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First and Second Language Use in Reading Comprehension Strategies of Japanese ESL Students

Thomas A. Upton
University of Wisconsin – Eau Claire
<uptonta@uwec.edu>

Abstract

Reading in a second language (L2) is not a monolingual event; L2 readers have access to their first language (L1) as they read and many use it as a strategy to help comprehend an L2 text. Due to difficulties in observing the comprehension process, little research has been conducted to try to determine what roles the L1 and L2 play in the reading strategies of L2 readers or how these roles vary at different proficiency levels. This study attempts to address these two issues. Eleven native speakers of Japanese, at two different proficiency levels, were asked to think-aloud –in the language of their thoughts—as they were reading an English text. In retrospective interviews, subjects then listened to their tape-recorded think-aloud protocols and were asked to clarify and explain their thoughts.

Three generalizations about L1 and L2 strategy use emerged from the data and are discussed.

As both Sarig (1987) and Anderson (1991) have pointed out, reading in the native language and in other languages is of a highly individual nature; that is, no two readers approach or process a written text in exactly the same way. Nevertheless, there are general factors which do have an impact on reading comprehension. Much work has been done to increase our understanding of the influences of factors such as strategy choices and background knowledge on second language reading comprehension (Afflerbach, 1990; Barnett, 1988; Block, 1986; Carrell, 1983; Levine & Haus, 1985). However, a major factor that has been underexplored in studies examining the L2 reading process is the role of the reader's languages (L1 and L2). We know very little about how L2 readers might use their L1 and their L2 to help them comprehend what they are reading.

Several studies have shown that translation, using the first language as a means for understanding and/or producing the second language, is not an uncommon cognitive strategy for high school and adult language learners (Block, 1986; Chamot, Kupper, & Impink- Hernandez, 1988a; Chamot, Kupper, & Impink-Hernandez, 1988b; Chamot,

O'Malley, Kupper, & Impink-Hernandez, 1987). Cook (1992) argues further that all second language learners access their L1 while processing the L2. She suggests that "the L2 user does not effectively switch off the L1 while processing the L2, but has it constantly available" (Cook, 1992, p. 571). Cook also maintains that when working with second language learners, teachers must not treat the L2 in isolation from the L1. In fact, according to Cook, one cannot do so: "The L1 is present in the L2 learners' minds, whether the teacher wants it to be there or not. The L2 knowledge that is being created in them is connected in all sorts of ways with their L1 knowledge" (Cook, 1992, p. 584).

Despite these observations that L2 learners do make use of their native language, at least in the early stages of language acquisition, Cohen makes the general observation that there has been little research on the "extent to which non-natives' thoughts are in the LT [target language] and the effectiveness of 'thinking in the LT" as opposed to thinking in the L1" (Cohen, 1995, p. 100). Kern specifically points out that, "at present it remains unclear precisely what role the native language plays in L2 reading comprehension" (Kern, 1994, p. 441).

However, several recent studies do provide some intriguing insights. Haenggi and Perfetti (1992, 1994), examining first language readers, argue that comprehension is determined primarily by the efficiency with which readers can identify words and encode propositions into working memory. Bialystok (1991) makes a similar argument for second language proficiency in general. This hypothesis has important implications for understanding how L2 readers make use of their L1 and L2 when reading and how this affects comprehension. Two other recent studies add support to this hypothesis for L2 reading.

Cohen (1995) used a survey given to bilingual and multilingual university students to explore factors influencing language of thought. He found that not only do people with access to two or more languages shift frequently between them, these shifts can be either unintentional (e.g., it is easier to think in one language than another and so the brain automatically shifts languages) or intentional (e.g., using another language to help understand the grammar or vocabulary of the target language).

Kern (1994), whose study is one of the few that looks expressly at the language of thought used by L2 learners in comprehending L2 texts, looks at the role of translation as a cognitive strategy in the L2 reading comprehension process. Using verbal report interviews while reading, 51 students (L1=English) in a third- semester, college French class were asked to report what they were thinking as they read a text in French as well as how they went about making sense of what they read. Kern found that not only did these subjects make frequent use of translation as a strategy to understand the L2 text, but that "mental translation during L2 reading may facilitate the generation and conservation of meaning" (p. 441). A partial replication of this study by Hawras (1996) supports Kern's (1994) findings. Hawras in fact argues that, for beginning language learners, "mental translation is not just the major, but the only comprehension tool at the student's disposal" (Hawras, 1996, p. 65). While this statement seems extreme, it does stress the importance of an L2 learner's L1 in the early acquisition stages.

Clearly, the cross-linguistic influences of the first language and second language is of major interest in the field of SLA; as noted by Selinker (1992), "the principled role of the NL [native language] in the SLA [second language acquisition] process is one that…has become once again central to SLA (p. 171). However, the research conducted has not been balanced across the field. For example, extensive investigation of verbal "code-switching" has been carried out for several years (e.g., Woolford, 1983), and significant work has been done by Bialystok (1990) and others in looking at the role of learners' languages in communication strategies. Nevertheless, as Kern (1994) has pointed out, there has been little if any research (other than his) investigating translation in the context of L2 reading comprehension processes, "other than listing it as a cognitive strategy used in L2 reading (p. 442).

It is clear from this limited overview of relevant studies that reading in a second language is not a monolingual event. Second language readers have access to their first language and indeed use this resource as a strategy to help themselves to comprehend an L2 text. In fact, it seems likely that the L1 is used as a valuable strategy for overcoming obstacles in word recognition and propositional integration, which Haenggi and Perfetti (1992, 1994) suggest are two important sources of limitations to reading comprehension.

Reading, Strategies, and Language Proficiency

It is now obvious that the L2 reading process, like the L1 process, needs to be viewed as a top-down/bottom-up interaction between the "graphic display in the text, various levels of linguistic knowledge and processes, and various cognitive activities" (Weber, 1984). As Carrell and Eisterhold have summarized it:

Bottom-up processing ensures that the readers will be sensitive to information that is novel or that does not fit their own ongoing hypotheses about the content or structure of the text; top-down processing helps the readers to resolve ambiguities or to select between alternative possible interpretations of the incoming data (1983, p. 557).

Various taxonomies have been developed attempting to map strategies used or thought to be used by L2 readers which reflect this top-down and bottom-up processing (e.g., Anderson, 1991; Block, 1986; Pritchard, 1990). In general, these taxonomies use superordinate category labels to outline specific strategies, which can generally be classified as more "top-down" or "bottom-up" in nature. Block's (1986) classification scheme of reading comprehension strategies used by ESL students was used in this study. While not necessarily better than or even as exhaustive as others, it does provide a rather detailed classification system for analyzing reading strategies and was developed directly from think-aloud protocols done on expository texts. Block's coding system classifies strategies into two levels: general comprehension and local linguistic strategies. General comprehension strategies include methods used for "comprehension- gathering" and "comprehension- monitoring" (Block 1986, p. 472). These would be considered top- down, reader-centered strategies. Local linguistic

strategies deal with the reader's attempt to understand specific linguistic units. These would be considered bottom-up, text-centered strategies.

What is of particular interest to this study is that little research has been conducted in determining what role the second language readers' L1 and L2 play in reading strategy use, other than the fact that readers sometimes use "translation" as a reading strategy. In order to expand our understanding of the second language reading process it seems important to explore more thoroughly how L2 readers use their knowledge of both their L1 and L2 to help them process a text they are reading.

The present study attempts to address the following research questions: What are the roles of the L1 and the L2 in the reading comprehension process? Do the roles of the L1 and the L2 in reading an L2 text vary at different levels of L2 proficiency?

Description of the Data Collection

Subjects:

Subjects for the study were 11 native speakers of Japanese. Six subjects were taking intermediate ESL classes at the Minnesota English Center at the University of Minnesota, and are referred to as "ESL students." Five subjects were no longer taking ESL classes but were enrolled in academic programs at the University of Minnesota and are referred to as "academic students." The gender, age, length of time in the U.S., age at which English was first studied and most recent TOEFL score are given below in Table 1 and Table 2 for each subject in both groups.

Table 1: Proficiency Group 1 — ESL Subjects

Subject	Sex	Age	Time in US	Start	TOEFL
ESL#1	M	25	9 months	12	493
ESL#2	M	20	2 months	13	490
ESL#3	F	25	7 months	13	453
ESL#4	F	27	14 months	12	460
ESL#5	M	20	24 months	12	450
ESL#6	F	36	34 months	12	500

Table 2: Proficiency Group 2 — Academic Subjects

Subject	Sex	Age	Time in US	Start	TOEFL
Academic#1	F	21	2 months	12	563
Academic#2	F	25	48 months	14	578
Academic#3	F	32	50 months	12	600
Academic#4	F	26	11 months	13	560
Academic#5	M	28	38 months	12	620

The average age for the two groups was similar: 25.5 for the ESL Subjects versus 26.4 for the Academic Subjects. The primary distinctions between these two groups were with their length of residence in the U.S. and their TOEFL scores. The Academic Subjects had resided, on average, in the U.S. twice as long as the ESL Subjects: 30 months versus 15 months. More importantly, the Academic Subjects had an average TOEFL score more than 100 points higher than their ESL counterparts: 584 versus 474. One further distinction that should be made is that all of the Academic Subjects were enrolled in graduate level studies while none of the ESL subjects were.

Data Elicitation and Analysis:

There were two stages to the data collection in this study. In order to get the best picture of the role of language in the L2 reading process, both think-aloud verbal protocols and retrospective interviews on the think-aloud protocols were used as a means for looking at how subjects use their L1 and their L2 during the actual act of reading. Think-aloud protocols have the advantage of giving a more direct view of how readers process a text as they indicate what they are doing at the moment they are doing it (Cohen, 1987b). Retrospective interviews, in turn, provide an opportunity for investigators to ask directed questions to gain clarification of what was reported during the think-aloud. Pressley and Afflerbach (1995), Matsumoto (1993) and Cohen (1987a, 1987b) all provide persuasive arguments for the value and validity of using verbal protocols to investigate the conscious processes of reading in general and reading in a second language in particular, which will not be reviewed here.

After a training session, subjects were instructed to verbalize everything they were thinking about and doing as they read and, as much as possible, to do so in the language (L1 or L2) they were thinking in as they read the text. If they were thinking in Japanese, they were asked to think aloud in Japanese. If they were thinking in English, they were asked to think aloud in English.

The passage that the participants read was taken from *Aide Magazine* (February, 1992), a quarterly magazine put out by the insurance organization USAA. The text, 231 words

long, is titled "The Problem with Lead-Based Paint" and discusses some of the harmful health effects of lead-based paint as well as some suggestions for dealing with the problem. A red dot was placed at the end of each sentence in order to visually prompt the subjects to think aloud (Afflerbach, 1990; Olshavsky, 1976; Pritchard, 1990).

The think-aloud protocols were tape recorded. Immediately upon completing the think-aloud, subjects were asked to listen to their protocols. While listening to comments on the tape they made about their thought processes, the subjects were asked to explain (do a self-observation of) what they were doing as they were reading, including why they were thinking in either English or Japanese. The interviews were done in Japanese.

Block's (1986) classification scheme of reading comprehension strategies used by ESL students was used to analyze the think-aloud protocols. While specific strategies used by subjects were noted, of greater interest was the reported language (L1 or L2) in which the strategy was employed, if applicable. Both the think-aloud protocols and the retrospective, self-observation interviews were first translated and transcribed completely into English by the researcher and an assistant who is a native speaker of Japanese. The retrospective interviews were used as qualitative descriptions to verify and clarify results.

Think-aloud Protocol And Retrospective Interview Results

The two questions addressed in this study were: 1) What are the roles of the L1 and the L2 in L2 reading comprehension? And 2) Do the roles of the L1 and the L2 in reading an L2 text vary at different levels of L2 proficiency?

Think-Aloud Protocol:

As outlined above, the think-aloud protocols were analyzed using Block's (1986) coding system for categorizing strategies used and the language in which these strategies were conducted. Two trained raters coded the protocols; a Kappa inter-rater reliability value of k = .79 was calculated and discrepancies were resolved in consultation. The results from this analysis are displayed in Table 3 and Table 4.

Table 3: Analysis of Think-Aloud Protocols Using Block's (1986) Coding System: General Strategies

Part 1. ESL Subjects (L1/L2) →	#1	#2	#3	#4	#5	#6
General Strategies						
1. Anticipation	0* (0/0)**	0 (0/0)	2 (0/2)	3 (3/0)	0 (0/0)	0 (0/0)
2. Recognition of text structure	0 (0/0)	2 (2/0)	1 (0/1)	0 (0/0)	2 (2/0)	0 (0/0)
3. Integration	0 (0/0)	0 (0/0)	0 (0/0)	0 (0/0)	0 (0/0)	0 (0/0)

Part 1. ESL Subjects (L1/L2) →	#1	#2	#3	#4	#5	#6
General Strategies						
4. Questioning of text	0 (0/0)	0 (0/0)	0 (0/0)	0 (0/0)	2 (2/0)	0 (0/0)
5. Interpretation	0 (0/0)	0 (0/0)	0 (0/0)	1 (0/1)	1 (1/0)	2 (2/0)
6. Association	0 (0/0)	0 (0/0)	0 (0/0)	0 (0/0)	1 (1/0)	1 (1/0)
7. Commenting	9 (8/1)	0 (0/0)	0 (0/0)	1 (1/0)	7 (7/0)	0 (0/0)
8. Monitoring	10 (6/4)	0 (0/0)	1 (1/0)	1 (1/0)	6 (6/0)	1 (1/0)
9. Corrective behavior	1 (0/1)	0 (0/0)	0 (0/0)	0 (0/0)	0 (0/0)	0 (0/0)
10. Emotional Reaction	0 (0/0)	0 (0/0)	0 (0/0)	0 (0/0)	0 (0/0)	0 (0/0)
Total General Strategies	20 (14/6)	2 (2/0)	4 (1/3)	6 (5/1)	19 (19/0)	4 (4/0)

* The top number in each cell indicates the total number of times a particular strategy was used.
** The bottom two numbers in each cell indicate the number of times a particular strategy was expressed in the L1 (the first number) or the L2 (the second number).

Part 2. Academic Subjects (L1/L2) →	#1	#2	#3	#4	#5
General Strategies					
1. Anticipation	0 (0/0)	2 (0/2)	0 (0/0)	2 (2/0)	1 (0/1)
2. Recognition of text structure	2 (1/1)	1 (0/1)	0 (0/0)	1 (1/0)	9 (0/9)
3. Integration	0 (0/0)	1 (0/1)	0 (0/0)	3 (2/1)	2 (0/2)
4. Questioning of text	1 (0/1)	0 (0/0)	0 (0/0)	0 (0/0)	1 (0/1)
5. Interpretation	0 (0/0)	3 (0/3)	1 (0/1)	8 (7/1)	3 (0/3)
6. Association	1 (1/0)	0 (0/0)	1 (0/1)	10 (5/5)	1 (0/1)

Part 2. Academic Subjects (L1/L2) →	#1	#2	#3	#4	#5
General Strategies					
7. Commenting	10 (4/6)	1 (0/1)	2 (1/1)	2 (1/1)	4 (0/4)
8. Monitoring	5 (0/5)	4 (1/3)	0 (0/0)	2 (0/2)	3 (0/3)
9. Corrective behavior	0 (0/0)	2 (0/2)	0 (0/0)	0 (0/0)	0 (0/0)
10. Emotional Reaction	1 (0/1)	0 (0/0)	0 (0/0)	3 (2/1)	0 (0/0)
Total General Strategies	20 (6/14)	14 (1/13)	4 (1/3)	31 (20/11)	24 (0/24)

Table 4: Analysis of Think-Aloud Protocols Using Block's (1986) Coding System: Local Strategies

Part 1. ESL Subjects (L1/L2) →	#1	#2	#3	#4	#5	#6
Local Strategies						
1. Paraphrasing	15* (15/0)**	5 (5/0)	16 (13/3)	25 (25/0)	6 (6/0)	11 (11/0)
2. Questioning of clause	1 (1/0)	8 (8/0)	12 (9/3)	5 (5/0)	3 (3/0)	3 (3/0)
3. Questioning of vocabulary	19 (0/19)	6 (6/0)	2 (1/1)	8 (7/1)	2 (2/0)	2 (2/0)
4. Word Solving	12 (12/0)	0 (0/0)	1 (1/0)	4 (4/0)	0 (0/0)	0 (0/0)
Total Local Strategies	47 (28/19)	19 (19/0)	31 (24/7)	42 (41/1)	11 (11/0)	16 (16/0)

* The top number in each cell indicates the total number of times a particular strategy was used.
** The bottom two numbers in each cell indicate the number of times a particular strategy was expressed in the L1 (the first number) or the L2 (the second number).

Part 2. Academic Subjects (L1/L2) →	#1	#2	#3	#4	#5
Local Strategies					
1. Paraphrasing	7 (7/0)	4 (0/4)	17 (3/14)	7 (7/0)	19 (0/19)
2. Questioning of clause	5 (1/4)	0 (0/0)	1 (1/0)	0 (0/0)	2 (0/2)
3. Questioning of vocabulary	15 (5/10)	3 (3/0)	3 (1/2)	4 (1/3)	1 (0/1)
4. Word Solving	1 (0/1)	2 (0/2)	2 (1/1)	0 (0/0)	1 (0/1)
Total Local Strategies	28 (13/15)	9 (3/6)	23 (6/17)	11 (8/3)	23 (0/23)

When looking at the strategy use of these subjects, as indicated by their think-aloud protocols, several interesting trends seem to emerge. First of all, the mean number of strategies expressed by the two L2 proficiency groups was almost equal. The six ESL subjects expressed a total of 221 strategies, with an average of about 37 expressed strategy moves per reader. The five academic subjects expressed a total of 187 strategies, with also about 37 expressed strategy moves per reader. The primary value of this observation is that clearly both groups of readers were verbally, and it is assumed fairly accurately (e.g., Pressley and Afflerbach, 1995), indicating the strategies that they were using to pursue comprehension.

While it is impossible to look at anything more than trends with the limited number of subjects used in this study, these expressed strategies appear to fall into two different categories. First, five of the six ESL subjects expressed more local strategies dealing with the comprehension of words and sentences at the linguistic level than general strategies, which focus more on comprehension-gathering and comprehension-monitoring. In fact, for the six ESL subjects, the vast majority (166 out of 221) of the strategies they expressed were of the local strategy type. For the academic group, on the other hand, there did not appear to be an obvious preference of strategy use, with about half (93 out of 187) of the expressed strategies being general strategies and half (94 out of 187) being local strategies.

A second way that the two proficiency groups appeared to differ was in their language use. All the subjects were instructed to use the language that they were thinking in as they read to verbalize their strategy use. For the ESL group, Japanese, the L1, was clearly the language of preference for subjects to indicate their strategy use (183 out of 221), with no apparent difference between the general and local strategies. Four of the six

subjects used Japanese almost exclusively. For the academic group, the majority (129 out of 187) of the strategies were expressed in English, the L2, again with no obvious difference between the general and local strategies.

To summarize, it appears from this think-aloud data that there are three basic trends that can be pointed to: 1) the ESL subjects seem to focus more on local, linguistic aspects of a text as they read while academic subjects focus more equally on both the general comprehension-gathering/monitoring strategies as well as the local, linguistic oriented strategies; 2) the ESL subjects appear to rely heavily on their first language to help them think through and wrestle with the L2 text while the academic subjects seem to feel much more comfortable with thinking about and making sense of the text using the language of the text, their L2; and 3) reading comprehension strategies and the relative use of the L1 and L2 in   the comprehension process vary between individuals but tend to fall within predictable domains.

Several comments should be made at this point. Most notably, the number of subjects in this study is relatively small and any conclusions and generalizations can only be tentatively made. Nevertheless, the three trends highlighted above reflect observations that have been made in other studies. Cziko (1980) and Eskey (1988), among others, have observed that less proficient L2 readers tend to focus more on bottom-up strategies while more proficient readers tend to use a greater mix of bottom-up and top-down strategies. Kern (1994) found that the use of translation to aid comprehension decreased as proficiency increased, while Bernhardt and Kamil (1995) observed that L2 proficiency was the most powerful predictor of L2 reading ability. Lastly, as noted previously, Sarig (1987) and Anderson (1991), as well as Eskey (1988), have pointed to the individual differences in the reading process that are clearly apparent in this study. While the number of subjects in this study is small, the data do reflect trends that have been observed in previous studies. With this in mind, a more careful analysis of the think-aloud data in light of the retrospective interviews provides some interesting insights into more specifically when and how second language readers use their L1 and L2 when reading an L2 text.

Retrospective Interviews:

The first thing that becomes obvious when analyzing the retrospective interviews is that the think-aloud protocols do not capture all the strategies used by L2 readers to comprehend an L2 text. The strategies which subjects described while retrospec- tively discussing their think-aloud protocols sometimes went far beyond what they had originally verbalized in the think-alouds. Several examples of comprehension strategies that were indicated in the retrospective interviews but not in the think-aloud protocols are given below. The following key should be used when reading the following think-aloud and retrospective interview excerpts:

Key
S: = Subject
I: = Interviewer
Plain words = words from the text read aloud during think-aloud
<<Caretted words>> = words spoken by subject in English
<<CARETTED, CAPITAL WORDS>> = words spoken by subject in Japanese (translated)
CAPITAL WORDS = words spoken by interviewer in Japanese (translated)
Unindented words = think-aloud protocols
Indented words = retrospective interview

Example 1: Subject ESL#4

 lead-based paint....<<ok>> I: WHY DID YOU SAY "OK" HERE? S: <<I CAME TO THE POINT WHERE I DIDN'T UNDERSTAND SO I DECIDED TO GO BACK TO THE PREVIOUS SENTENCE, AND THAT'S WHY I SAID "ok".>>

Example 2: Subject ESL#3

However, perfectly intact...<<however>>...

 I: WHY DID YOU SAY "however" IN JAPANESE IN THE MIDDLE OF THE SENTENCE S: <<I KNOW THE WORD "however" SIGNALS A DIFFERENT OPINION, SO I WANTED TO MAKE SURE THAT I WAS AWARE OF THIS.>>

Example 3: Subject ESL#5

But authorities are learning that health problems associated with lead-based paint are far more widespread than previously thought.

 <<ACTUALLY, IT MUST BE A VERY SERIOUS PROBLEM BECAUSE IS IT MORE WIDESPREAD THAN PREVIOUSLY THOUGHT. AND IT IS ALSO WRITTEN THAT IT IS HARMFUL TO ONE'S HEALTH.>> I: WHAT WERE YOU TRYING TO DO HERE? S: <<BECAUSE I COULD NOT UNDERSTAND THE FIRST SENTENCE, I WAS TRYING TO RELATE THE FIRST SENTENCE TO THIS SENTENCE WHILE PREDICTING THE CONTENT OF FOLLOWING SENTENCES.>>

In the first example above, the word "ok" gives the impression that the reader understood what she had read. However, it is clear from the feedback that she gave in the retrospective interview that her thoughts were much more complex. She in fact did not understand what she had read and as a result went back to reread the first sentence. Neither her lack of comprehension nor the fact that she went back to reread the previous sentence were indicated in the think-aloud protocol. In the second example, the

reader was obviously aware of structural signal words like "however" which she uses to help her comprehend a text; but again this strategy use was not indicated in the think-aloud. In fact, her restatement of the word "however" in Japanese was classified as a local linguistic strategy, when in fact it might have better been classified as a general, comprehension-gathering strategy based on the information provided in the retrospective interview. Similarly, in the third example, the subject in her think-aloud protocol merely paraphrases in Japanese what she has read in English–employing a local strategy. However, according to her retrospective interview, she was doing much more than that and was in fact trying to integrate previous information with what she was reading as well as predict future content.

The observation that think-aloud protocols do not capture all of the strategy moves that a reader makes is neither surprising nor a major drawback. In fact, no one has ever claimed that think-alouds thoroughly reveal all of the strategies used by readers; their value comes in that they do reveal valuable information about the types of strategies they do use. During the retrospective interviews, while many clarified their think-aloud protocols, none of the subjects contradicted information that they gave during the think-aloud task. Most of the time the retrospective interviews merely supported information that they had already given. However, the retrospective interviews were invaluable due to the detail they added to the information provided by the think-alouds, which permitted a more accurate interpretation of what the reader was actually doing at a given point.

Language Use and Comprehension Processes:

Having made the observation that the think-aloud protocols and retrospective interviews complement each other with respect to identifying reading strategy use, the question at hand is how L2 readers use their L1 and L2 in the course of trying to comprehend a written text. What the think-aloud and retrospective interview data show is that in many respects, L1 and L2 language use is very individualized. However, the more proficient readers become in the L2, the less frequently they tend to revert to their L1 to aid in their comprehension. This trend is clearly illustrated by the following two examples. In Example 4, the subject is one of the ESL group members and expressed all of his verbalized thoughts in Japanese; in Example 5 the subject is one of the academic group members and expressed all of his verbalized thoughts in English:

Example 4a: Subject ESL#2

 I: WHEN YOU READ IN ENGLISH, WHAT IS USUALLY GOING ON IN YOUR MIND? S: <<WHEN I READ IN ENGLISH, I TRANSLATE THE SENTENCES INTO JAPANESE. WHEN I COME TO WORDS THAT I DON'T KNOW, I SKIP THEM FOR THE TIME BEING AND I TRY TO GUESS THE MEANING FROM THE CONTEXT. IF GUESSING DOESN'T WORK THEN I WILL READ THE ENTIRE THING FIRST, THEN I WILL COME BACK TO THE WORDS.>> I: SO YOU TRY TO UNDERSTAND THE TEXT IN JAPANESE? S: <<YES, THAT'S RIGHT.>>   I: HOW DO YOU TRANSLATE THE SENTENCES IN JAPANESE? DO YOU TRANSLATE WORD-BY-WORD? S: <<I TRANSLATE PHRASE-BY-PHRASE, BUT IF I DON'T

UNDERSTAND IT BY DOING THIS, I LOOK AT THE ENTIRE SENTENCE.>> I: WHY DO YOU THINK IN JAPANESE? S: <<IT'S MY HABIT. I'VE BEEN THINKING IN JAPANESE ALL MY LIFE.>>

This particular subject illustrates his strategy of translating the English text into Japanese on many occasions in his think-aloud protocol and during his retrospective interview, as exemplified by the following:

Example 4b: Subject ESL#2

 But authorities are learning that health problems associated with lead-based paint are far more widespread than previously thought. <<IT SAYS SOMETHING ABOUT THE RELATIONSHIP BETWEEN PAINT AND HEALTH.>> I: WHAT WAS GOING ON IN YOUR MIND HERE? S: <<WHEN I READ THIS SENTENCE, I SAW THE WORDS "health problems" SO I GUESSED THAT THIS WAS ABOUT HEALTH. I ALSO READ THE PHRASE "health problems associated with lead-based paint" SO I GUESSED IN JAPANESE THAT IT TALKS ABOUT THE RELATIONSHIP BETWEEN PAINT AND HEALTH.>>

(And then later)

 IN ADULTS IT CAUSES AN INCREASE IN BLOOD PRESSURE. I: WHAT WAS GOING ON HERE? S: <<I JUST TRANSLATED THE WHOLE SENTENCE INTO JAPANESE.>>

However, the following academic subject uses his language knowledge very differently.

Example 5: Subject Academic#5

 I: HOW DO YOU USUALLY READ ENGLISH MATERIALS? DO YOU HAVE ANY STRATEGIES YOU USE? S: <<OH YES. I WAS TRAINED NOT TO USE JAPANESE WHEN I READ ENGLISH. SO, WHEN I WAS A COLLEGE STUDENT I NEVER USED JAPANESE TO THINK ABOUT THE ENGLISH DISCOURSE; I WAS TRAINED TO THINK IN ENGLISH.>>

This subject's apparently exclusive use of English in his comprehension process is illustrated by the following excerpt:

Example 6: Subject Academic#5

 Because these symptoms also occur in many other illnesses, <<what does this mean,>> symptoms also occur in many other illnesses? <<Oh, so I see. "Those symptoms occur in many other illnesses" means there are illnesses that are not the result of lead poisoning, so>> prompt medical testing is crucial if you suspect lead-based paint in your home. <<I see, so that means people might think that the disease that they have is probably ok, probably ok, but this author indicates that this is not right because it might, because the disease might have been influenced by lead poisoning, which is much more hazardous and perhaps really detrimental to their lives. Because, for example, it says fetal development might be influenced, I mean it causes fetal...retards fetal development, it says...right here. Ok, hmm.>> I: HERE YOU WERE THINKING ABOUT A LOT OF THINGS TRYING TO REASON THROUGH THIS. S: <<I WAS VERY EXCITED ABOUT THIS SENTENCE; I REALLY ENJOYED THIS SENTENCE.>> I: ALSO, YOU WERE REFERRING TO PREVIOUS INFORMATION. S: <<YES, I WAS VERY EXCITED ABOUT THIS SENTENCE

BECAUSE THIS IS SOMETHING THAT IS GOING TO BE VERY IMPORTANT LATER ON TO PRODUCE A SOLUTION BECAUSE "the same symptoms occurs in other diseases" MEANS THAT YOU HAVE TO BE REALLY CAREFUL. NORMAL PEOPLE CANNOT FIGURE OUT WHAT THOSE SYMPTOMS ARE A RESULT OF. FOR EXAMPLE, IF YOU HAVE A HEADACHE YOU MAY NOT KNOW WHAT CAUSES IT. MAYBE IT IS FROM A LACK OF SLEEP; IF THIS IS THE CASE IT IS OK, BUT IF IT IS A RESULT OF LEAD-BASED PAINT, THEN IT'S A BIG PROBLEM. SO THIS CLEARLY INDICATES THAT YOU MAY NOT KNOW WHETHER THE HEADACHE IS CAUSED BY A LACK OF SLEEP OR THE DUST. SO THAT'S VERY GOOD; THIS SENTENCE IS GREAT.>> I: SO ALL OF THIS REASONING WAS GOING ON IN ENGLISH? S: <<YES, WELL, AT LEAST NOT IN JAPANESE.>>

These last two subjects were on the two ends of a continuum, with Subject ESL#2 thinking about and attempting to make connections between items in the text apparently exclusively in Japanese, and Subject Academic#5 processing the text apparently completely in English. The other nine subjects fell somewhere in between these two in their use of their L1 and L2 in helping to comprehend the L2 text.

While recognizing this continuum in the use of the L1 and L2 to wrestle with text meaning, there appear to be three generalizations that can be made about how the ESL and academic subjects in this study used their L1 and L2 in their attempt to comprehend the L2 text. First of all, subjects at the two proficiency levels used to different extents their L1 and L2 when wrestling with vocabulary difficulties. Second, subjects at the two proficiency levels used to different extents their L1 and L2 when wrestling with conceptual problems. And third, subjects at the two proficiency levels used to different extents their L1 and L2 when confirming their comprehension of the text.

Language Use and Vocabulary Solving Strategies:

For the ESL subjects, there seemed to be a very strong reliance on the L1 when confronted with vocabulary they did not know or were not sure about. Examples 7 & 8 provide illustrations of this.

Example 7: Subject ESL#5

 The stereotype is of inner-city youngsters eating paint chips... <<EAT? MAYBE NOT...>> I: WHERE DID YOU GET THE WORD "EAT"? S: FROM THE WORD "eating". BUT I WASN'T SURE. that have peeled off the walls of crumbling houses. <<LET'S SEE...chips? WHICH PEELS OFF walls...CLIMBS TO THE ROOFS? MAYBE IT'S AN ANIMAL.>> I: I THINK YOU'RE GUESSING THE MEANING BY TRANSLATING. S: <<I DIDN'T UNDERSTAND THE MEANING OF THIS SENTENCE, SO I WAS TRYING TO DO A LOT OF GUESSING, BUT I GUESSED "chips" AS AN ANIMAL.>>

In this example, the reader translated the English words "eat" (EAT), "walls" (ROOFS) and "chips" (ANIMAL) into Japanese, not always successfully, in an attempt to better understand the meaning of the words and the sentence. The process of checking the English word by translating it into Japanese was an attempt to facilitate her understanding.

Example 8: Subject ESL#3

The Problem with Lead-Based Paint. The stereotype is of inner- city youngsters eating paint chips that have peeled off the walls of crumbling houses. <<FOOD FOR YOUNG PEOPLE. I DON'T UNDERSTAND VERY WELL>>....crumbling houses. <<YOUNG PEOPLE EATING SOMETHING. I WONDER IF THIS IS ABOUT HOW THEY EAT?>>   I: WHILE YOU ARE READING IN ENGLISH, SOMETHING MUST BE GOING ON IN YOUR MIND. S: <<I THINK WHILE I READ I THINK IN ENGLISH BUT AFTER FINISHING READING ONE SENTENCE I THINK IN JAPANESE. I TRY TO PICK UP THE WORDS AND TRY TO TRANSLATE THEM INTO JAPANESE.>> I: SO YOU MEAN IN THE FIRST SENTENCE YOU WERE TRANSLATING THE WORDS YOU KNOW. IS THAT THE METHOD YOU USE WHEN YOU READ IN ENGLISH? S: <<I TEND TO DO THAT. YES, WHILE I READ I TRY TO PICK UP THE WORDS I KNOW.>>

While the ESL subjects frequently resorted to their L1 to try and figure out vocabulary, the academic subjects did not make the switch to their L1 as quickly.

Example 9: Subject Academic#3

In children, lead poisoning...impair mental functioning. <<Let's see,>> brain damage and impair mental functioning. In children, lead poisoning can cause...irreversible brain damage and impair mental functioning. <<Okay, "impair", that is also...make a harm? No, wait.>>...impair mental functioning...mental functioning. I: ARE YOU TRYING TO FIGURE OUT THE MEANING OF "impair"? S: <<YES, NOW I REMEMBER THE MEANING. WE CALL PEOPLE WHO CANNOT HEAR WELL "impaired." SO THIS MUST MEAN TO LOSE SOME ABILITIES.>> I: SO YOU WERE TRYING TO GUESS THE MEANING IN ENGLISH? S: <<YES, THAT'S RIGHT.>>

One could question whether the subject understood the meaning of words in this sentence at the time of reading or later when talking with the interviewer, but the interesting aspect of this example is the subject's choice to wrestle with difficult vocabulary ("impair") in English, with no attempt to translate ideas into Japanese.

Example 10: Subject Academic#2

Because these symptoms also occur in many other illnesses, prompt medical testing is crucial if you suspect lead-based paint..... <<I can't figure out what's the "lead-based" paint...is probably the name of the wall?>>   I: YOU WERE SILENT FOR AWHILE. WHY? S: <<I KNEW THE WORD "lead-based paint" IS A KEY WORD FOR THIS TEXT, SO I WAS TRYING TO FIGURE OUT WHAT IT IS.>>

Nevertheless, even some of the academic subjects on occasion would revert to their L1 to confirm their understanding of an English word, though not as frequently or consistently as the ESL subjects. The following examples illustrate one subject focusing on specific words using both her L1 and her L2:

Example 11: Subject Academic#1

"Fatigue" <<IS FATIGUE.>> I: WHY DID YOU TRANSLATE THIS WORD INTO JAPANESE? S: <<IN HIGH SCHOOL, I MEMORIZED THIS WORD AND ASSOCIATED IT WITH "FATIGUE." I WAS CONFUSED WITH WORDS LIKE "lead-based paint" SO WHEN I SAW THE WORD "fatigue," WHICH I KNEW, I FELT A LITTLE RELIEVED.>> <<Upset stomach, yeah, I have it now. Oh, hmm "span." What's the meaning "constipation?" What are they? Here is the reason, ok.>> <<Hmm, something, yeah, what is "lead-based"...I have no idea, it's very confusing.>>

To summarize the above discussion, it seems that one key function that a reader's L1 serves in comprehending an L2 passage is to help the reader either confirm an L2 vocabulary word or to help the reader reason through or guess the meaning of the L2 word. The need to use this strategy seems to decline as proficiency in the L2 increases, with the more proficient readers even wrestling with unknown vocabulary in English, their L2.

Language Use and Strategies for Understanding Text Meaning:

Besides dealing with vocabulary, these L2 readers also frequently used their L1 to aid in helping them gain a more global understanding of the L2 text. Following are two examples from the ESL group:

Example 12: Subject ESL#1

 youngsters eating paint chips...paint chips <<...I got it...>> that have peeled off the walls of crumbling houses....crumbling houses <<PEELED THE WALLS OFF.>>   I: HOW DID YOU COME UP WITH THIS PHRASE? S: <<I GOT IT FROM THE ENGLISH "peeled off the walls".>> I: WHY DID YOU TRANSLATE THIS PHRASE? S: <<I DIDN'T UNDERSTAND "crumbling houses" AND "paint chips". SO I THOUGHT IN JAPANESE BECAUSE I THOUGHT I WOULD UNDERSTAND IT BETTER.>> I: WERE YOU TRANSLATING THE SENTENCE? S: <<YES, IT MAKES IT EASIER TO UNDERSTAND.>>

(and then later)

 <<FROM "dust" TO BE CREATED>> that is created as the paint comes loose from the worn surfaces. <<FROM THE SURFACE OF SOMETHING that paint comes...paint? Mmm, CONFUSED. NEXT!>> I: HOW WERE YOU CONFUSED? S: <<THERE WERE TOO MANY WORDS I DIDN'T KNOW, SO I COULDN'T MAKE SENSE OF IT, EVEN WHEN I PUT THEM INTO A JAPANESE STRUCTURE.>>

Example 13: Subject ESL#4

 <<"surface"...SOMETHING THAT COMES FROM SOMETHING OF THE SURFACE...>> I: WHY ARE YOU USING THE WORD "something" IN GUESSING? S: <<EVEN WHEN I DON'T KNOW THE MEANING OF WORDS, IF I PUT THE IDEAS INTO A GRAMMATICAL FORM, SOMETIMES I CAN GET SOME MEANING FROM IT.>>

(and then later)

<<it DOES>> deteriorates, even when covered with new paint. <<EVEN IF YOU COVER IT WITH NEW "paint" IT CAN STILL HAPPEN.>> I: YOU ARE TRYING TO SUMMARIZE THE SENTENCE IN JAPANESE USING PRONOUNS, WHY? S: <<EVEN IF I DON'T UNDERSTAND EVERY WORD IN THE SENTENCE, BY PUTTING THE IDEAS INTO A GRAMMATICAL FORM I CAN GET SOME MEANING FROM IT.>> I: DID YOU KNOW WHAT "it" MEANT? S: <<"It" IS "problems">>

There really were no obvious examples of subjects from the ESL group wrestling with sentence or text meaning in English. However, as with vocabulary words, there was a marked decrease in L1 reliance for the academic subjects when focusing on sentence and   text-level comprehension. The following examples illustrate academic subjects wrestling with the meaning of a sentence using English:

Example 14: Subject Academic#2

 <<Ok, I think lead-based paint is something done by themselves, because they say by a professional, or by...I don't know...>> I: HOW DID YOU GET THIS? S: <<I THOUGHT IT WAS ABOUT SOMETHING CONTAINED IN PAINT, AND IF IT IS CORRECT, IT CAN BE COVERED. AND WHEN I READ THE PHRASE "removed by a professional" I THOUGHT IT WAS SOMETHING YOU COULD DO BY YOURSELF IF YOU WANTED TO. EVEN IF YOU HAVE A PROFESSIONAL DO IT, IT STILL WILL GET OLD AND YOU WILL NEED TO ASK A PROFESSIONAL AGAIN. I WAS JUST RAMBLING IN MY MIND.>>

Example 15: Subject Academic#3

 <<And then the next one is...>> Because these symptoms also occur in many other illnesses, prompt medical testing is crucial if you suspect lead-based paint in your home. <<Okay, so these symptoms are...can occur in other illnesses, so that if...I guess this sentence is saying that if you, if your house has lead-based painting and you have to be...especially have to be careful about, about it if you see these symptoms.>>

However, even the academic subjects would occasionally slip into their L1 when confusion arose about the meaning of a sentence they were reading, as indicated by the following example:

Example 16: Subject Academic#4

 You can also reduce lead-based paint by covering it with a sealant or wallboard. <<IT SAYS THERE ARE OTHER POSSIBLE SOLUTIONS.>> By covering it with sealant...<<what's sealant?...I don't know this word, "sealant."... "wallboard".>> <<PROBABLY THIS MEANS TO ATTACH SOMETHING TO WALLS.>>

Summarizing these examples, it seems that a second key function that a reader's L1 serves in comprehending an L2 passage is to help the reader make sense of sentence and text meaning. As with vocabulary confusion, the need to use this strategy also seems to decline as proficiency in the L1 increases, with the more proficient readers often working through sentence and text meaning using their L2.

Language Use and Comprehension Checking:

One last common application of the L1 and the L2 that became apparent through the think-aloud protocols and the retrospective interviews was the paraphrasing, in either the L1 or L2, of what was read or understood. In other words, the readers frequently rephrased or translated — some in the L1 and some in the L2 — what they had read as a means of checking their comprehension. As with the other two trends mentioned above, the ESL subjects paraphrased almost exclusively in Japanese–most of the time by directly translating the English text into Japanese.

Example 17: Subject ESL#4

In adults it can increase blood pressure....<<IN THE CASE OF ADULTS, IT CAUSES HIGH BLOOD PRESSURE.>>

For the academic group, two subjects paraphrased exclusively in Japanese, two exclusively in English, and one most of the time in English. One example of a academic subject summarizing in the L2 is as follows:

Example 18: Subject Academic#5

<<The next paragraph is...let me go over from the very beginning before going to the conclusion. The first paragraph indicates that the..uh...(????)>> more widespread than previously...<<ok. So the dust coming off from the walls is a dangerous fact. The second paragraph indicates the result of, the result of the paint dust, I mean...coming, coming off the wall. That's the second point. And the...lead's dangerous because there are symptoms that ..uh...that's shared with some other diseases, so it, you should be really careful about this. Hmm, the third point is that prevention is pretty difficult from a normal way of thinking. Ok, then the final paragraph is...>>

Interestingly, there were also a few examples of paraphrases that were done generally in the L1, except for a couple of words that subjects indicated they understood but could not automatically put into their L1.

Example 19: Subject ESL#4

pregnant women and individuals...<<THERE IS risk FOR health OF PREGNANT WOMEN, CHILDREN, AND VARIOUS PEOPLE>>....with high blood pressure...<<ALSO FOR PEOPLE WITH HIGH BLOOD PRESSURE.>> I: WHY DID YOU USE THE WORDS "health" AND "risk" IN ENGLISH? S: <<I COULDN'T FIND THE WORDS IN JAPANESE.>>

Example 20: Subject Academic#4

However, perfectly intact lead paint can generate lead dust as it deteriorates, even when covered with new paint. However, perfectly intact lead paint...<<EVEN PERFECTLY intact LEAD PAINT.>> I: WHY DID YOU USE AN ENGLISH WORD? S: <<I HAVE THE CONCEPT OF THE WORD "intact" BUT I CANNOT FIND AN EQUIVALENT JAPANESE WORD FOR IT. IF I TRIED TO EXPLAIN THE CONCEPT IN JAPANESE, IT WOULD BE A LONG SENTENCE.>>

Summary of Discussion of Language Use and Comprehension Strategies:

Using the above discussion to respond to the first two research questions, it appears that while much of the time a reader's use of the L1 and L2 is very individualistic in nature, there are three generalizations that can be made. First of all, it appears that the ESL subjects frequently switched to their L1 when reading an L2 text when they came across vocabulary they did not know. They used their L1 to help themselves guess or piece together word meaning. On the other hand, the academic subjects did not seem to need to wrestle with confusing vocabulary in their L1, but generally attempted to work out vocabulary difficulty in the L2.

A second generalization is that the ESL subjects had a greater tendency to try and work out text and sentence meaning by translating concepts they understood into the L1. As with vocabulary, the academic subjects did not need to rely on their L1 to the same extent.

Lastly, the ESL subjects seemed to find it more comfortable to paraphrase or restate sentences and phrases they understood in the L1 just to confirm their comprehension. Again, the academic subjects did not resort to translation as frequently. However, even when paraphrasing in the L1, there were some instances when meaning that was understood in the L2 was not readily translatable into the L1 and therefore was not, resulting in interesting interactions of the two languages in the comprehension process.

One key point that needs to be raised here is that these three generalizations refer to instances when L2 subjects are "reporting verbally during the reading of an L2 text". It must be remembered that subjects are performing a task that is different in some respects from "normal" reading when they think-aloud as they read. There were indications that the act of thinking-aloud altered in some respect these readers' normal reading processes. For example,

Example 21: Subject Academic#5

But authorities are learning that health problems associated with lead-based paint are far more widespread than previously thought. <<Hmm...so the problem is much bigger than they...they think, than they expected.>> I: WHAT WAS GOING ON HERE? S: <<WELL, I UNDERSTOOD THE SENTENCE WHEN I FIRST READ IT, BUT I THOUGHT I HAD TO SAY SOMETHING HERE SO I WAS THINKING OF SOMETHING TO SAY.>>

Example 22: Subject Academic#4

I: ALTHOUGH YOU DIDN'T TRANSLATE EVERYTHING, YOU DID SUMMARIZE IN JAPANESE. S: <<I SAW THE READ DOT AND I FORCED MYSELF TO SAY WHAT I WAS THINKING, SO I OVERREACTED AND I TRANSLATED MORE THAN USUAL.>>

Nevertheless, the assumption that what readers do express in their think-alouds correlates highly with how they actually process an L2 text appears to be a strong one in that all the readers indicated that what they described in their think-alouds was for the most part indicative of how they actually do process a text during normal reading.

Conclusions

The trends from the data in this study would suggest that readers with different levels of L2 proficiency make use of their first and second languages to different extents in their attempts to make sense of a text they are reading. As was expected, an analysis of the strategies used by the L2 readers, as indicated by the think-aloud protocols and categorized by Block's (1986) coding system, showed that the ESL group relied more on local, text-based strategies to attempt to gain understanding of the text they were reading — using these types of strategies the majority of the time. The academic group, on the other hand, relied more equally on both the text-based strategies and the more reader-based, "top-down" strategies (using both about half of the time).

The stronger reliance on text-based, "bottom-up" strategies by the ESL group was expected and reflects the observations made by other researchers (e.g., Alderson, 1984; Bossers, 1991). Lower proficient L2 readers are seen as having to focus more on "decoding" text-based elements of a text because their proficiency is not at a point where automatic processing of these elements can occur, as it does with more fluent readers. As Kern (1988) has noted, it appears the comprehension process is impeded by, among other things, inefficient word access. When the text-based elements are automatically processed, the L2 reader can focus more attention on retaining contextual clues needed to connect and predict as well as infer and develop the necessary inferences to gain full understanding of a text. This indeed seems to be more descriptive of the strategies used by the academic group in this study.

The contribution that this study makes, however, is the observation that the ESL subjects — given instructions to express their thoughts in the language in which they were thinking — used their L1 by far the majority of the time. The academic subjects, on the other hand, expressed their thoughts in the L2 most of the time. Looking at these data alone, there appears to be a close relationship between L2 readers' ability to focus on broader, general aspects of an L2 text ("top-down" strategies) and their ability to think about the text in the L2. In other words, subjects wrestling with word- and phrase-level meaning are also generally forced to think about and process what they understand from the L2 text in their L1 due to the limitations of their L2 proficiency. In short, if they cannot understand the words in the text, they must use words they do understand (in their L1) to look for meaning.

The retrospective interviews that were conducted after the think-aloud protocols were completed seem to support this initial observation. The discussion above outlined three generalizations, based on the think-aloud and retrospective interview data, about how the ESL and academic subjects differ in their use of their L1 and L2 to comprehend an L2 text. The first generalization is that the ESL subjects use their L1 more when confronted with unknown L2 vocabulary, due to a large extent to the fact that there was a lot more vocabulary they did not know. Since the second language resources of the academic subjects are more extensive, they do not tend to need to rely on their L1 as much when confronted with unknown words.

The second generalization made from the think-aloud and retrospective interviews is that the ESL subjects have a greater tendency to work out L2 text and sentence meaning using their L1, while the academic subjects tend to use the L2 as the language of thought while wrestling with meaning. And third, the ESL subjects tend to check even the sentences they did understand directly in the L2 by translating to and confirming their understanding in the L1, a strategy not usually employed by the academic subjects.

The emerging pattern from these data is that the language that L2 readers use to think about and process an L2 text directly corresponds to their language proficiency. Less proficient ESL readers rely to a great extent on their L1 to help them determine word and text meaning, as well as to check their comprehension. More proficient second language readers revert less frequently to their L1 as a comprehension strategy.

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The Author:

Thom Upton is the Director of ESL Programs and an Assistant Professor of ESL in the Department of Foreign Languages at the University of Wisconsin – Eau Claire.