was 12 years old(3), she and her brother made a great discovery(2). This was the complete fossil of a strange creature(3) with teeth like a crocodile's and a body like a dolphin's. Many scientists went to see the fossil. An expert at the British Museum named the animal an "ichthyosaur,"(6) which means "fish lizard."(3)

Mary began to buy books so that she could learn more about dinosaurs(4). Later, she made many more important discoveries(2). However, although she knew more about fossils(4) than most professors, she did not become famous(3) until the end of the life. This was because she was poor(3) and because she was a woman(3). A few months before she died(1) in 1847, though, she was honored by the government, and since then she has been known as one of the first experts in the study of dinosaurs.

(Source: *Eiken* Grade Pre-2 test, 2009 (spring test))

Passage 4 (Modification patterns)

Mary Anning

At the beginning(9) of the 19th century(12), people's ideas about the natural(11) world(12) were different from those that are common today(8). Most people in Europe(12) did not believe that animal species died out. When the remains of unknown(11) animals(12) were found, it was thought that the animals must be living somewhere(10) in the world(10). By the end(9) of the century(12), however, people understood that the Earth had once(8) been full of dinosaurs and other strange(11) animals. An important(11) reason for this change(12) was the discovery of many dinosaur fossils(12). One person who played a big(11) part in these discoveries(12) was Mary Anning.

Mary was born in 1799(9) in Lyme Regis(9), a small(11) port in the south(12) of England(12). The seashore at Lyme Regis(12) has many fossils in its rocks(9). Mary's father, Richard Anning, was a carpenter, but he also collected fossils and sold them to visitors(10). He taught Mary and her brother, Joseph, how to find fossils and sell them.

Richard died in 1810(9), and Mary's family became very poor. They continued hunting for fossils(10) to make some money. Then, when Mary was 12 years old, she and her brother made a great(11) discovery. This was the complete(11) fossil of a strange(11) creature(12) with teeth(12) like a crocodile's and a body(12) like a dolphin's. Many scientists went to see the fossil. An expert at the British Museum(12) named the animal an "ichthyosaur," which means "fish lizard."

Mary began to buy books so that she could learn more about dinosaurs(10). Later(8), she made many more important(11) discoveries. However, although she knew more about fossils(10) than most professors, she did not become famous until the end(9) of the life(12). This was because she was poor and because she was a woman. A few months before she died in 1847, though, she was honored by the government(10), and since then(9) she has been known as one(10) of the first experts(12) in the study(12) of dinosaurs(12).

(Source: *Eiken* Grade Pre-2 test, 2009 (spring test))

Passage 5 (Clause types)

Camels in Australia

When people think of animals(4) in Australia, they usually think of kangaroos or koala bears(4). So it is surprising to learn there are also many wild camels living in the country. In fact, there are more wild camels living in Australia than in any other country in the world.

Camels were first taken to Australia in the middle of the 19th century. They were brought from places like Africa and India. Camels can travel up to 70 kilometers(4) a day and survive(1) without water for a long time. Because of this, people often used them(2) in the deserts of central and western Australia, where the weather is very hot and dry(3). They rode the camels(2) and used them(2) to carry goods over long distances.

This changed(1) in the 1920s. At that time, cars and trucks were becoming more common(3), so the camels were no longer needed. Most of them were set free in the desert by their owners. Because there were no local animals that killed camels(2) for food, their number grew(1) very quickly. According to some experts, there are now about 1 million wild camels living in Australia, and their number is increasing(1) rapidly each year.

In the past, when there were fewer camels, they did not cause many problems(2). Now, however, they have begun to harm trees and plants. Also, when they move to areas of farmland(4), they drink water(2) and eat grass(2) that is used for cows and sheep. For these reasons, the Australian government wants to control their number. One way to do this is to catch them so that they can be kept on farms and sold for their meat. However, many of the camels will remain in the desert(4) and continue to remind people of Australia's interesting history.

(Source: *Eiken* Grade Pre-2 test, 2010 (spring test))

Passage 5 (Modification patterns)

Camels in Australia

When people think of animals(10) in Australia(12), they usually(8) think of kangaroos or koala bears(10). So it is surprising to learn there are also(9) many wild(11) camels living in the country(10). In fact, there are more wild(11) camels living in Australia(10) than in any other country(10) in the world(12).

Camels were first(8) taken to Australia(10) in the middle(9) of the 19th century(12). They were brought from places(10) like Africa and India. Camels can travel up to 70 kilometers(10) a day and survive without water(9) for a long(11) time(9). Because of this, people often(8) used them in the deserts(9) of central(11) and western(11) Australia(12), where the weather is very hot and dry. They rode the camels and used them to carry goods over long distances(10).

This changed in the 1920s(9). At that time(9), cars and trucks were becoming more common, so the camels were no longer needed. Most of them were set free in the desert(9) by their owners(10). Because there were no local(11) animals that killed camels for food(10), their number grew very quickly(8). According to some experts, there are now(8) about 1 million wild(11) camels living in Australia(10), and their number is increasing rapidly(8) each year(9).

In the past(9), when there were fewer camels, they did not cause many problems. Now(8), however, they have begun to harm trees and plants. Also, when they move to areas(10) of farmland(12), they drink water and eat grass that is used for cows and sheep(10). For these reasons(9), the Australian government wants to control their number. One way to do this is to catch them so that they can be kept on farms(10) and sold for their meat(10). However, many of the camels will remain in the desert(10) and continue to remind people of Australia's interesting(11) history(10).

(Source: *Eiken* Grade Pre-2 test, 2010 (spring test))

Passage 6 (Clause types)

Horses to the Rescue

There are many search-and-rescue teams in North America that help people who become lost or hurt in forests and mountains. In places that are difficult to reach with cars or other vehicles, members of search-and-rescue teams sometimes use horses(2). Rescuers can travel(1) further on horseback than they can on foot, and the horses can also carry equipment and injured people(2).

Recently, though, a horse trainer named Terry Nowacki has been showing that(2) horses can be used for more than just transportation. Nowacki says that(2) horses–just like dogs–can be trained to use their sense of smell to find people. Several years ago, Nowacki heard that(2) there was a shortage of search-and-rescue dogs in his area, so he decided to try to train his horse Stormy to do the same type of work.

Nowacki says that(2) training Stormy was surprisingly easy(3) because horses find it easy to recognize the smell of humans. They also seem to enjoy looking for them. Nowacki would ask a stranger to hide on his farm, and then Stormy would look for him(4). When Stormy led Nowacki to the stranger(7), Nowacki gave the horse something to eat(5) as a reward. Nowacki says that(2) looking for people seems like a game(3) to horses.

Since then, Nowacki has taught his methods to a number of search-and-rescue teams(7). He says that(2) the people on the teams always need more training(2) than their horses. The most important thing is for riders to learn about their horses' body language. For example, a horse might move its head(2) in a certain way when it has picked up the smell of a human(2). Then the rider must allow the horse to follow the smell. Nowacki is confident that his techniques will help rescuers to save many lives in the future.

(Source: *Eiken* Grade Pre-2 test, 2010 (winter test))

Passage 6 (Modification patterns)

Horses to the Rescue

There are many search-and-rescue teams in North America(10) that help people who become lost or hurt in forests and mountains(9). In places(9) that are difficult to reach with cars or other vehicles(10), members of search-and-rescue teams(12) sometimes(8) use horses. Rescuers can travel further(10) on horseback(10) than they can on foot(10), and the horses can also(8) carry equipment and injured people.

Recently(8), though, a horse trainer named Terry Nowacki has been showing that horses can be used for more than just transportation(10). Nowacki says that horses–just like dogs–can be trained to use their sense of smell(12) to find people. Several years ago(9), Nowacki heard that there was a shortage of search-and-rescue dogs(12) in his area(10), so he decided to try to train his horse Stormy to do the same(11) type of work(12).

Nowacki says that training Stormy was surprisingly easy because horses find it easy to recognize the smell of humans(12). They also(8) seem to enjoy looking for them(10). Nowacki would ask a stranger to hide on his farm(10), and then Stormy would look for him(10). When Stormy led Nowacki to the stranger(10), Nowacki gave the horse something to eat as a reward(10). Nowacki says that looking for people(10) seems like a game to horses.

Since then(9), Nowacki has taught his methods to a number of search-and-rescue teams. He says that the people on the teams(12) always(8) need more training than their horses. The most important(11) thing is for riders to learn about their horses' body language(10). For example, a horse might move its head in a certain way(10) when it has picked up the smell of a human(12). Then(8) the rider must allow the horse to follow the smell. Nowacki is confident that his techniques will help rescuers to save many lives in the future(9).

(Source: *Eiken* Grade Pre-2 test, 2010 (winter test))

Appendix E

Article Used for Modeling

NASA Confirms Aliens Exist - Right On Our Planet!

By Meera Dolasia

The human race has been obsessed with finding Alien life for centuries. Turns out, they may actually exist - not in the planets far beyond, but right here on Earth. And the discovery was made by none other than the smart scientists of NASA, who announced their big news amidst much fanfare, at a press conference held in **Washington D.C.** on December 2nd.

Unfortunately for most of us, the 'aliens' are not little green men who have mistakenly arrived from a distant planet, but a **bacterium** identified as the GFAJ-1 strain of the Halomonadaceae family, which was discovered at the bottom of Northern California's highly **saline**, **Mono Lake**.

(Source: DOGO news, http://www.dogonews.com/2010/12/8/nasa-confirms-aliens-exist-right-on-our-planet)

Appendix F

Titles and Pictures of the Reading Materials Used for the Reading Strategy Training

1st week lesson

Robot Teachers Roll Into South Korean Classrooms	
	

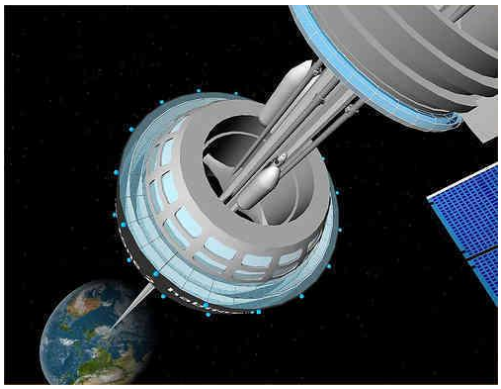
(Source: DOGO news, http://www.dogonews.com/2011/1/13/robo-teachers-roll-into-south-korean-classrooms)

2nd week lesson

The REAL Life Mermaid	
	

(Source: DOGO news, http://www.dogonews.com/2009/3/2/the-real-life-mermaid)

3rd week lesson

Taking an Elevator to Space	
	

(Source: DOGO news, http://www.dogonews.com/2008/9/25/taking-an-elevator-to-space)

4th week lesson

Oh To Be Able To Fly (and Land) Like a Bird!	
	

(Source: DOGO news, http://www.dogonews.com/2008/1/14/oh-to-be-able-to-fly-and-land-like-a-bird)

5th week lesson

Flying Car Is One Step Closer To Lift Off!	
	

(Source: DOGO news, http://www.dogonews.com/2010/7/2/flying-car-is-one-step-closer-to-lift-off)

6th week lesson

How About Swim in My New Car?


(Source: DOGO news, http://www.dogonews.com/2008/2/18/how-about-a-spin-er-swim-in-my-new-car)

Appendix G

Reading Materials

1st week lesson

DOGONews!
Fodder for young minds

Robot Teachers Roll Into South Korean Classrooms

A number of fortunate students at 21 elementary schools in the Southeast city of **Daegu,** South Korea are testing out a new kind of educator - A robot teacher. The 29 droids that have been deployed for a five-month trial, are the brainchild of *The Korean Institute of Technology*, which is trying to promote the **integration** of robots into people's daily lives.

Designed to teach English, the egg-shaped robots have been pre-programmed to read books, sing songs and play alphabet games. Just like human teachers, they can also roam around the class on their wheels, and even dance to music by moving their arms and heads.

While they appear to be completely **autonomous**, the robots are controlled by human educators from the Philippines, who can hear and see the children's reactions via a remote controlled device. The children can also observe the teacher's expressions, which are reflected on the avatar that is pasted onto the flat panel television atop the

robot's neck.

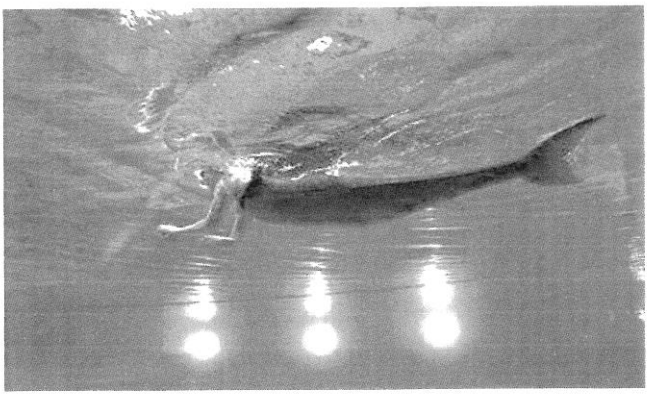
The $1.4mm USD pilot program has been sponsored by the government to test if children respond better to robots than humans. Also, the cost of hiring English teachers remotely is far lower than bringing them into the country. They also believe that if the robots prove to be reliable and effective, they can be sent to **remote** regions, where the teachers are **reluctant** to go. An added benefit is that robots don't get sick, ask for vacations or pay or up and away for a better paying **gig**! A little maintenance and oil every now and again and, they are good to go. However, the officials do maintain that these robots will be assisting human teachers, not replacing them, anytime in the near future.

While the initial trials are going really well, there are still some hurdles that need to be overcome before the rolling eggheads show up all across South Korea. They still require a lot of handling and at a cost of about $8,000USD each, are a little too **steep** for mass **deployment**. If these relatively minor problems can be overcome, robot teachers will become a common sight across all schools in **South Korea** and maybe, other parts of the world too!

Sources: Dailymail.co.uk, heraldsun.co.au

(Source: DOGO news, http://www.dogonews.com/2011/1/13/robo-teachers-roll-into-south-korean-classrooms)

The REAL Life Mermaid



A medical condition, caused doctors to amputate both of Nadya Vessey's legs when she was young. Now at the age of 50, she has realized her dream of becoming a real-life mermaid, thanks to Weta Workshop, an Oscar-winning special effects company, that brought us movies like *Lord of the Rings*, *King Kong* and *The Chronicles of Narnia*.

A resident of **Auckland,** New Zealand, Vessey took up swimming after her first leg was amputated at the age of 7. Through high school, she swam competitively, even after her second leg was amputated at 16.

She never saw herself as a mermaid however, until a 4-year old asked why she was taking her (prosthetic) legs off. Not wanting to go through the process of explaining her amputation, she told him she was a mermaid.

That idea stuck with her and two years ago she approached Weta Workshop to ask if they could make her a prosthetic tail. To her surprise, they agreed.

The company had some experience with *mermaid tails* before, thanks to *Peter Pan*. However, those tails were directly applied on to the actors' bodies and only had to last until the film had been made.

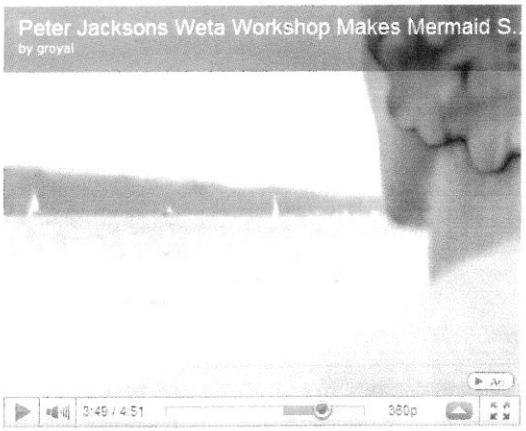
Vessey's tail, however, had to be fully functional, pretty and last for a long time. Using 3-D modeling, the company hand-crafted a custom-made tail using a combination of neoprene and Lycra. The outer layer has been hand-painted with mermaid scales, giving it a very authentic look.

Nadia loves her new tail, which has been tested in her local swimming pool, as well as, the ocean. She is hoping to use it for the swimming portion of her next triathlon.

So the next time you see a tailed figure frolicking in the ocean, don't panic - It's just Nadya Vessey, the real-life mermaid.

To read more about how Weta built the tail and see some of their other fun projects, check out their website at www.wetanz.com/a-mermaid-s-tale/.

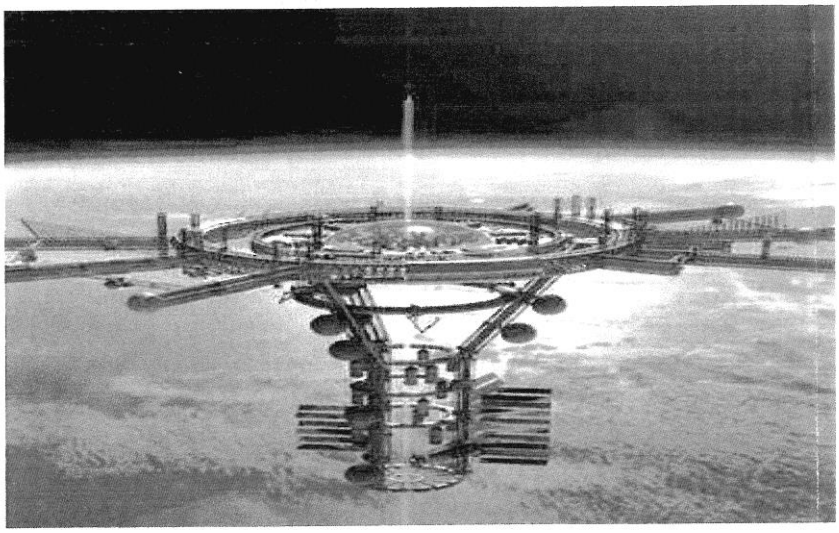
Sources: Dailymail.co.uk, wetaanz.com



(Source: DOGO news, http://www.dogonews.com/2009/3/2/the-real-life-mermaid)

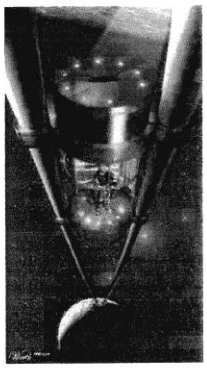
DOGONews!
Fodder for young minds

Taking An Elevator To Space



If the *Spaceward Foundation* is successful, Space Shuttles may become a thing of the past - Instead Astronauts and the rest of us will simply take an elevator to Space. Though initially the elevator will transport only cargo, the ultimate goal is for Space to become a tourist destination.

While the effort is being spearheaded by Japanese scientists and companies, the project is being worked on by the some of the best minds in the world and includes University professors, engineers, students, research scientists and even folks at the US Space agency NASA.

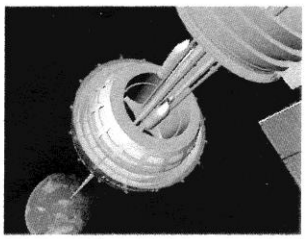


The vision of foundation is to create a 62,000-mile long cable or ribbon that will run from the ground to a satellite docking station in Space. The first design will entail

using a 1/4" cable, which will have the capacity to lift 20 tons and launch once a day. Once the cable is in place, they will be able to add the elevators.

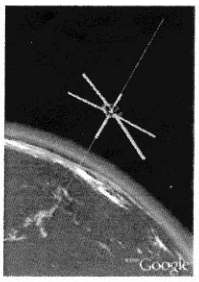
So as to make the elevators as light as possible, the design calls for no fuel or battery to power them. Instead they will use a method called 'power beaming', which involves the cars holding photo-voltaic cells facing the Earth while a laser beam is projected at them from the ground. The cells will convert the light projected from the laser to electricity, which will power the cars. Besides making the cars lighter, this method of fueling will also ensure that there is no danger of explosion.

The two biggest challenges facing the team right now is developing a cable that is thin and strong enough to sustain an elevator car and, to develop a long-range power beaming system so that the photo-voltaic cells are able to obtain enough light to fuel the car all the way to Space. To try get the best minds in the world engaged on this issue, NASA is sponsoring several contests this fall, with prizes as high as $2million USD for anyone who comes up with the right solution(s).



Researchers are hopeful that with the advent of nanotechnology and other technological advances, they will be able to overcome these hurdles fairly quickly. Once the materials have been tested thoroughly, the construction process will begin. If everything works according to the current schedule, a functioning space elevator is expected to be ready by 2020 - at an estimated cost of $10 billion USD.

Once complete, the elevator will carry the necessary infrastructure to build hotels for tourism. If that is successful, passengers will be able to hop on to the elevator just like they hop on to airplanes and zoom into space for a peaceful vacation!



Unlike today, there will be no countdown to blast-off's - passengers will be able to stand by the glass elevator doors and wave to their loved one for as long as they can see them - and since it will take a few days to get to the final destination, space elevators will be equipped with restaurants and sleeping accommodations. As far as the cost - while nothing has been determined yet, scientists believe that compared to what it will cost for food, accommodation and oxygen in Space - it will be a miniscule amount. But don't pack you bags yet - for even if everything goes according to schedule, the first passengers will not be transported until 2030! For additional information on this ambitious project, check out http://www.spaceward.org/ and http://science.howstuffwork.com/space-elevator

Source:www.spaceward.com

(Source: DOGO news, http://www.dogonews.com/2008/9/25/taking-an-elevator-to-space)

DOGONews!
Fodder for young minds

Oh To Be Able To Fly (And Land) Like A Bird!

Jeb Corliss is a man on a mission - he wants to fly like a bird and land like one too - that is without a parachute. Why? - Because no one has ever done it before and he believes he can.

Jeb's plan is to use a wingsuit, a special jumpsuit that shapes the human body into an airfoil, which can create lift (see picture). Wingsuits, also known as birdman suits or squirrel suits are not new, and have been used in some form or shape since the 1930's. They have however evolved through the years and improved immensely. Jeff plans to use a **prototype** created specially for him.

In a normal wingsuit dive, flyers exit the aircraft wearing both a wingsuit and a parachute. At a certain altitude, just like a skydiver, a wingsuit flyer will deploy (open) his parachute, which will help him glide down to a designated landing place.

This is what Jeb is hoping to change. He wants to fly with just a wingsuit and land without a parachute. His plan is to land on a specially designed runway. The design for the runway is top secret and expected to cost about $2 million USD.

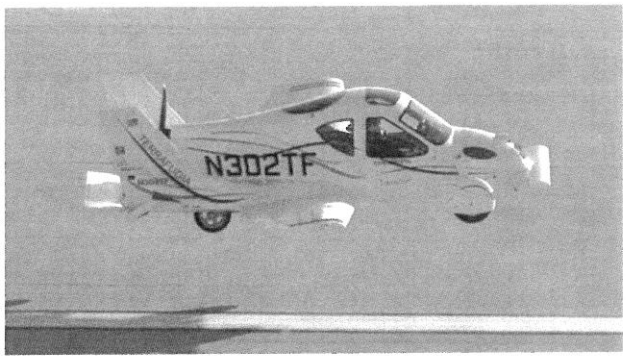
While this may be an almost impossible feat, Corliss is certainly well qualified to attempt it. He is a BASE jumper - someone who leaps from tall buildings, bridges etc. and lands using a parachute - and has performed over 1,000 jumps including the Eiffel Tower in **Paris** and the Golden Gate Bridge in **San Francisco,** California.

We wish this amazing and fearless man the best of luck and hope he succeeds in his quest to fly (and land) like a bird. Hear his passion for the mission in his own words in the video below.

(Source: DOGO news, http://www.dogonews.com/2008/1/14/oh-to-be-able-to-fly-and-land-like-a-bird)

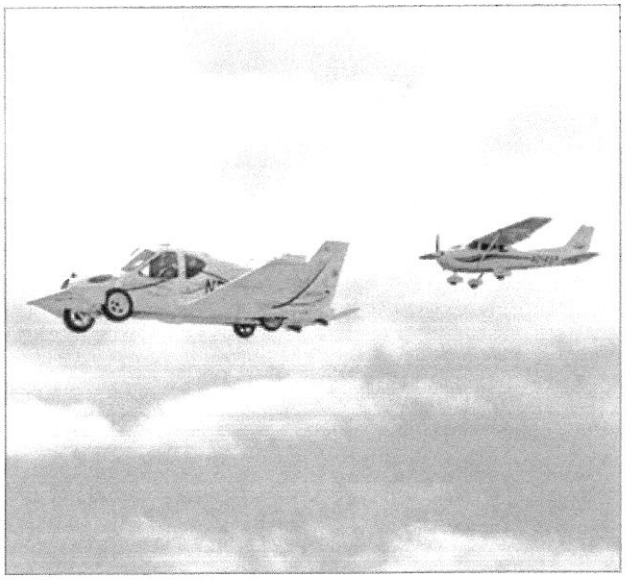
DOGONews!
Fodder for young minds

Flying Car Is One Step Closer To Lift Off!



What flies like a plane and hugs the roads like a super-charged roadster - The *Terrafugia Transition* of course - And now, thanks to a much-needed **concession** from the Federal Aviation Authority (FAA), we may get to see one or more of these aero-mobiles in motion soon.

In development since 2006, the hybrid car/ light aircraft is the brainchild of **Massachusetts**-based Terrafugia. With a mere push of a button, the vehicle switches from a two-seat roadster to an aircraft in 15 seconds. The wings simply fold in or open out depending on what the driver wishes to do. Also, unlike normal airplanes, it runs on unleaded fuel, so it can be refueled at any ordinary gas station.



Fitted with a fuel-efficient 100 horsepower engine, the *Terrafugia Transition* can fly a distance of 500 miles on a single tank of gas and drive at speeds of up to 115mph.

While all the development work on the car has been down - the company was not sure until this week whether the FAA would license it as light sport aircraft or a normal one. The main difference is that pilots, which in this case means potential owners, would need only 20 hours of flying time, if it is a light sport aircraft.

However, the company had a hard time fulfilling all the safety regulations whilst still maintaining the vehicle's weight under the required *1,320lbs* limit imposed by the FAA for it to qualify. Much to their relief, the FAA made an exception and ruled that the *1,430lbs* Terrafugia, could indeed be a light-sport aircraft.

Now the company's only challenge is to find enough buyers who have $200,000USD to spare and access to a runaway of 1,700sq.ft. for the *Terrafugia Tranisition* to take off.

However, the company, who expects to roll out the vehicles in fall of this year, says that it already has advance orders from 70 customers and expects many more, thanks to the FAA decision. For those who cannot afford the real deal, **paper model kits** are available on the company's website, for a mere $4USD.

Source: gizmag.com.

(Source: DOGO news, http://www.dogonews.com/2010/7/2/flying-car-is-one-step-closer-to-lift-off)

6th week lesson

DOGOnews
Fodder for young minds

How about swim in my new car?

Welcome to the latest innovation in automobiles, a car that can run on land and underwater - if it reminds you of a James Bond movie, you are not the only ones.

Called sQuba, this car was invented by Swiss designer Rinspeed Inc, whose CEO is a big James Bond fan. He says the inspiration to build a car like this came after he saw something similar in the Bond movie " The Spy who loved Me" - over thirty years ago.

The sQuba is the first real submersible car - it travels like a submarine and is able to go down as much as 30 ft below the surface of the water. While it can drive about 77mph on land, in water its speed is reduced to 3mph on the surface and only 1.8mph underwater. sQuba's engine comprises of several electrical motors, situated at the rear of the car. One provides propulsion on land, whilst the other two are used for underwater driving.

Passengers in the car will be able to continue breathing underwater through a tank of compressed air similar to those used in scuba diving, but can expect to get really wet (and cold), because the sQuba is a convertible. Rinspeed says that's just to ensure that passengers can get out easily incase the car malfunctions.

sQuba is currently just a "concept" car that will be displayed at the Geneva Auto Show later this month. This first model cost about 1.5 million U.S. Dollars to manufacture. Rinspeed Inc. estimates that if produced commercially, the car will cost about the same price as a Rolls Royce - about 400,000 U.S. Dollars.

The video below featuring the sQuba in action, truly feels as though one is watching a James Bond thriller.

(Source: DOGO news, http://www.dogonews.com/2008/2/18/how-about-a-spin-er-swim-in-my-new-car)

Appendix H

Worksheet Used for the Reading Strategy Training

Student No.	Name

Questions	Answers

Appendix I

Number of Participants Who Were Aware of or Were Unaware of the Individual Syntactic Elements

	Syntactic elements	Number of participants with presence of awareness	Number of participants with absence of awareness
Basic clause word order types	SV clause word order	45	3
	SVO clause word order	47	1
	SVC clause word order	47	1
	SVA clause word order	46	2
	SVOO clause word order	24	24
	SVOC clause word order	30	18
	SVOA clause word order	43	5
Basic modification patterns	Verb modification by adverbs	33	15
	Verb modification by adverbials	33	15
	Verb modification by adverbial complements	42	6
	Noun modification by adjectives	40	8
	Noun modification by adjectival phrases	11	37

Appendix J

Consent Form

USQ AUSTRALIA

University of Southern Queensland

The University of Southern Queensland

Consent Form

TO: Student who enrols in a course entitled 'Scientific English 1'

Full Project Title: An Investigation of the Relationship between Japanese University Students' English Syntactic Awareness and Their Use of Cognitive and Metacognitive Reading Strategies

Principal Researcher: Hideki Kamita

Student Researcher:

Associate Researcher(s):

- I have read the Participant Information Sheet and the nature and purpose of the research project has been explained to me. I understand and agree to take part.
- I understand the purpose of the research project and my involvement in it.
- I understand that I may withdraw from the research project at any stage and that this will not affect my status now or in the future.
- I confirm that I am over 18 years of age.
- I understand that while information gained during the study may be published, I will not be identified and my personal results will remain confidential. *If other arrangements have been agreed in relation to identification of research participants this point will require amendment to accurately reflect those arrangements.*

  Participants under the age of 18 normally require parental consent to be involved in research. The consent form should allow for those under the age of 18 to agree to their involvement and for a parent to give consent. Copy and paste another signature field if necessary.

  Name of participant.....

  Signed.....**Date**.....

If you have any ethical concerns with how the research is being conducted or any queries about your rights as a participant please feel free to contact the University of Southern Queensland Ethics Officer on the following details.

Ethics and Research Integrity Officer
Office of Research and Higher Degrees
University of Southern Queensland
West Street, Toowoomba 4350
Ph: +61 7 4631 2690
Email: *ethics@usq.edu.au*