Triangulating Think-alouds and Questionnaires in Reading Strategy Assessment: An Exploratory Study

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This study was designed to investigate reading strategies of L2 learners, using a combination of a questionnaire and think-aloud protocols. The participants' reading strategies were compared to find whether the results of the questionnaire and think-aloud protocols compensate or contradict each other. In addition, it was examined whether the ordering of the two instruments would influence strategy awareness and use and reading comprehension scores. Only the task-specific reading strategies from the questionnaire were employed to read a text, and items such as "skipping" and "adding information" were newly found by think-aloud protocols. Also, the participants were observed to do ineffective behaviors such as "being inflexible" and "mistranslating," which might not have been discovered when using the questionnaire only. Overall, the questionnaire and think-aloud protocols turned out to be complementary to each other rather than conflicting. The participants' reading comprehension scores were not influenced by the ordering, however, after a certain task, they were able to reflect on their strategy use more accurately than without or before a task. Thus, if used properly for their own purposes, both instruments are effective to measure students' reading strategies complementarily.

I. INTRODUCTION

Researchers increasingly have been interested in self-reporting verbalization to tap into readers' internal cognitive processes, which cannot be easily measured (Ericsson & Simon, 1993). Although self-reporting has been argued in terms of veridicality and incompleteness, it still gives useful information about internal cognitive processing, including reading

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strategies (Afflerbach, 2000). Among various kinds of self-reports, such as interviews and diaries, verbal protocols (also known as think-aloud protocols) and questionnaires have been adopted to assess reading strategies by many researchers (for a review, see Chamot, 2005; Oxford, 1996). Verbal protocols usually happen concurrently (on-line) while reading a text. In contrast, questionnaires evoke written verbalization that can be considered retrospective (off-line) because participants self-report what they thought and did after reading a text or what they generally do without doing a specific task (Matsumoto, 1994).

Researchers of a first language (L1) (e.g., Afflerbach, 1990; Boekaerts, 2002) and those of a second/foreign language (L2) (e.g., Anderson, 1991; Oxford, 1996) have also used both instruments to identify reading processes. L1 and L2 researchers have employed these two tools with different emphases, and they have found reading strategies and prior knowledge to be important for reading well (Alfassi, 2004; Chamot, 2005; Lan & Oxford, 2003; Li & Munby, 1996; Pressley, 2000).

Several studies have tried to triangulate their findings using a combination of assessment techniques (Ehrman & Oxford, 1990; O'Malley, Chamot, Stewner-Manzanares, Kupper, & Russo, 1985). Levine and Reves (1998) compared reading and writing strategies assessed by questionnaires after think-aloud protocols. Even though they found the similarities and differences of strategies by the two instruments (i.e., participants tended to report general strategies similarly while they reported specific strategies differently by the two instruments), little research has been conducted on the relationship between reading strategies assessed by questionnaires and those identified by think-aloud protocol analysis, including differences caused by the ordering of two instruments, especially in the L2 reading field.

Therefore, this study is designed to examine L2 learners' reading strategies, assessed by both a questionnaire and think-aloud protocols, in order to find whether the results of the questionnaire and think-aloud protocols compensate or contradict each other. This study also aims to discover whether the ordering of the two instruments (i.e., administering a questionnaire first or thinking-aloud first) causes any differences in strategy awareness and use and reading comprehension scores. Using the information of L2 reading strategies from a questionnaire and think-aloud protocols will help us understand L2 readers better, and this understanding will ultimately help us teach them better.

In accordance with these purposes, the data is analyzed to address the following three research questions.

1. What kinds of reading strategies in the questionnaire are not used by students while reading?
2. What kinds of reading strategies are newly found by the think-aloud protocols?
3. Does administering the questionnaire first influence more positively than thinking-aloud first in terms of reading strategy awareness and use and reading comprehension scores?

II. LITERATURE REVIEW

Since the 1980s, research on learning strategies, including language learning strategies, has been blooming and these studies have found how effective strategies are for learning (e.g., Oxford, 1990, 1996; Pressley & Afflerbach, 1995). Compared to the amount of L1 reading research (Afflerbach, 2000; Gaffney & Anderson, 2000; Mokhtari & Reichard, 2002; Palincsar & Brown, 1984; Pressley, 2000), there is more to be studied about L2 reading strategies. Since the population learning English in the L2 context is increasing remarkably (Garcia, 2000) and reading is one of the most difficult but necessary language skills (Alfassi, 2004), especially in an academic world, more research focusing on reading in English as a second/foreign language (ESL/EFL) is needed.

Researchers who consider strategy use to be consistent through similar tasks are likely to use self-reporting measurements like questionnaires; on the other hand, those who treat strategy use to be changeable according to each specific task tend to adopt think-aloud protocols (Winne & Perry, 2000). Numerous studies using questionnaires, mostly with a large group of participants, have shown that language learning strategies, including reading strategies, are very helpful to learn a language (Green & Oxford, 1995; Hyo-Woong Lee, 2002). Think-aloud analyses have discovered and described what readers do while reading a text and have focused on the in-depth information of a few participants (Anderson, 1991; Feyton, Flaitz, & LaRocca, 1999; Li & Munby, 1996; Serren, 2002; Young, 1993). Oxford (1996) summarized each assessment technique's appropriate uses and limitations of use and according to her, in-depth reading strategies can be assessed by think-aloud protocols while typical strategy use can be measured by strategy questionnaires.

1. Questionnaires

Questionnaires have been employed mainly in the fields of L2 learning strategies (e.g., Lan & Oxford, 2003; Oxford, 1990) as well as L1 reading strategies (e.g., Mokhtari & Reichard, 2002). The validity of data collected by questionnaires has been controversial because learners have to rely on the information stored in their long-term memory to answer questionnaires (Ericsson & Simon, 1993; Pressley & Afflerbach, 1995). Moreover, questionnaires are often administered without an actual task, which has been criticized because it causes learners' over- and under-report of strategy use (Cohen, 1998). However, questionnaires are frequently used because of the following reasons. First, using questionnaires is one of the "most efficient and comprehensive ways to assess frequency of language learning strategy use" (Oxford, 1996, p. 28). Second, questionnaires help to find general profiles of status data (Winne & Perry, 2000) from a relatively large group of participants, which allows the data to be analyzed in relation to different variables such as

gender, age, proficiency level, and learning style (Ehrman & Oxford, 1990; Oxford, 1996). In addition, data measured by questionnaires can help predict students' choices, such as what they will do or whether they will use a strategy in a certain situation (Boekaerts, 2002; Winne & Perry, 2000). Those choices are assumed to be planned in advance so that their reactions can be observed in certain ways (Winne, Jamieson-Noel, & Muis, 2002), if the data is reliable.

There are various questionnaires assessing language learning strategies (e.g., Oxford, 1990; Politzer & McGroarty, 1985). To assess reading strategies, in particular, several reading strategy inventories have been developed and used in both L1 (e.g., Mokhtari & Reichard, 2002; Pereira-Laird & Deane, 1997) and L2 fields (e.g., Mokhtari & Sheorey, 2002; Oxford, Cho, Leung, & Kim, 2004).

Among all questionnaires, the most frequently and widely used one in L2 fields is the *Strategy Inventory for Language Learning* (*SILL*, Oxford, 1990). The *SILL* has been used to measure general English language learning strategies (Green & Oxford, 1995; Lan & Oxford, 2003; Oxford, 1996; Oxford & Ehrman, 1995), rather than task-specific or for domain-specific strategies. While the *SILL* has been proven to be effective for various groups in terms of age, proficiency levels, nationalities, and locations, it has been also criticized due to several limitations (Oxford, in press). It is possible that students do not remember what strategies they used in the past and that they do not understand what a strategy item in a questionnaire means (Chamot, 2004). LoCastro (1994) criticized the *SILL* for including culturally irrelevant items. With this spur, since the mid-1990s Oxford has requested users to adapt the *SILL*, i.e., to remove culturally irrelevant items and to tailor the *SILL* to their local needs, and researchers around the world have done so (Oxford, in press). Dörnyei and Skehan (2003) complained that the *SILL* was not sufficiently task-related. However, Oxford et al. (2004) had already piloted a text-specific reading strategy inventory largely modeled on the *SILL*. This inventory includes text-specific reading strategies, such as "Before I read a text, I skim it first, and later I read for details;" "While I am reading a text, I translate each sentence into my native language;" and "After I read a text, I summarize it in my own words." Oxford (in press) recommended further research on statistical issues to provide a tighter measurement geared to tasks within specific sociocultural settings.

2. Verbal Protocols

Verbal protocols usually happen concurrently (on-line) while reading a text (Matsumoto, 1994), so this method has been used to discover what readers do while reading with or without prompts like "What are you thinking now? What made you think so? Why did you stop here? Please keep talking." Researchers who are interested in participants' various

usage of strategies have explored their think-aloud protocols by each specific task (Winne & Perry, 2000). This method has been widely used because researchers believe that learners can report what is in their working memory (Ericsson & Simon, 1993; Pressley & Afflerbach, 1995), and that reporting while doing a task concurrently gives more and better information than reporting what they did retrospectively (Kuusela & Paul, 2000).

According to Afflerbach's (2000) overview of the history of protocol analysis in L1 reading research, there are several controversial issues regarding protocol analysis: (a) whether protocol analysis is appropriate to unearth reading processes; (b) whether verbal protocols produce veridical data; and (c) whether verbal protocols have educational values as much as Vygotsky's (1978) inner speech for helping learners by letting them acquainted with their inner processes (see also Guerrero, 2004).

It is said that protocol analysis helps to better understand readers' strategies by focusing on reading, although readers' thoughts and actions are very complex (Afflerbach, 2000; Payne, 1994). In addition to helping understand L1 readers, it has helped discover and describe what L2 readers do while reading a text and has helped focus on the in-depth information of a few participants (Anderson, 1991; Feyton et al., 1999; Li & Munby, 1996; Serren, 2002; Young, 1993).

While many researchers have proven the effectiveness of verbal protocols to assess reading strategies, there are also many studies showing the adverse influences on the validity of the data (Branch, 2000; Kuusela & Paul, 2000; Leighton, 2004; Wilson, 1994). Producing verbal protocols while doing a task may be too much of a burden on some students (Branch, 2000). Some other students may not have appropriate words to express what they are doing or they may misreport what they are doing while believing it is the right way to (Kuusela & Paul, 2000). In other words, limited language skills may cause students, especially when they are young, to fail to report what they are doing, not because of limited knowledge (Singhal, 2001).

Students with higher proficiency cannot verbally express what they are doing when they are doing it unconsciously (Kuusela & Paul, 2000; Leighton, 2004). It is also possible that being in an unnatural and distracting situation makes learners produce distorted data that is not representing what they are doing silently.

In terms of languages that students used to think-aloud, participants have been allowed to report in either L1 or L2 that they feel more comfortable with, and most of them produced verbal protocols in their native languages (Anderson, 1991; Upton, 1997; Young, 1993) because L2 proficiency is closely related to the degree of L1 use (Kern, 1994). Upton (1997) also found that only some ESL students with higher proficiency levels preferred to use L2 in some cases, but most of them did not. Seng and Hashim (2006) found that L2 learners tended to use L1 especially when facing difficult parts while reading, which supported the important role of L1 use in L2 readers' comprehension processes.

Garcia (2000) emphasized a greater influence of L2 learners' L1 use in reading comprehension than expected.

III. METHOD

This section describes participants and settings, instrumentation, data collection procedures, and data analysis procedures.

1. Participants and Settings

The data was collected in Korea. Middle school students with high English reading proficiency were recruited. The two middle schools, where the participants recruited from, were located in the eastern area of Seoul, Korea. The average academic abilities of the students in both schools are similar to each other. The two schools used the same English textbook. The average socioeconomic status of the parents in the two schools is below average in Seoul. Thus, not many students in those schools had experienced private lessons, such as English tutoring.

English teachers were asked to recommend 20 (10 females and 10 males) second graders in middle schools—equivalent to eighth or ninth graders in the U.S.—with higher than average reading proficiency in their English classes. Their proficiency was rated by the scores on standardized tests (standardized within the school: e.g., final exams) as well as a teacher's informal observations compared with other classmates. The tests were combinations of reading, listening, grammar, and short writing (but not speaking). Their scores were higher than 80 out of 100, and they each were within the top 10 students in their classes. These students had been studying English for four to eight years. At the time of the study they were 13 to 14 years old. The recommended students were provided with the information about this study, and they voluntarily participated.

2. Instrumentation

1) Questionnaires

In order to measure reading strategy use, the participants took the *Background Information Questionnaire*, the *Reading SILL*, and the *Reading SILL Checklist*.

The *Background Information Questionnaire* was designed to document participants' general background information such as gender and age. It was translated into Korean by the first author, and the translation was checked by a bilingual English teacher with a

master's degree, who was in Korea. Because its questions are short and simple, no distortion by the translation was observed.

Because the *SILL* has not been specified to reading strategies, we made the *Reading SILL* to see whether the *Reading SILL* can keep the merits of the *SILL* for assessing reading strategies. The *Reading SILL* consisted of 30 items related to reading with a Likert scale—excerpted from the *SILL* 7.0 for ESL/EFL students (15 items) and from the *SILL* 5.1 for native English speakers learning other languages (15 items) (Oxford, 1990)— and the items were modified to refer to reading strategies with Oxford's permission. The *SILL* 7.0 has 50 items and the *SILL* 5.1 has 80 items, with six categories: memory, cognitive, compensatory, metacognitive, social, and affective strategies. Thirty items in the *Reading SILL* were excerpted from all these categories. However, cognitive (11 items, including "I find the meaning of an English word by dividing into parts that I understand" and "I say or write new English words several times") and metacognitive strategies (7 items, including "I plan what I am going to accomplish in English reading each day or each week" and "I evaluate the general progress I have read in English") comprised the largest portion of the *Reading SILL*.

Since there were published versions of the translated *SILL* in Korean (Kyungja Park, Hyunjin Kim & Hyesook Park, 2003), the *Reading SILL* was translated by the first author and compared with the existing translation in keeping with the *Parallel Blind Technique* (Behling & Law, 2000). The translation was checked again by the bilingual English teacher.

The *Reading SILL Checklist* consisted of the 30 items in the *Reading SILL* in a different order. It was presented last to let the participants check which strategies they thought they had used while reading the text, aiming to find whether they were aware of (report) their strategy use accurately. The items in the *Reading SILL Checklist* were grouped into the items checked and the items unchecked. The strategies that the participants thought they had used (i.e., the items checked) were compared with the reading strategies identified by the think-aloud protocols.

2) Think-Aloud Protocols

Two expository texts were chosen from one of the major English textbooks in Korea: one for training and the other for a main task. Visual prompts (red dots) were placed at the end of every sentence, at the end of paragraphs, and at the end of the text (Afflerbach, 1990). Among many possible genres, an expository text was chosen because it is the most common style of text in academic reading. Also, because second graders in middle schools participated (in terms of the difficulty calculated by Fry's readability graph (1977), their textbook is for sixth graders in the U.S.), the two texts were excerpted from the third

graders' textbook, which were assumed to be a little bit challenging (for seventh graders in the U.S.; Fry, 1977). Challenging texts were used because they could make the participants use strategies to comprehend (Students can read an easy text without using strategies). Before producing think-aloud protocols with a main text, the participants practiced with a sample text to familiarize them with the think-aloud procedure. The sample text, *Special Effects*, consisted of three paragraphs, 15 sentences, and 191 words. The main text from the same textbook, but with a different topic, *Music Around Us* was composed of seven paragraphs, 32 sentences, and 413 words.

The participants provided think-aloud protocols in their L1, which was Korean in this study, as in other studies (Anderson, 1991; Leow & Morgan-Short, 2004; Young, 1993). According to Leow and Morgan-Short (2004), there is no study comparing native languages to non-native languages while producing verbal protocols; however, making participants produce verbal reports in English might cause potential distortion of their intention or purposes and prevent their cognitive processes from being used for reading itself because speaking in English would be too burdensome on cognition. The participants were allowed to speak in Korean unless they felt more comfortable talking in English. Their verbal protocols were transcribed in Korean first, and then translated into English. The English transcription was reviewed by another bilingual Korean. If the reviewer considered anything unclear or mistranslated, the researcher discussed it with the reviewer and resolved any gaps between the original verbal protocol and its translation.

3) Pre-test and Post-test

A pre-test was administered to measure the participants' baseline knowledge of the main text, *Music Around Us*. It consisted of questions regarding vocabulary, topic, and content knowledge. Each participant was not provided with the answers of the pre-test until they finished a post-test. The post-test had the same questions as the pre-test to compare task performance based on the pre-test. The questions in the post-test were rearranged and the wording was changed (e.g., "Please find a correct sentence" to "Based on your reading, please find a correct sentence.") to make it look different from those in the pre-test.

The pre-test and the post-test were scored with numerical value, 1 for a correct answer and 0 for a wrong answer. Among the nine questions, seven were multiple-choice questions and two were open-ended questions. The answers of the two open-ended questions were very simple—Vivaldi and composer, so these were also scored with 1 and 0.

3. Data Collection Procedures

The first author visited the middle schools for 10 days. Each day, after school, two

participants were provided with the information about this study. They completed the *Background Information Questionnaire* together first. It took about five minutes. Then, they took the pre-test for 10 minutes. The answers were to be found in the text but were not provided until they finished the post-test. During the pre-test, they were not able to use a dictionary.

The practice session was given to let participants get familiar with think-aloud protocols. The sample text, *Special Effects,* which was not related to the main text, was provided. At first, the students laughed to see the first author demonstrating, but soon they got used to thinking-aloud. The participants produced verbal protocols while reading the sample text with visual prompts (red dots). It took about 20 minutes. The researcher tried not to prompt the participants verbally, in order not to distract them. A dictionary, a pen, and paper were given and they were encouraged to use these items whenever they wanted.

After a five-minute break, the participants were randomly assigned to one of the two groups: *SILLTA* (taking the *Reading SILL* first and then reading a text while thinking aloud) and *TASILL* (reading a text while thinking aloud first and then taking the *Reading SILL*). Each participant was given 30 minutes to read the text while thinking aloud, which was recorded by a digital voice recorder. One participant sat by the researcher, facing a wall to avoid any distraction, while the other was waiting outside of a classroom.

In order to see whether the participants' reading strategies differ according to thinking-aloud before and after taking the questionnaire, the participants in the *SILLTA* group took the *Reading SILL* before they produced think-aloud protocols while reading the text, and the other participants in the *TASILL* group took the *Reading SILL* after they produced think-aloud protocols while reading the text (see Table 1). The participants were provided with a dictionary, a pen, and paper with the text for the main reading task. Each group on average read the text in 13 minute. The instructions were, "You will read an English text. I am trying to learn more about how Korean students read English texts. Your task is to read and understand this text in 30 minutes. Please read aloud and 'think aloud' consciously whenever you see a red dot, which you will see at the end of every sentence and every paragraph and at the very end of the text. It is not a test, so please feel free to use this dictionary, this pen, and paper when you need, as you do at home."

The participants took the post-test after the main task without consulting a dictionary or their notes. While the second participant was doing his/her main task, the first participant took the post-test in another classroom with his/her English teacher's supervision. The second participant took the post-test after finishing the main task. Each had 10 minutes to answer the questions.

Lastly, after taking the post-test, the participants checked which strategies they thought they had used while reading the text on the *Reading SILL Checklist*. They were also given empty lines to write the strategies they had used while reading the text, if the given

Reading SILL Checklist did not have theirs. They had as much time as they wanted.

TABLE 1
Experimental Procedure

Group 1 (*SILLTA*)	Background → Pre-test→ Practice → Break → *Reading SILL* → Reading Task → Post-test → Checklist Info. Questionnaire. with Think-Aloud (5 min) (10 min) (20 min) (5 min) (10 min) (30 min) (10 min)
Group 2 (*TASILL*)	Background → Pre-test → Practice → Break → Reading Task → *Reading SILL* → Post-test→ Checklist Info. Questionnaire with Think-Aloud (5 min) (10 min) (20 min) (5 min) (30 min) (10 min) (10 min)

4. Data Analysis Procedures

Oxford's (1990) key to understanding the averages and to interpreting the frequencies of students' strategy use was used in order to analyze the participants' reading strategy use assessed by the Reading SILL. The mean of the frequencies of strategy use, 1.0 to 1.4 (never or almost never used) and 1.5 to 2.4 (usually not used), was interpreted as low use; 2.5 to 3.4 (sometimes used) as medium use; and 3.5 to 4.4 (usually used) and 4.5 to 5.0 (always or almost always used) as high use.

Recorded think-aloud protocols were transcribed in Korean and translated into English. The verbatim transcriptions were identified as a certain strategy, coded, and tallied per item; several reading task-specific items were chosen from the *Reading SILL* and Pressley and Afflerbach's (1995) lists, based on the task analysis: 17 strategies were from the *Reading SILL*, and 12 from Pressley and Afflerbach (1995). Some overlapped items were grouped into one strategy item, resulting in the 16 items, and four newly identified items were added later, to make a coding scheme of this study (Appendix A). Also, interestingly, nine ineffective behaviors were identified from think-aloud protocols (Appendix B).

The strategy items identified through the think-aloud protocols were compared with the items in the *Reading SILL* in terms of variety and frequency. The chi-square analysis and the correlation analysis were used to discover whether taking the questionnaire before or after thinking-aloud made any differences in strategy use and awareness. To compare the participants' reading comprehension scores, an independent t-test was conducted.

IV.   RESULTS AND DISCUSSION

This section presents the results and discussion of each research question. The reliability of the *Reading SILL,* without any excluded items, was pretty high, α=.84.

1. What Kinds of Reading Strategies in the Questionnaire Are Not Used by Students While Reading?

Because the items in the *Reading SILL* should be compared with those identified from the think-aloud protocols, the task-specific strategies were distinguished from more general strategies. Among the 30 items in the *Reading SILL*, 17 items were task-specific reading strategies. However, the other 13 items could be used in a more general setting; for example, "28. I look for opportunities to read as much as possible in English" and "30. I ask for help from English speakers" could not be employed while reading a certain text. While reading the main text, those 13 general strategy items were not identified by any participants' think-aloud protocols, even though they reported to use those strategies using the Likert scale in the *Reading SILL*. It is possible that the participants felt obligated to choose 1 to 5 in the questionnaire because there was no option like "not this time", which can be a disadvantage of employing questionnaires when assessing reading strategies.

The 17 task-specific strategies were grouped to the 11 items. Then, those 11 reading strategies were grouped to *before, during*, and *after* reading strategies before analyzing the participants' verbal protocols (see Table 2). As a result, the protocols showed that except for skimming, the other 10 strategies were actually used by the participants.

More specifically, three strategies were expected to be used *before* reading the text (skimming, goal-setting, and activating PK). Interestingly, from their think-aloud protocols, no behaviors indicating that they were using any of the three strategies were observed. However, in the *Reading SILL*, they answered that they usually skim (high use) and set goals sometimes (medium use), and sometimes activate their prior knowledge (medium use). However, from their think-aloud protocols, only "activating PK" was observed to be used *during* reading. For example, one of them said, "Is it Pastoral Symphony?" after reading 'in The Sixth Symphony there is a famous thunderstorm,' showing that he activated what he already knew to understand the given sentence. It is possible that because the participants were aware of the usefulness of the three strategies, but without knowing how to skim, to set goals, and to activate prior knowledge before reading, they might not have been able to actually use them *before* reading. Another possibility is that they simply did not (or could not) report as verbatim even though they actually (unconsciously) skimmed, set a goal, and activated their prior knowledge *before* reading.

The following five strategies were used *during* reading: (1) translating, (2) looking for patterns, (3) guessing words, (4) reading with dictionary, and (5) repeating. Even though the strategy of "guessing sentences" (discussed in the results for research question 3) was also expected to be used *during* reading, it was not observed in their think-aloud protocols.

TABLE 2
Task-based Reading Strategies in the Reading SILL (N = 20)

	Strategies	Reading SILL (average)	Think-aloud (raw frequency)
	Before		
4, 5[1]	Skimming	3.86[2]	-
3, 6	Goal-setting	3.02	-
7	Activating PK	3.45	-
	During		
12, 21	Guessing sentences	3.43	-
8, 9	Translating	3.10	199
10, 11	Looking for patterns	3.38	45
13, 20	Guessing words	3.10	23
19	Reading with dictionary	3.35	67
18	Repeating the text just read	2.85	21
7	Activating PK	3.45	38
14	Summarizing	2.53	7
25	Evaluating	2.81	2
	After		
14	Summarizing	2.53	17
25	Evaluating	2.00	17

Lastly, the following two items were employed *after* reading: summarizing and evaluating. When summarizing, we usually write down a summary, so the participants were given the paper and a pencil, but few used them. That is why their summarizing behaviors were little observed. Also, even after seeing a red dot at the end of the text, not many students evaluated their comprehension of the text. It may be influenced by their passive studying habits; in other words, after reading a text, they tended to be asked the related questions by their teachers or the quizzes in textbooks to check their comprehension. Thus, without those explicit cues, it might not be easy to evaluate themselves after reading the text. Interestingly, some participants summarized and evaluated *during* reading, which was expected to be done *after* reading. However, in the *Reading SILL*, the items related to summarizing and evaluating did not specify whether they are *during* reading or *after* reading strategies; therefore, it was hard to compare them with the behaviors observed from their think-aloud protocols.

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[1] This number represents each item in the *Reading SILL*.
[2] This is the average frequency of strategy use that the participants reported on the *Reading SILL*.

2. What Kinds of Reading Strategies Are Newly Found by the Think-Aloud Protocols?

As noted before, "activating PK" was expected to be used *before* reading, and "summarizing" and "evaluating," *after* reading. However, these three items were reported to be used *during* reading too through the participants' think-aloud protocols, and the items were not specified in the *Reading SILL* if they are *before* or *after*. Therefore, the items were not classified as newly identified strategies although they did not exactly conform to the coding scheme.

To establish the coding scheme for the think-aloud protocols, Pressley and Afflerbach's (1995) was also examined. From their list, five items were added to the existing 11 items: (1) paraphrasing, (2) pausing, (3) repeating a thought, (4) predicting, and (5) rereading.

Using the coding scheme of these 16 strategies, many interesting findings were observed. First, to native English speakers, "paraphrasing" is one of the important strategies helping them understand a text (Pressley & Afflerbach, 1995). It was unexpected that the strategy of "paraphrasing" was not used at all. It seemed that EFL learners translated English sentences, instead of paraphrasing, because paraphrasing in English was too difficult for them. Therefore, "paraphrasing" might not be suitable for English language learners (it may be a reason why most questionnaires for ESL/EFL learners such as the *SILL* do not include "paraphrasing"). Another possibility is that "translating" should be considered as a sub-item of "paraphrasing" for ESL/EFL students.

Second, "repeating the text just read" meant "memorizing" in the *Reading SILL*, but the participants repeated what they just read to hold it in their working memory while translating. Therefore, instead of adding a new item, it was modified into "I repeat words or sentences several times until I can understand." in the coding scheme.

Third, four new strategies were newly found by the think-aloud protocols (see Appendix A for examples): (1) skipping, (2) communicating with the text, (3) monitoring grammar, and (4) adding information. When we used only the *Reading SILL*, it would have been impossible to identify these new strategies; because those items were not listed in the *Reading SILL*, the participants could not answer them. One of the most interesting new strategies was "communicating with the text." The participants answered the questions in the text and conversed with the text (e.g., "I think so too; Is that so?; What are they like?").

In addition to these four new strategies, the think-aloud protocols newly identified interesting behaviors. Some participants were found to do what might hinder their reading (called ineffective behaviors; Appendix B). The previous research showed the positive relationships between proficiency levels and strategy use without mentioning any ineffective behaviors. From the think-aloud protocols in this study, the participants with high reading proficiency used effective strategies (399, tallied from think-aloud protocols)

more than those with low proficiency (234), but the latter used ineffective behaviors (72) more than the former (53). In other words, the higher reading proficiency the participants had, the more they used effective strategies, which has been shown by the previous research such as Green and Oxford (1995) and Lan and Oxford (2003); and the lower reading proficiency they had, the more they used ineffective strategies, which has been identified by this study. Even though the independent t-test result about ineffective behaviors was not significant, it still showed a possible negative influence of ineffective behaviors on reading proficiency.

Among the ineffective behaviors, "being inflexible" needed to be paid attention to for EFL students. In the EFL settings, the participants have fewer opportunities to contact various meanings of the same word, so they tend to memorize and translate the words as the first meaning in a dictionary or as they first memorized. For example, when one participant read "So does the sea," he said, "Therefore, uh / sea / sea." Because he knew *so* only as *therefore*, he could not translate this sentence and skipped it without understanding. Interestingly, the participants did not realize that translating with the first meaning was awkward, or even if they realized this, they did not try another meaning. "Skipping" usually followed "being inflexible." However, because "skipping" helped readers read through to the end, it was not classified into ineffective behaviors.

Even though strategies are helpful, if students use them in a wrong way, then the strategies will hinder learning. Therefore, students should learn how to use strategies and correct ineffective behaviors. Not all strategies are good for every student, so students have to find strategies proper for them. However, no participants realized that they were using ineffective behaviors. The first step should be helping the students monitor their strategy use accurately and promoting strategy awareness to employ strategies effectively. More studies regarding ineffective behaviors are needed.

3. Does Administering the Questionnaire First Influence More Positively than Thinking-aloud First in Terms of Reading Strategy Awareness and Use and Reading Comprehension?

We just examined what were similar or different between the reading strategies assessed by both the questionnaire and the think-aloud protocols. Now we focus on any differences caused by the ordering of presenting the two instruments. To examine whether taking the questionnaire before reading (SILLTA group) made a significant difference from taking it after reading (TASILL group), a chi-square analysis was used (Azevedo & Cromley, 2004). The raw scores were assigned with numerical value, 1 for above median and –1 for below median, and a chi-square analysis was conducted. The raw scores and the percentage of the participants using each item above the median were compared between the two groups.

As shown in Table 3, the average frequencies of the task-specific strategies on the *Reading SILL* (items 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 18, 19, 20, 21, 25) were not significantly different between the two groups, *SILLTA*=3.24, *TASILL*=3.48, t(17)=.75, p>.05. Likewise, the average raw frequencies of the (*Reading SILL* related) strategies identified from think-aloud protocols were not significantly different either, *SILLTA*=21.45, *TASILL*=21.44, t(18)=.00, p>.05.

However, there was a significant difference between these two items: "reading with dictionary" and "adding information." The participants who saw the strategy of "using a dictionary" in the *Reading SILL* (*SILLTA*) might have been cued to actually use a dictionary while reading. The raw frequencies of two groups in terms of "reading with dictionary" were similar (*SILLTA*=36 / *TASILL*=31). However, most students in the *SILLTA* group (8 out of 11) used the strategy above the median, while only two students in the *TASILL* group used it very often. More interesting result was that the *SILLTA* students did not "add information" while reading, but the *TASILL* students did. Because the *SILLTA* students did not see this item in the *Reading SILL*, they might not have used it.

Moreover, in terms of strategy awareness, both groups were aware of almost all the strategies because they had little differences in the variety of strategies even though the *TASILL* students did not see the items in the *Reading SILL*. In other words, the *TASILL* students were able to use the most strategies in the *Reading SILL* too without looking at them before. These insignificant results in terms of frequency and variety can mean that taking the questionnaire right before thinking-aloud did not influence much on the participants' strategy use. It may also mean that the participants used strategies, based on their typical use in their repertoire, rather than their choice of strategies was influenced by a certain task. This is an indirectly supporting evidence of the questionnaire researchers' assumption that strategy use is sort of an aptitude (Winne & Perry, 2000). Therefore, questionnaires may be used for assessing typical strategy use as has usually been.

In addition, in order to see whether the ordering of the two instruments would influence the participants' strategy awareness (i.e., whether the participants can monitor what strategies they used), their strategy use assessed by the *Reading SILL*, think-aloud protocols, and the *Reading SILL Checklist* were compared. Among all strategies, "translating" deserves attention especially for EFL learners. It was one of the most frequently used strategies identified from think-aloud protocols as shown in other L2 studies (Leow, 2001; Leow & Morgan-Short, 2004). The participants who did not translate word-for-word seemed to employ "guessing sentences," but it was impossible to count because there was no obvious statement indicating that they were guessing the meaning of sentences. However, we could identify when they were guessing the meaning of words; for example, after reading 'The Pastoral Symphony,' one of the students who used the strategy of "guessing words" said, "Is this a name? I thought so because it starts with capital

letters." Therefore, more caution is necessary regarding "guessing sentences." The *SILLTA* students seemed to know guessing (3.68 from the *Reading SILL*) is better than translating (2.69), but, in reality, they translated often while reading (98 from think-aloud protocols). On the other hand, the *TASILL* students answered in the *Reading SILL* that they translated (3.50) more than guessed (3.17), which conformed to their translating behaviors observed from their think-aloud protocols (101).

The correlation analyses showed the interesting results. To see the relationships between the task-specific strategies on the *Reading SILL* and the strategies from the think-aloud protocols, the correlations were conducted. To the *SILLTA* students, taking the *Reading SILL* before was significantly correlated with their actual strategy use (r=-.70, p<.05). The negative direction of the correlation (-.70) means that the more the *SILLTA* students answered that they would use the strategies on the *Reading SILL*, the less they used them while reading the text. This negative relationship can also be explained by Cohen's (1998) caution, which is, the *SILLTA* students' over- or under-report without an actual task. With a task, the *TASILL* students were able to report their strategy use more accurately (neither over- nor under-report).

Discrepancy was also found between the actual strategy use (from the think-aloud protocols) and the strategies they thought they had used (from the *Reading SILL Checklist*), but not significant. Even though it was not significant, it indicated the similar problem (e.g., the *SILLTA* students translated often, but they did not check "translating" on the checklist). Again, the participants seemed to think that guessing sentences sounded better to them. Therefore, strategy instruction is needed for Korean EFL students to let them have better perception of strategies (e.g., if effective and efficient, "translating" is a good strategy too).

In terms of the participants' reading comprehension scores, both groups had very similar prior knowledge about the topic, *SILLTA*=4.36, *TASILL*=3.68, t(18)=.88, p>.05. After reading the main text using the strategies, they improved at the similar degree too, *SILLTA*=5.73, *TASILL*=5.33, t(18)=.57, p>.05. The results mean that the ordering of the two instruments did not help the participants significantly improve in reading comprehension within such a short period. It is necessary to observe both groups' improvement after longer term intervention related to the ordering.

To summarize, the participants tended to be more aware of what they did when taking the questionnaire after a certain task than taking it before the task. It suggests that if teachers are interested in teaching how to monitor the students' strategy use, questionnaires should be administered after certain tasks, which will help answer based on the information activated in the working memory about what they just did, rather than based on the long-term memory about what they did relatively long ago (or will do in similar situations).

TABLE 3
Strategies from the *Reading SILL* and Think-Aloud Protocols: *SILLTA* vs. *TASILL*

Strategies		*SILLTA* Reading SILL (average)	Think-aloud Raw Frequency	(n=11)	*TASILL* Reading SILL (average)	Think-aloud Raw Frequency	(n=9)	χ^2
	Before							
4, 5, PA[3]	Skimming	3.82	0		3.89	0		
3, 6, PA	Goal-setting	3.36	0		2.67	0		
7, PA	Activating PK	4.00	0		2.89	0		
	During							
12, 21	Guessing sentences	3.68	-	-	3.17	-	-	
New[4]	Skipping		24	4 (36%)[5]		19	3 (33%)	.020
8, 9	Translating	2.69	98	5 (46%)	3.50	101	5 (56%)	.202
New	Communicating with the text		68	3 (27%)		59	4 (44%)	.642
10, 11, PA	Looking for patterns	3.32	25	5 (46%)	3.44	20	4 (44%)	.002
New	Monitoring grammar		4	2 (18%)		1	1 (11%)	.194
13, 20	Guessing words	3.14	16	4 (36%)	3.06	7	5 (56%)	.737
19	Reading with dictionary	3.36	36	8 (73%)	3.33	31	2 (22%)	5.051*
PA	Paraphrasing		0	0 (0%)		0	0 (0%)	
18, PA	Repeating the text just read	2.91	17	2 (18%)	2.78	4	1 (11%)	.194
PA	Pausing		4	2 (18%)		3	2 (22%)	.051
PA	Repeating a thought		1	1 (9%)		0	0 (0%)	.861
PA	Predicting		0	0 (0%)		2	2 (22%)	2.716
7, PA	Activating PK	4.00	22	4 (36%)	2.89	16	2 (22%)	.471
14, PA	Summarizing	2.73	0	0 (0%)	2.33	7	2 (22%)	2.716
25, PA	Evaluating	2.73	0	0 (0%)	2.89	2	2 (22%)	2.716
New	Adding info		0	0 (0%)		9	3 (33%)	4.314*
	After							
PA	Rereading		1	1 (9%)		0	0 (0%)	.861
14, PA	Summarizing	2.73	11	1 (9%)	2.33	8	0 (0%)	.861
25, PA	Evaluating	2.73	11	0 (0%)	2.89	6	0 (0%)	
Total (Average per person)			338 (30.73)			295 (32.78)		
Average per Person (*Reading SILL* related strategies)		3.24	21.45		3.48	21.44		

* < .05

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[3] An item from Pressley & Afflerbach (1995)
[4] A newly found item by think-aloud protocols
[5] It means that four out of 11 students (36%) in the *SILLTA* group used "skipping" strategy more than the median frequency.

V. CONCLUSION

This study contributed to finding the relationship between reading strategies assessed by a questionnaire and reading strategies identified by verbal protocols. The findings of this study showed that there were advantages and disadvantages in the *Reading SILL* and think-aloud protocols respectively. What was discovered by the verbal protocols suggested how to revise the *Reading SILL*. Those two instruments showed different perspectives of reading strategies, implying that they should be employed together to compensate each other. Teachers can understand their students' reading habits and try different teaching methods, based on the results found by different assessment techniques.

Overall, the strategies from think-aloud protocols were overlapped with the strategies in the *Reading SILL*, meaning that both instruments did not contradict or show totally different findings. Instead, they compensated each other. First, as "reading with dictionary" did, taking the strategy inventory before reading may prompt students to use some strategies. Second, the *Reading SILL* helped to identify the strategies that might not have been found solely from the think-aloud protocols. For example, without the *Reading SILL*, it might have been ignored that the participants knew about "setting goals" or "skimming." Even though it was not confirmed whether they set goals or skimmed, the *Reading SILL* showed the possibility that they could have. Likewise, think-aloud protocols helped to discover not only effective reading strategies such as "skipping" and "communicating with the text," but also ineffective behaviors such as "mistranslating" and "mis-summarizing."

When a questionnaire is well designed to list most strategies that students use, then the questionnaire is very effective to see how often they use its strategies. When it is not well designed to show what students do not actually use, then its results do not tell much about the students' actual strategy use. Students are bound within the choices of what they have in the questionnaire. In this sense, most task-specific strategies in the *Reading SILL* were properly selected and actually used while reading.

In addition, the comparative results suggested that to assess task-specific strategies based on the participants' short-term memory about what they just did, administering the questionnaire right after doing a task would be better than taking it before a task or with no task. The think-aloud protocols uncovered the participants' task-specific reading processes for a given text, and it helped to identify several new strategies, including ineffective behaviors, which might not have been discovered by the questionnaire.

As far as the *Reading SILL* is concerned, the general reading strategies, such as "I look for opportunities to read as much as possible in English" and "While reading in English, I ask help from English speakers," were not relevant to the current reading task. Thus, only the items directly related to the task were analyzed. This suggests that only task-specific strategies should be included when developing a questionnaire to measure task-specific

reading strategies.

In sum, this study showed that there were strategies overlapped between the *Reading SILL* and the strategies found from think-aloud protocols; moreover, each technique showed the findings uniquely explained by its own strengths and emphases. Based on the results of this study, educators can decide what type of assessment technique and how to use in order to see a certain aspect of reading strategies.

VI. IMPLICATIONS AND RECOMMENDATIONS

Because this study is an exploratory study with a small number of students, caution should be exercised when interpreting the results. First, the data of 20 students was not enough to analyze statistically.

Second, because each student participated in one session, the results should not be generalized to all reading events of even one student. There were some students who did not perform as well as they usually do, so this study might not represent the participants' natural reading processes. For example, speaking *un*related thoughts, rather than thinking them silently, might have caused more distractions, as Pressley (2000) reported that poor readers tend to use prior knowledge that is not directly relevant to the important ideas in the text, resulting in unnecessary inferences. One student kept adding irrelevant information while she was reading: for example, 1) after reading 'Birds, rain, and wind make kind of music,' she added "Rain? Um I like *Rain* [famous Korean singer] a lot"; and 2) after reading '/ bee buzzing sound //,' she added "Buzzing? Buzz? Um my friend is a fan of *Buzz* [famous Korean band]), which made her laugh a lot. Her pre-test score was 1 and her post-test score was 3, which was the worst of all participants. Because she was also one of the students with higher reading proficiency than her classmates, these results indicated that thinking aloud irrelevant information affected her negatively in this study (she might have done better if she had added these irrelevant information silently as she usually does) (Leow & Morgan-Short, 2004).

Third, the participants are not *tabula rasa*, and this study was not based on strategy instruction, so it should not be ignored that their results might have caused by their previous learning experiences, not simply because of this study. Therefore, the results in this study should be considered to show how to use a questionnaire and think-aloud protocols to assess reading strategy use in an exploratory way. More studies are needed not only to describe ESL/EFL learners' reading strategies using different instruments, such as this study, but also to prescribe what to do and how to do it, based on the triangulated data.

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APPENDIX A

Coding Scheme Based on *Reading SILL* and Pressley and Afflerbach (1995)

Strategies	Definition	Sample Responses
Before		
Skimming	Noticing characteristics of the text, such as the length and structure; Noticing important parts, especially important information covered in the text; Gathering information about what might be in the text that is relevant to the reading goal; Determining what to read and in what order; Determining what to read in detail; Determining what to ignore	None
Goal-setting	Constructing a goal for reading of this text (i.e., knowing what the reader wants to get out of the text)	None
Activating PK	Through mental search of what one knows about topic, the text structure, and author intention; Reading inference list to activate prior knowledge	None
During		
Guessing sentences	Understanding what the reader reads without translating it word-for-word into his/her own language	[Reading only English sentences. Usually comments related to what the reader just read was added—Different from skipping]
Skipping	Moving to the next sentences without trying to understand; Saying that sentences or words are difficult but trying nothing to understand; Saying that the reader will skip sentences or words	"Because it is a little difficult to translate / I'll skip." "um / I can't remember 'hum' [and he just skipped to the next words]."

Strategies	Definition	Sample Responses
Translating	Translating English words or sentences into his/her own language	[After reading 'What kind of music do you like?'] "네가 좋아하는 음악은 / 무슨 / 아 어떤 음악을 좋아하니? [Music you like / what / ah what type of music do you like?]"
Communicating with the text	Answering the questions in the text; Conversing with the text; Confirming what the text says; Asking questions about the content; Asking to find more than the given in the text	[After reading 'What kind of music do you like?'] "I like Korean pop songs too and I like others regardless of its genres." "Is that so? What are they like?"
Looking for patterns	Finding grammatical patterns while reading words or sentences (trying to connect the grammar they learned) Dividing sentences into parts to understand or translate sentences (it does not necessarily involve dividing sentences by grammatical components.)	"This is present perfect tense what I learned a couple of days ago." "One of the greatest composers. Beethoven wrote. Nine symphonies."
Monitoring grammar	While reading, checking the English sentences or translations are grammatically correct (focusing on whether it is grammatically correct)	"Whether this sentence structure is correct // yes it is."
Guessing words	In spite of looking up a word, making guesses what the given word means based on the context or the *PK*; Reading English without looking up every word; Using English words while translating the sentences with the words	[After reading 'The Pastoral Symphony'] "Is this name of place? because it starts with capital letters." "도시에서 버스 타이어들도 길에서 / hum을 한다 [In the city bus tires also on the street / do 'hum'.]"
Reading with dictionary	Reading English with looking up words that the reader do not know	"I'll look up a dictionary."
Paraphrasing	Recounting narrative or message of the text; Re-wording the sentences into the reader's words	None
Repeating the text just read	Repeating words or sentences sometimes because working memory is full or at capacity or sometimes because only partial understanding of text has been accomplished and reader needs to repeat them to complete the model held in working memory	"Music can make an exciting story more exciting, a sad one sadder… happier. 음악은 어 / an exciting story more exciting / 흥미로운 이야기를 더 흥미롭게 하고 / a sad one sadder…"
Pausing	Pausing to reflect on text	"a famous thun // der // storm //"
Repeating a thought	Repeating or restating a thought that occurred during reading to hold in working memory, or to explain something in the text	"ah I think I was right. I think it is the Pastoral Symphony."
Predicting	Hypothesizing a tentative interpretation of overall paragraph/text meaning and/or tentative understanding of the structure of the paragraph/text; Looking for information consistent/inconsistent with expectations; Jumping back to reconsider previously read information in light of information encountered later in the text;	[After reading the first paragraph] "It seems a story about music." [After reading Beethoven's name] "ah it seems like story about Beethoven."

Strategies	Definition	Sample Responses
Activating *PK*	Thinking of relationship between what the reader already knows and new things he/she reads in English	[After reading 'in The Sixth Symphony there is a famous thunderstorm'] "Is it Pastoral Symphony?" "Now that I read the rest, there is pastoral symphony among Beethoven's works."
Summarizing	While reading, making summaries of the sentences, paragraphs, and/or the text	[After reading a whole paragraph in English] "Well, it is about whether you like music / something like that I think."
Evaluating	While reading, evaluating how much the reader understands the text and how much vocabulary he/she knows	[While reading] "ah / there are many words I don't know."
Adding info	Adding more information (personal) to what the sentences say	[After reading 'Birds, rain, and wind make a kind of music.'] "When we pick a seashell at the seashore, it makes sound."
After Rereading	Rereading after the first reading	"I planned to look it [a word she doesn't know] up after finishing all. I read once again and look it up." [Then she read the part including the word and guessed what it means.]
Summarizing	Making summaries of the sentences, paragraphs, and/or the text	"It is about music. Music is surrounding all of us and everything around us can be music. And composers like Vivaldi and Beethoven make music in a way they listen from nature. They do not simply imitate but express it in their own genuine way. Both Beethoven and Vivaldi live totally different from us, but people can understand them without any difficulty because there is no obstacle in understanding music."
Evaluating	Evaluating how much the reader understands the text and how much vocabulary he/she knows	"I understood quite well." "Except for there are some words I don't know, it was easy."

APPENDIX B

Ineffective Behaviors from the Think-Aloud Protocols

Behaviors	Description	Sample response
Mistranslating	Translating in a wrong way without trying to realizing	[After reading "…wrote nine great symphonies, and in Sixth Symphony there is a famous thunderstorm"] "아홉 개의 좋은 교향곡과 그리고 여섯 개의 교향곡을 유명하게 만들었다 […made nine good symphonies and six symphonies famous]"
Translating only what they know	Translating only the part of what they know and skipping the rest of it	[After reading "Music can speak to us from many lands and across many years,"] "음악은 말해줍니다 [music tells] 우리들한테 [to us] [then he skipped]"
Finding a wrong meaning	Finding another word from a dictionary without realizing	[Looked up "tires" but used the meaning of "Tiresias" without realizing he was looking at a different word] "장님 예언자… [blind prophet]"

Behaviors	Description	Sample response
Misidentifying a word	Mistaking a word for another word	[After reading "Have you ever thought…"] "다시… [again…]"
Being inflexible	Using the first meaning in a dictionary without considering the context	[After reading 'The Pastoral Symphony' and looking up the word in a dictionary], "어 양치기 교향곡 [uh shepherd symphony]"
Not trying to use *PK*	Not trying to find out whether or not they knew it before	[Right after reading "Antonio Vivaldi" and looked it up] "아 남자이름 [ah a man's name]"
Adding irrelevant info	Adding irrelevant information so keeping from the focus	[After reading "So does the sea."] "아! 바다! SES 멤버 중에 하하 [ah! sea! The member of SES (Korean singers) haha]"
Mis-summarizing	Giving a wrong summarization or only part of the whole text	[After reading all] "비발디의 음악에 대한 거네요 [it was about Vivaldi's music]"
Mis-evaluating	Considering themselves to have understood well without doing so	"다 이해 했어요 [I understood almost all (but she did not)]"

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