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Reading and learning from L2 text: Effects of reading goal, topic familiarity, and language proficiency

Yukie Horiba
Kanda University of International Studies
Japan

Keiko Fukaya
St. Luke's College of Nursing
Japan

Abstract

This study examined the effect of reading goal, topic-familiarity, and language proficiency on text comprehension and learning. English-as-a-foreign-language (EFL) students with high and low topic-familiarity read and recalled a text. Some were told in advance to expect a recall task in a particular language—the first language (L1) or second language (L2)—and recalled in the same language (the L1-L1 condition and the L2-L2 condition). Others were told of the L1 recall before reading and later recalled in the L2 (the L1-L2 condition). It was found that content recall was enhanced in the L1-L1 condition whereas incidental vocabulary learning benefited from the L2-L2 condition. Language proficiency affected overall content recall while topic-familiarity facilitated processing of specific content information. These findings suggest that reading goal affects resource allocation during text processing, with topic-familiarity and language proficiency intervening additively.

Keywords: reading goal, topic familiarity, language proficiency, content recall, incidental vocabulary learning

Reading a text is a goal-oriented intentional activity. People read a variety of texts for a variety of purposes or goals. The reader may process a text in order to learn about the topic of the text, to look for some specific information presented in the text, and simply to entertain himself. In the case of reading in a (foreign or) second language (L2), the individual may process a text in order to learn the language that is used to form the text, in addition to the content of the text. After reading, the L2 reader may use what is understood of the text in tasks such as recall or retelling, in which he informs someone about the content of the text, by using the language of the text (i.e., L2) or his native language (i.e., first language [L1]), depending on the situation. However, it has not been made fully clear how a reading goal affects L2 students' processing of and learning from a text, and how reader variables, topic-familiarity and language proficiency influence goal-oriented L2 text processing and learning. The present study was set up to help fill these gaps by

investigating the comprehension of and learning from L2 texts for students, who varied in level of topic-familiarity and language proficiency, and who engaged in a read-and-recall task.

Background

Basic Requirements of Reading Comprehension

Reading comprehension involves the interaction of linguistic processing and conceptual processing and results in the construction of meaning or conceptual representation of a text in the memory. As basic requirements for comprehension, words must be recognized, semantic propositions must be extracted from sentences, and ideas from different sentences must be connected to one another. General knowledge relevant to the content or topic of the text must be activated and inferences generated so that connections can be made between different pieces of textual information and between textual information and general knowledge (Graesser, Gernsbacher, & Goldman, 2003; van den Broek, 1994). The perception of connectedness among various pieces of information gives a sense of coherence in the representation of the text in the memory (Kintsch, 1998; van Oostendorp & Goldman, 1999; Zwaan & Radvansky, 1998). Because of the capacity-limited cognitive resources or working memory, readers must be able to monitor and regulate their own processing in order to achieve reading goals in the given situation (McNamara, 2007; Pressley & Afflerbach, 1995).

When a learner reads a text written in the L2, there are more possibilities that the reader encounters some processing difficulties which may undermine his or her reading goal. The most likely cause of the difficulty is unfamiliarity of the language of the text and limited language proficiency of a reader. Other possible causes are unfamiliarity with the topic or content of the text, and lack of (inaccessibility to) relevant general knowledge. There is a combination of language- and topic-related unfamiliarity. Furthermore, the difficulty caused by these language- and topic-related factors may hamper readers' ability to monitor and regulate the goal-oriented text processing.

Reading Goal and Comprehension and Learning

People read a variety of texts for a variety of purposes or goals. Reading goals vary in terms of directness (vs. indirectness) and explicitness (vs. implicitness), and they may consist of multiple sub-goals and may change during the course of text processing. In empirical research, task instructions are given to the reader so that a reading goal is set, and processes and strategies are employed in order to achieve the reading goal. Differences in performances in processing and comprehension measures are considered to reflect the effect of the reading goal.

There is ample evidence that L1 readers with different reading goals allocate cognitive resources differently during reading, and build representations varying in strength at various levels (e.g., read for entertainment vs. for study in van den Broek, Lorch, Linderholm, & Gustafson, 2001; read a news story vs. a literary text in Zwaan, 1994; read to comprehend vs. to predict vs. to explain in Magliano, Trabasso, & Graesser, 1999).

As for L2 reading, a small number of studies have been conducted so far on the effect of reading goal on comprehension. For example, Horiba (2000) examined and compared L2 and L1 readers of Japanese who processed an essay under two task conditions: reading freely and reading to find connections between sentences. It was found that, although the effect of reading goal on L2 readers was not as clear as that on L1 readers in terms of the mode of processing, the L2 readers in the read-for-coherence condition generated more connecting inferences and recalled the content better than those in the read-freely condition. Yoshida (2012) examined the effect of the relationship between task type (outlining, answering embedded questions, and reading only) and text type for Japanese EFL students. Students read and recalled a narrative passage and an expository passage under one of the three task conditions. It was found that there were no significant differences in recall as a function of task type and that the narrative text was more memorable in terms of main ideas than the expository text. The results of these studies regarding goals and task types for L2 readers might be influenced by limited language proficiency.

In order to dissociate the effect of language proficiency from the effect of reading goal, Horiba (2013) compared three groups of Japanese EFL students who read an essay for expressions, read for image, and read for critique. Participants read and recalled one text in L1, and another in L2 each under one of the three conditions. The correlational study found that the relative contributions of general comprehension skill (via L1 reading) and level of L2 proficiency (via L2 proficiency test) to L2 reading comprehension differed across reading-goal conditions. Think-alouds produced during reading revealed different patterns of resource allocation to linguistic processing (i.e., structure analysis), higher-level conceptual processing (i.e., reader response), and self-monitoring, depending on the reading goal. These findings suggest that reading goal affects L2 readers' process and representation of a text and that the goal may interact with language proficiency and general comprehension skill.

Some researchers targeted a post reading task, recall. Earlier research suggested that the language used for a recall task may influence L2 students' performance, with recall in L2 being poorer than recall in L1 (Donin & Silva, 1993; Lee, 1986). Joh and Schallert (2013) examined the effect of advanced notice of L1 recall for Korean EFL students. They found that there were no significant differences in recall between those who received an advanced notice and those who did not, but that the two groups differed in self-reported strategy use. The most frequent strategy for the recall group was memorization, whereas for the comprehension group it was overall depiction of the text by looking for main ideas. In order to scrutinize the effect of the language used for a recall task and the timing of giving instructions, Horiba and Fukaya (2012) compared three groups of EFL students. Two groups were given an advanced notice of recall in a particular language and later recalled using the same language (i.e., the L1-only condition and the L2-only condition), while the other group was told in advance of L1 recall and later asked to recall in the L2 (i.e., the L1-L2 condition). It was revealed that the L1-only condition outperformed the other conditions for content recall, whereas the L2-only condition was better than the other conditions for incidental vocabulary learning.

In sum, the findings from the above-mentioned studies suggest that reading goal may influence how L2 readers process a text, and that its effect on comprehension outcomes may differ depending on what is measured and how it is measured. Some research also suggests that goal-oriented L2 reading may interact with factors such as level of language proficiency and general

comprehension skill. However, it has not been made clear yet how general knowledge or topic-familiarity plays a role in goal-oriented L2 reading. In order to elucidate the effect of reading goal on the interactive nature of L2 text processing, the present study extends Horiba and Fukaya (2012) by adding another factor, topic-familiarity, and analyzing its effect on comprehension outcomes in more detail.

Topic-familiarity and Language Proficiency in Reading Comprehension

Research has accumulated ample evidence for the importance of general knowledge relevant to the content and topic of the text. Readers who have more relevant knowledge of the topic of a text tend to show better comprehension of and learning from the text. It is presumably because relevant general knowledge helps semantic and conceptual processing at various levels, activating relevant semantic feature information, generating correct explanatory and elaborative inferences, and facilitating the new information connected to prior knowledge in meaningful and coherent ways (e.g., Cook, 2005; Coté, Goldman, & Saul, 1998).

Research has shown that general knowledge and familiarity can enhance comprehension of an L2 text, but that its effect may be overshadowed by or interact with the effect of readers' limited language proficiency or linguistic difficulty in texts (e.g., Barry & Lazarte, 1998; Brantmeier, 2005; Bügel & Buunk, 1996; Lee, 2007; Pulido, 2007; Usó-Juan, 2006). For example, Usó-Juan (2006), using regression techniques to examine the contribution of discipline-related knowledge and language proficiency to English for Academic Purposes (EAP) reading for L1 Spanish students, found that language proficiency was a stronger predictor of reading than discipline-related knowledge. Lee (2007) examined comprehension and language learning for EFL students under some different treatments involving topic-familiarity and textual enhancement. It was found that topic-familiarity aided reading comprehension but was ineffective for learning the target forms (i.e., passive), and that textual enhancement facilitated grammar learning but was unfavorable for comprehension. Pulido (2007) examined lexical inferencing through reading for L2 Spanish students and reported that passage sight vocabulary and topic-familiarity affected lexical inferencing (success and ease of processing) in complex ways.

It is reasonable to suspect that language proficiency facilitates linguistic processing while topic-familiarity promotes conceptual processing. However, little is understood about the mechanism and the relation of these factors in L2 reading. Is the effect of language proficiency and the effect of topic-familiarity simply 'additive' or different and complimentary? How do they function as the reader progresses through processing content information of the text?

Some L1 research suggests that readers judge the relevance of the content in relation to their perspective and interest, allocate cognitive resources systematically during reading, and build representation of the text accordingly (e.g., Alexander, Jetton, & Kulikowich, 1995; Kaakinen & Hyönä, 2005; McCrudden & Schraw, 2010; McCrudden, Schraw, & Kambe, 2005). For example, McCrudden and Schraw (2010) asked participants to read a text describing four places (from the perspective of a research scientist) and evaluate the good and bad sides of living in Place A (or B). It was found that readers spent more time in processing the content that was relevant to their perspective and built a representation of the text accordingly. The findings from this line of research suggested that the effect of topic-familiarity and interest may appear in the way in

which different types of content information is processed and represented.

In the present study, two groups of EFL students—those who major in nursing and those who major in other displines such as English, international communication, and sociology—read a text and recalled the content of the text. Two narrative texts were used each of which describes a patient's case with health care and nursing. Those who major in nursing were considered to be higher in topic-familiarity and interest than those who major in the other disciplines. In order to tease apart the effect of language proficiency and the effect of topic-familiarity or interest, we scrutinized content recall qualitatively as well as quantitatively. Given the importance of causal relations in narrative text comprehension (e.g., Goldman, Graesser, & van den Broek, 1999; Graesser, Millis, & Zwaan, 1997), recall protocols were analyzed in terms of events and causal relations between events. Adapting the idea of relevance in text processing (e.g., Kaakinen & Hyönä, 2005; McCrudden & Schraw, 2010), recalls were also analyzed in terms of the types of content (i.e., propositions) recalled.

Reading Comprehension and Incidental Vocabulary Learning

In the context of L2 reading, it is often expected that the student may learn the language of a text in addition to the content of the text. Learning new vocabularies contained in the text may be considered to be a part of learning the content of the text. However, how incidental vocabulary learning occurs through reading and what aspects of the vocabulary items are learned are not completely understood. Incidental vocabulary learning through reading may be affected by learner-related factors (e.g., L2 proficiency, L2 vocabulary knowledge, and L1 background), lexical or text-related factors (e.g., frequency, salience of use) (e.g., Elgort & Warren, 2014; Hulstijn, Hollander, & Greidanus, 1996; Peters, Hulsijn, Sercu, & Lutjeharms, 2009; Pulido, 2007), as well as task-related factors including reading purpose (e.g., Hulstijn & Laufer, 2001; Swanborn & de Glopper, 2002).

The present study was also designed to examine how reading goal affects L2 students' vocabulary learning as well as content learning from a text, and how the reader variables, topic-familiarity, and language proficiency, influence the goal-oriented L2 text processing and learning. Incidental vocabulary learning was assessed by an unplanned vocabulary acquisition test which consisted of production and recognition subtests. Content learning was assessed by a recall test in which students produced as protocols what they understood of the content of the text.

Study

The research questions addressed in the present study were as follows:

1. Is there a significant effect of reading goal on content recall of the L2 texts, as well as on L2 learning? Is the former equally effective for the latter? Is the reading goal which is effective for language learning equally effective for content recall?

2. Is there a significant effect of topic-familiarity on content recall of the L2 texts, as well as on L2 learning? Does the effect of topic-familiarity interact with the effect of reading goal?

3. How do topic-familiarity and language proficiency affect the content recall of the L2 texts, as well as on L2 learning? How does the effect of topic-familiarity differ from the effect of language proficiency?

Method

Participants

A total of 145 college students in Japan participated in the study. They consisted of two groups: nursing majors ($N = 70$) who were 31 first-, 14 second-, 16 third-, and 9 fourth-year level students (68 females and two males) at a private nursing college, and non-nursing majors ($N = 75$) (i.e., English, international communication, business, and sociology) who were 48 first-, 19 second-, five third-, and three fourth-year level students (54 females and 21 males) at several universities. They were all native speakers of Japanese who had English language education in secondary schools in Japan and did not have overseas experiences for one year or longer. The participants' English language proficiency was estimated to range around TOEFL 430–470. The reading materials used in the study deal with health care topics. Therefore the nursing majors are considered *high topic-familiarity* readers while the non-nursing majors are considered *low topic-familiarity* readers.

Materials

Reading materials. Two short narrative English passages (425–427 words, 24–28 sentences) were used in the study. Each of the texts describes a patient's experience in a health care and nursing situation. The original texts were selected from the *American Journal of Nursing* by considering the content and textual organization. Narrative texts tend to have a fairly consistent and predictable causal structure typically based on characters' intentional, goal-directed actions; the reading of narrative texts involves more active use of general knowledge of the world than reading of informational expository texts (e.g., Britton & Black, 1985; Goldman et al., 1999; Graesser et al., 1997; Zwaan & Rapp, 2006). These passages were considered to be appropriate because one of the purposes of the study was to examine the effect of topic-familiarity as well as general knowledge on text comprehension. In order to make the two texts comparable in text length, vocabulary difficulty, and propositional complexity, some adjustments were made. One of the test passages is shown in Appendix A.

Each of the test passages contained 25 new words that were glossed (i.e., underlined with the L1 translation provided underneath). All the new words were at the 5000-word level or above. Among these glossed words, 15 words related specifically to health care (i.e., listed in Mosby's *Medical and Nursing Dictionary* or Steadman's *Medical Dictionary*) and were selected as the targets; the remaining ten words (five related and five unrelated to health care) were non-targets. The test materials were developed by a group of applied linguists, EFL instructors, and a native English professor of nursing. The materials were pilot-tested multiple times with other groups of EFL students whose profiles were comparable to the participants of this study.

The vocabulary acquisition test. Participants' incidental vocabulary learning was measured with an unannounced vocabulary test. The vocabulary acquisition test consisted of two production and two recognition subtests. For production, participants were given a list of words in their L1 translation and asked to write the words in the L2 (i.e., production in isolation), and to complete each of the target word forms with the first syllable provided in its original sentence context. For recognition, participants were asked to judge whether or not they thought each of the given words had appeared in the passage they had just read (i.e., form recognition), and to write in the L1 the meaning of each of the given words. As a part of the recognition subtest, participants were also asked to report whether or not they had known each of the given words prior to the reading. For both of the production-in-isolation and two recognition subtests, the target words and 20 filler words were presented in a random order.

L2 proficiency measures. Participants' L2 proficiency was measured in two ways. Overall language proficiency was assessed with a *TOEFL-ITP* test (which consisted of reading and structure sections) . In addition, vocabulary knowledge was assessed with the *Vocabulary Levels Test* (VLT; 2000, 3000, 5000 levels and academic words; Nation, 1990, 2001). Although there is ample evidence pointed out in the literature where both language proficiency and vocabulary knowledge are critical in reading comprehension, how each of these factors affects reading and learning from an L2 text has not been made clear. Because this study was to examine L2 students' learning of content and vocabulary through reading, use of the two measures was expected to help provide reliable information about the effect of L2 proficiency.

Procedure

Task condition and the recall task. Participants read a text written in the L2 and later recalled the content of the text by using the L1 or L2. In order to manipulate the reading goal, three task conditions were created. In each of the high and low topic-familiarity groups, about one-third of the students were told before reading that they would be later asked to recall in the L1, and after reading they recalled in that language (the L1-L1 condition). Another one-third of the students were told before reading that they would be later asked to recall in the L2, and after reading they recalled in that language (the L2-L2 condition). The remaining one-third were told before reading of the L1 recall, and after reading they were in fact asked to recall in the L2 (the L1-L2 condition). In the recall task, participants were encouraged to write down as much as possible what they understood of the content of the text as if to inform someone who had never read the text. In order to ensure that the participants would recall from their long-term memory (rather than their short-term memory), they solved some arithmetic problems after reading a passage and before doing the recall task.

Prior to the reading of the test passage, the participants practiced the read-and-recall procedure with a practice passage. In the practice session, those in the L1-L1 condition and the L2-L2 condition practiced under their respective condition, while those in the L1-L2 condition practiced the procedure under the L1-L1 condition.

General procedure. Data collection was made within a two-month period. The students took part in this study in groups of various sizes. At the meeting, one researcher of us explained the general purpose and procedure of the current study in the participants' L1, and then each

participant signed a consent form and filled out a learner-profile questionnaire. The participants took a *TOEFL-ITP* first, engaged in the read-and-recall task second, which was followed by a vocabulary acquisition test, and lastly took the VLT. For the read-and-recall task, the participants were randomly assigned to one of the three task conditions and one of the two passages by receiving an envelope containing the test materials.

Analysis

L2 proficiency measures. The responses to the *TOEFL-ITP* test were scored by the TOEFL-ITP office. The responses on the VLT test were scored independently by two judges using predetermined answer keys. Interrater reliability for scoring the VLT responses was 1.00.

Recall protocols. Recall protocols were analyzed in two ways. First, each recall protocol was scored for comprehension of the events (e.g., X happened, X did Y, how X was) and the causal relations between the events that are described in the text. Research suggests that causal structures in narratives guide readers' comprehension; readers utilize general knowledge of the world to explain or supply reasons for goals, actions, and emotions of characters and events in the situation or microworld described in the texts (e.g., Graesser et al., 1997; van den Broek, 1990; Zwaan & Radvansky, 1998). There is ample evidence that events that are on the causal-chain (which runs from the beginning to the end of the narrative) tend to be better recalled than off-chain events and that events with more causal connections to other events tend to be better recalled than events with fewer connections (e.g., Goldman et al., 1999; Horiba, van den Broek, & Fletcher, 1993; Mandler & Johnson, 1977; Stein & Glenn, 1979; Trabasso & Sperry, 1985; van den Broek, 1994).

We parsed each of the test passages for events and analyzed the causal structure of the text by using the procedures (i.e., classifying events, specifying and mapping causal relationships between events based on the criteria of necessity and sufficiency in the circumstances) recommended by Trabasso and van den Broek (e.g., Trabasso, Secco, & van den Broek, 1984; Trabasso & Sperry, 1985; Trabasso & van den Broek, 1985). Each of the recall protocols was analyzed for the number of events recalled and for causal structural properties of the events (i.e., causal chain status and causal connectivity).

Second, each recall protocol was scored for comprehension details, including propositions that are contained in the text. We parsed each passage for propositions by using the procedures recommended by Bovair and Kieras (1985), and then categorized each proposition as either healthcare-related (e.g., [POSSESS MICHAEL CHEMOTHERAPY]) or general (e.g., [POSSESS MICHAEL PARENT]). Each recall protocol was scored for the number of each type of propositions recalled. Prior research suggests that readers with topic interest or perspective judge 'relevance' of content information during reading, and recall relevant information better than irrelevant information (e.g., Alexander et al., 1995; Kaakinen & Hyönä, 2005; Lehman & Schraw, 2002). We suspected that topic interest as well as familiarity might affect the processing of content information at this level (i.e., proposition), leading to potential qualitative differences in content recall.

Each recall protocol was scored independently by two judges. Interrater reliability was .93; all

the discrepancies were resolved through discussion. The percentage scores were used in the statistical analyses.

Vocabulary acquisition. Based on the responses to the prior-knowledge report (given as part of the vocabulary acquisition test), the "genuine" new words (targets) were identified and adjusted for each participant. The number of the genuine target words ranged between 10 and 15. Readers in the high topic-familiarity group (M = 12.8, SD = 1.6) had 1.5 fewer target words than readers in the low topic-familiarity group (M = 14.4, SD = .9), $F(1,133) = 45.761$, $p = .0001$ (total effect size: $R^2 = .268$). There were no significant differences in the number of the genuine target words as a function of task condition, $F(2,133) = .615$, $p = .54$, and passage, $F(1,133) = 2.856$, $p = .09$. Responses on the two production subtests and the meaning-recognition subtest were scored by awarding one point for a correctly produced word and a half point for a partially correct word. Responses on the form-recognition subtest were scored for whether they were correctly or incorrectly recognized; each participant's score was calculated by subtracting the number of falsely recognized dummy words from the number of correctly recognized targets. The maximum score for each subtest ranged between 10 and 15 points. All the responses on the vocabulary acquisition test were scored independently by several judges and inter-rater reliability of over .90 was achieved. All the disagreements were resolved by the rescoring of another rater.

Results

Overall Language Proficiency and Vocabulary Knowledge

A summary of the percentage scores for overall language proficiency (measured with *TOEFL-ITP*) and vocabulary knowledge (measured with the VLT) is shown in Table 1. A three-way ANOVA with group, task condition, and passage as between-subjects variables was conducted for each measure. The low familiarity group scored significantly higher than the high familiarity group on the *TOEFL-ITP*, $F(1,133) = 25.705$, $p = .0001$, and on the VLT, $F(1,133) = 16.523$, $p = .0001$. There were no significant main effects of task condition, TOEFL: $F(2,133) = .916$, $p = .40$; VLT: $F(2,133) = .531$, $p = .59$, and passage, *TOEFL-ITP*: $F(1,133) = .018$, $p = .89$; VLT: $F(1,133) = 2.036$, $p = .16$. There were no significant two-way and three-way interactions. Thus, the participants within each group were equally distributed across task conditions and between passages in terms of overall language proficiency and of vocabulary knowledge. There were reliable high correlations between the *TOEFL-ITP* and VLT, $r = .699$, $F(1,144) = 136.32$, $p = .0001$.

Table 1. *Percentage test scores on overall language proficiency and vocabulary knowledge*

	High familiarity readers			Low familiarity readers		
	n	*M*	*SD*	*n*	*M*	*SD*
Language proficiency	70	65.7	7.6	75	72.1	7.4
Vocabulary knowledge	70	67.5	15.0	75	77.0	13.1

Recall

Quantity of Recall. A summary of the percentage of events recalled is presented in Table 2. Overall, the high familiarity group (M = 33.3, SD = 20.5) and the low familiarity group (M =

32.9, *SD* = 19.1) recalled similar amounts of events from the texts. In each group, readers in the L1-L1 condition performed best (high-familiarity: *M* = 48.8, *SD* = 22.0; low-familiarity: *M* = 40.2, *SD* = 18.4), followed by readers in the L1-L2 condition (high-familiarity: *M* = 27.8, *SD* = 16.1: low-familiarity: *M* = 29.4, *SD* =20.0), and readers in the L2-L2 condition did poorest (high-familiarity: *M* = 22.8, *SD* = 11.9; low-familiarity: *M* = 29.2, *SD* = 17.5).

Table 2. *Percentage of event recall as a function of task condition*

Task condition	High familiarity readers			Low familiarity readers		
	n	*M*	*SD*	*n*	*M*	*SD*
L1-L1	24	48.8	22.0	25	40.2	18.4
L1-L2	23	27.8	16.1	25	29.4	20.0
L2-L2	23	22.8	11.9	25	29.2	17.5
All	70	33.0	20.5	75	32.9	19.1

Covariate analysis on event recall with overall language proficiency and vocabulary knowledge as covariates (Appendix B) revealed that each of the five variables had a significant effect ($p < .05$) on recall, *TOEFL-ITP*, $F(1,133) = 5.625$, VLT, $F(1,133) = 10.273$, group, $F(1,133) = 8.479$, task, $F(2,133) = 25.707$, and passage, $F(1,133) = 85.154$. There were significant effects for the interaction between group and task, $F(2,133) = 4.910$. The other two-way and three-way interactions were not significant. Further analysis indicated that for the high-familiarity group, the L1-L1 condition (*M* = 52.4, *SE* = 2.7, *±95%CI* = [47.1, 57.8]) produced a substantially better recall than the L1-L2 condition (*M* = 31.2, *SE* = 2.8, *±95%CI* = [25.7, 36.7]) and the L2-L2 condition (*M* = 26.9, *SE* = 2.8, *±95%CI* = [21.3, 32.5]), and there were no significant differences between the L1-L2 condition and the L2-L2 condition. For the low-familiarity group, the L1-L1 condition (*M* = 36.2, *SE* = 2.7, *±95%CI* = [30.8, 41.6]) produced better recall than the other task conditions and the differences between the L1-L1 condition and the other two conditions were not significant: the L1-L2 condition (*M* = 27.0, *SE* = 2.6, *±95%CI* = [21.8, 32.2]) and the L2-L2 condition (*M* = 26.6, *SE* = 2.6, *±95%CI* = [21.3, 31.8]). Thus, the significant interaction between group and task condition was largely due to the amount of difference between the L1-L1 condition and the other conditions, and between the L1-L2 condition and the L2-L2 condition.

Quality of recall. Event recall was also analyzed in terms of sensitivity to the causal properties of a text, the event's causal-chain status, and the causal connectivity. Table 3 shows a summary of the results for event recall due to a function of causal-chain status. One-way ANOVA conducted for each group revealed that there was a significant effect of causal chain both for the high familiarity group, $F(1,96) = 7.176$, $p = .009$, and for the low familiarity group, $F(1,96) = 8.007$, $p = .006$, indicating that events that are on the causal chain running from the beginning through to the end of a story were more memorable than off-chain events for both groups of readers.

Table 3. *Probability of event recall as a function of causal chain status*

Causal-chain status	Number of events	High familiarity readers		Low familiarity readers	
		M	*SD*	*M*	*SD*
On chain	75	.39	.26	.38	.26
Off chain	22	.23	.14	.22	.15

Table 4 shows a summary of the results for event recall due to a function of causal connectivity.

Regression analysis revealed that there was a significant effect of causal connections for both the high familiarity group, $F(196) = 4.314$, $p = .041$, and the low familiarity group, $F(196) = 6.753$, $p = .011$, indicating that events with more causal connections to other events in a text were more memorable than events with fewer connections for both groups of readers.

Table 4. *Probability of event recall as a function of causal connectivity*

Number of causal connections	Number of events	High familiarity readers		Low familiarity readers	
		M	*SD*	*M*	*SD*
1	13	.33	.25	.31	.23
2	44	.31	.23	.29	.23
3	29	.39	.26	.38	.26
4	6	.42	.21	.51	.24
5	5	.53	.26	.52	.22

Next, propositions recalled were analyzed for the type of content (health care vs. general). Table 5 shows a summary of the probability of a proposition being recalled as a function of type of content. One-way ANOVA revealed that for high-familiarity readers, the probability of recall of healthcare information was similar to that of recall for general information, $F(1,408) = 1.776$, $p = .18$, whereas low-familiarity readers found healthcare information less memorable than general information, $F(1,408) = 6.243$, $p = .01$.

Table 5. *Probability of proposition recall as a function of type of content*

Type of content	Number of propositions	High familiarity readers		Low familiarity readers	
		M	*SD*	*M*	*SD*
Health care	123	.22	.21	.19	.18
General	286	.25	.20	.25	.21

Vocabulary Acquisition

On average, the high familiarity group ($M = 9.3$, $SD = 9.0$) performed much better than the low familiarity group ($M = 6.5$, $SD = 5.4$). For both groups, the L2-L2 condition (high-familiarity: $M = 12.8$, $SD = 12.2$; low-familiarity: $M = 8.9$, $SD = 5.7$) outperformed the L1-L1 condition (high-familiarity: $M = 8.0$, $SD = 5.6$; low-familiarity: $M = 4.9$, $SD = 3.8$) and the L1-L2 condition (high-familiarity: $M = 7.1$, $SD = 7.5$; low-familiarity: $M = 5.7$, $SD = 5.7$). Table 6 shows a summary of the results on the vocabulary acquisition test.

Table 6. *Vocabulary acquisition scores as a function of task condition*

Task condition	High familiarity readers			Low familiarity readers		
	n	*M*	*SD*	*n*	*M*	*SD*
L1-L1	24	8.0	5.6	25	4.9	3.8
L1-L2	23	7.1	7.5	25	5.7	5.7
L2-L2	23	12.8	12.2	25	8.9	5.7
All	70	9.3	9.0	75	6.5	5.4

Covariance analyses on vocabulary acquisition with overall language proficiency and vocabulary

knowledge as covariates (Appendix B) revealed that four of the five variables had a significant effect ($p < .05$) , VLT, $F(1,133) = 7.883$, group, $F(1,133) = 12.117$, task, $F(2,133) = 6.162$, and passage, $F(1,133) = 9.985$. There were no significant main effect of *TOEFL-ITP*, $F(1,133) = .010$, and no significant effects of two-way and three-way interactions. A further analyses revealed that the L2-L2 condition outperformed the other task conditions (*Difference* = 4.102, *SE* = 1.178, *±95%CI* = [1.772, 6.433]), and that there were no significant differences between the L1-L2 condition and the L1-L1 condition (*Difference* = .596, *SE* = 1.354, *±95%CI* = [-2.082, 3.275]).

Because the vocabulary acquisition test was given after the recall test, performances on the recall test might have had some influence on the performances on the vocabulary acquisition test. In order to clarify this possibility, another set of analyses was conducted by using event recall as an additional covariate. It was found that recall had a significant effect ($p < .05$), $F(1,133) = 4.413$ on vocabulary acquisition, as well as the followings: VLT, $F(1,133) = 4.719$, group, $F(1,133) = 8.406$, task, $F(2,133) = 8.423$, and passage, $F(1,133) = 14.518$. There were no significant main effects of *TOEFL-ITP*, $F(1,133) = .106$, and no significant effects of two-way and three-way interactions. Again the L2-L2 condition scored significantly better than the other task conditions (*Difference* = 5.025, *SE* = 1.243, *±95%CI* = [2.565, 7.484]), and there were no significant differences between the L1-L2 condition and the L1-L1 condition (*Difference* = 1.999, *SE* = 1.494, *±95%CI* = [-.957, 4.955]).

Discussion

The results reported above will be discussed in order to provide some answer to each of the research questions prepared for the study.

Research Question 1

The results of content recall indicated that, when the effects of language proficiency and vocabulary knowledge were statistically controlled, the L1-L1 condition was generally more effective than the L1-L2 condition and the L2-L2 condition, and there were no significant differences between the L1-L2 condition and the L2-L2 condition. In contrast, the results of incidental vocabulary acquisition revealed that, when the effects of language proficiency and vocabulary knowledge were controlled, the L2-L2 condition was more effective than the L1-L2 condition and the L1-L1 condition, and there were no significant differences between the L1-L2 condition and the L1-L1 condition for both groups of students.

These indications together informed us that a reading goal of enhancing the learning of content from a text (i.e., the L1-L1 condition) does not facilitate incidental learning of new words contained in the text, whereas a reading goal more conducive to incidental vocabulary learning from a text (i.e., the L2-L2 condition) does not promote the learning of content information from the text. In addition, a task condition that involves a change of reading goal is not effective for either type of learning from the text (i.e., the L1-L2 condition). These patterns were found for both groups of readers in this study, which is consistent with the previous study's findings (Horiba & Fukaya, 2012).

Considering the participants' limited language proficiency and the potentiality on their strategy use, there might be a 'trade-off' in resources allocation between linguistic processing and conceptual processing during text processing (Horiba & Fukaya, 2012; Lee, 2007). It is reasonable to speculate that readers who were told to expect an L1 recall task engaged heavily in conceptualization of the content of a text and allocated fewer resources to linguistic processing during reading when compared with readers who were informed of an L2 recall task. Emphasis on conceptual processing can help generate knowledge-based inferences and build more coherent representation of the content of the text (text-base, situation model), which was later accessed and expressed as more ideas recalled (i.e., the L1-L1 condition). However, little emphasis on linguistic processing during reading and recalling in this condition did not aid acquiring knowledge of the new words contained in the text, resulting in little incidental learning of the target words.

In contrast, readers with the intention of later L2 recall presumably allocated more cognitive resources to linguistic processing (and possibly tried to retain surface linguistic information of the text in memory) and fewer resources allocated to conceptual processing when compared with readers with the intention of later L1 recall. Emphasis on linguistic processing and reduced conceptual processing during reading might result in a less coherent representation of the content of the text, which was reflected in fewer ideas included in the L2 recall protocol (i.e., the L2-L2 condition). However, emphasis on linguistic processing during reading and recalling in this condition might help acquire knowledge of the new words incidentally.

As for the L1-L2 condition, emphasis on conceptual processing during reading facilitated the construction of a more coherent representation of the content of the text, as in the L1-L1 condition. However, the unplanned, forced use of the L2 for recall—which involved a change of the goals, plans, and strategies for recall—might inhibit the ideas from being retrieved from text memory and being expressed in L2 sentences during recall. Furthermore, use of the L2 in recall did not promote incidental vocabulary learning presumably because textual memory built during reading contained little trace of the linguistic forms.

Research Question 2

The results of content recall revealed that, when the effects of language proficiency and vocabulary knowledge were statistically controlled, students with high topic-familiarity outperformed students with low topic-familiarity, suggesting that topic-familiarity facilitated learning the content of the text. General knowledge relevant to the topic of a text needs to be activated and accessed in order to understand the ideas and events that are described in the text. In the present study, the high topic-familiarity group of nursing majors and the low topic-familiarity group of non-nursing majors both read narrative texts describing the case of a patient. The recall findings of the study indicate that L2 students with a greater amount of relevant topic knowledge or topic-familiarity were able to utilize information from their own topic knowledge sources, generating more explanatory and elaborative inferences and building more coherent representations of the text (with stronger situation model), compared with those with low topic-familiarity.

The results of content recall also revealed that, when the effects of language proficiency and vocabulary knowledge were statistically controlled, there was a significant interaction between topic-familiarity and task condition. Although both groups recalled best in the L1-L1 condition (second best in the L1-L2 condition, and poorest in the L2-L2 condition), the significant effect of task condition was found for the high topic-familiarity group and not for the low topic-familiarity group. In addition, when the effects of language proficiency and vocabulary knowledge were statistically controlled, the differences between the two groups were largest in the L1-L1 condition; the high topic-familiarity group recalled 1.4 times better than the low topic-familiarity group. In the other conditions the differences between the two groups were much smaller (i.e., 1.2~1:1). These findings suggest that the advantage of having a greater amount of topic-familiarity is actualized when conceptual processing is emphasized during reading a text (in the L1-L1 condition and the L1-L2 condition) and possibly also during recall in the L1 (in the L1-L1 condition). Having higher topic-familiarity does not seem to help increase the understanding of the content of the text when linguistic processing is emphasized (in the L2-L2 condition).

As for incidental vocabulary acquisition, the results of the vocabulary acquisition test revealed that, when the effects of language proficiency and those of vocabulary knowledge were statistically controlled, students with high topic-familiarity outperformed students with low topic-familiarity, suggesting that topic-familiarity facilitated learning of the new words contained in the text. The target words were healthcare-related new words presented with L1 glossing in the texts. The high topic-familiarity readers who were nursing majors may have found these linguistic items interesting and relevant to their learning, paying greater amount of attention to them, whereas the low topic-familiarity readers who were non-nursing majors were most likely not interested in learning them.

Research Question 3

The results of this study confirmed the importance of language proficiency and vocabulary knowledge for L2 reading and learning. Overall L2 proficiency and L2 vocabulary knowledge had positive effects on content recall, and incidental vocabulary learning as well. In addition, it was found that the high topic-familiarity group scored significantly lower than the low topic-familiarity group on both measures of the overall language proficiency and the vocabulary knowledge. Interestingly, however, in the L1-L1 condition the high familiarity group clearly outperformed the low familiarity group for recall, while in the L1-L2 condition and the L2-L2 condition the low familiarity group did better than the high familiarity group. These findings together suggest that some compensatory mechanism was involved in their text comprehension. More specifically, in the L1-L1 condition lower level of language proficiency and vocabulary knowledge might be compensated by use of topic-relevant knowledge in the high topic-familiarity group, while in the L1-L2 condition and the L2-L2 condition lower level of topic-relevant knowledge might be compensated by higher level of language proficiency and vocabulary knowledge in the low topic-familiarity group. These speculations are based on simple group comparisons. In order to scrutinize the effect of topic-familiarity and language proficiency on text comprehension, content recalls were analyzed qualitatively by using two techniques, causal structural analysis and propositional content analysis.

The results of event recall in terms of causal structural properties revealed that both high and low

topic-familiarity groups were sensitive to causal relations in the text, recalling events that on the causal chain better than off-chain events and recalling events that have more antecedent-consequence relations with other events better than events with fewer causal connections. These findings indicate that L2 readers utilized their general knowledge of the causal world to make connections between events, actions, and states that are described in the text and their products of comprehension (i.e., recall) reflect their sensitivity to the causal structure of the text, providing further evidence for the importance of causal relations in narrative text comprehension (e.g., Graesser et al., 1997; Horiba et al., 1993; van den Broek, 1994).

On the other hand, the results of type of propositional content recalled revealed that the patterns were different between the high topic-familiarity group and the low topic-familiarity group. Those with high topic-familiarity recalled healthcare-related information as well as general information, whereas those with low topic-familiarity recalled healthcare-related information significantly more poorly than general information. Presumably, students in the high familiarity group found healthcare-related propositions relevant and interesting, processed them more deeply, and encoded those pieces of content information into the text memory, which was reflected in their recall. Students in the low topic-familiarity group, on the other hand, did not perceive healthcare-related propositions as relevant or interesting, processed them more shallowly, and did not encode such detailed information into their text memory.

Considering that students in the low topic-familiarity group were more proficient than students in the high topic-familiarity group in terms of overall L2 proficiency and L2 vocabulary knowledge, the findings about recall altogether suggest as follows. First, language proficiency and topic-familiarity are both important and function additively and in a compensatory way to some extent when L2 readers process and represent a text. Second and more importantly, language proficiency, in combination with general world knowledge, facilitates the processing and representing of content information in a text in a general way, including the understanding of events, actions, and states and how they are causally related to one another. Topic-familiarity, on the other hand, affects specifically the processing and representing of detailed information (i.e., propositions) that is relevant to the topic of interest (healthcare-related information in this study), yielding qualitative differences in content recall.

Conclusion

Based on the results obtained in this study, the following conclusions are made. First, the cognitive processes and strategies L2 readers employ when they have a particular reading goal influence the amount of content recall of a text and the amount of incidental learning of unknown words contained in the text. Because of the limitation of working memory capacity together with limited language proficiency, the allocation of cognitive resources to both linguistic and conceptual processing during text reading may not be efficient nor effective to support both types of learning simultaneously. When conceptual processing is emphasized during text processing, learning of the content is enhanced and incidental vocabulary learning is not promoted. When linguistic processing is emphasized during text processing, content learning is rather inhibited though incidental vocabulary learning may be facilitated.

Second, topic-familiarity may have a profound effect on both learning of the content of a text and incidental vocabulary learning from the text. In addition, topic-familiarity may interact with task condition in its effect on content recall; L2 readers can take advantage of high topic-familiarity when they engage actively in conceptual processing but not when they place emphasis on linguistic processing.

Third, language proficiency intervenes the processing of linguistic information during reading-and-recalling task, affecting the amount of content recall and incidental vocabulary learning. Topic-familiarity and language proficiency may function additively and in a compensatory way to some extent in goal-oriented L2 text processing. Language proficiency, in combination with general knowledge, may be sufficient for the processing and representation of events and their causal relations that are described in the text, whereas topic-familiarity may function more specifically, facilitating the processing and representation of content information that is specifically relevant to the topic of interest.

Although the present study shed some light on the mechanism of goal-oriented L2 text comprehension and the effects of topic-familiarity and language proficiency on it, there are some limitations that need to be addressed in future research. First, the present study examined content recall and incidental vocabulary learning by using between-subject design. Although the effect of language proficiency (overall L2 proficiency and L2 vocabulary knowledge) was carefully considered and controlled statistically, the study compared different groups of L2 students who processed and recalled texts under different conditions. In order to investigate how goal-oriented strategic processing affects L2 text comprehension and learning from the text, future research needs to incorporate within-subject design where the same individuals' performances are examined and compared between different task conditions.

Second, the present study compared two groups of readers who varied in level of topic-familiarity; level of topic-familiarity was not measured but judged on the basis of their college major in relation to the topic of the reading materials. Use of some decent measure of topic-familiarity should help obtain more reliable data about the effect of it on L2 text comprehension and learning.

Third, the present study investigated the effect of goal-oriented L2 reading by employing post-reading tasks, content recall and a vocabulary acquisition test; it did not analyze 'on-line' text processing. Future research is also welcomed which investigates the allocation of cognitive resources during text processing online by using measures such as think-aloud protocols and eye movement.

Fourth, people read a variety of texts for a variety of purposes or goals. Yet there is little understanding of the nature of goal-oriented L2 reading. The present study, theoretically and educationally motivated, attempted to elucidate the effect of goal-oriented text processing involved in the read and recall task by manipulating task instructions (regarding the language used for recall and the timing of giving instructions). Further research is needed that can help inform us about how reading goals (and their characteristics in terms of directness and explicitness, structure, and persistence or change, etc.) affect comprehension and learning, and how they may interact with reader- and text-related variables.

Finally, some educational implications can be drawn from the findings of the present study. First, the selection and implementation of reading-related tasks should be made by carefully considering the effect of goals and strategies that L2 students employ under different task conditions. When the task is complex and the materials are challenging, how to reduce the processing demands and yet to produce students' learning become a critical issue. The processing demands can be reduced, for example, by dividing a task into subtasks and sequencing and recycling of the (sub)tasks, or by modifying the materials (e.g., simplifying the linguistic or structural aspects of the materials). Because different patterns of processing and learning are likely to occur under different task conditions, students should be given ample opportunities to engage in text processing for a variety of reading and learning goals.

Second, use of reading materials that intrigue learners and deal with familiar topics is important. Such materials may help L2 students overcome some of the linguistic difficulties they face in processing the text and help motivate them to actively engage in reading and learning. Third, incidental vocabulary learning through reading is quite limited, as this study as well as many other studies (e.g., Hulstijn et al., 1996) suggests. Analysis of the characteristics of the target words and their roles in a text should be incorporated when the reading materials are selected and prepared. This kind of linguistic and discoursal analysis for the target words may also be a useful strategy for L2 students who have already understood the general content of the text.

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Notes

1. The present study reports the findings from 145 participants who were L1 Japanese college EFL students in Japan, consisting of 75 nursing majors and 70 other majors (i.e., English, international communication, business, and sociology). Some of the data were used in an earlier study (Horiba & Fukaya, 2012). In the present study we put all the data into thorough analysis in order to examine the effects of task, topic-familiarity, L2 proficiency (overall proficiency and vocabulary knowledge), and possible interactions between these variables. In particular, recall data were analyzed both quantitatively and qualitatively to elucidate how topic-familiarity and L2 proficiency may influence recall either independently or interactively.

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Appendix A

Title Name

Who Decides the Treatment?

Michael Cantos, a 15-year-old who has recurrent **metastatic** Ewing **sarcoma**, has been hospitalized with

fever and **neutropenia**, common complications of his recent chemotherapy. Michael lives with his parents, two younger siblings, and his paternal grandmother. His parents and grandmother were born in the Philippines and emigrated to the United States about 30 years ago; all three of the Cantos children were born in this country. When Michael was first diagnosed, he was told that this type of cancer was aggressive and had already spread from the primary site in his **pelvis** to his **bronchi** and parenchyma. Treatment consisted of surgical **resection**, a year of **chemotherapy**, and six weeks of **radiation**. During the past year, whenever Michael asked if the cancer was fatal and what was the mortality rate, the **palliative** team members have responded both with veracity and reassurance, declaring, "Some patients die, but we're all fighting very hard to cure you." Michael hasn't forgotten a word.

On this admission, a routine chest X-ray reveals a large **lesion** in his right lung. Additional X-rays reveal multiple smaller lung lesions and a large pelvic **neoplasm**. Just two months earlier his routine **surveillance** scans were normal. Now, on learning the results of the chest X-ray, Michael asks if his mother can stay overnight in the hospital with him. Michael also tells his parents that he wants to hear his scan results and treatment options at the same time they do. His parents are shocked. They'd prefer withholding such "dismal news" from Michael, but they agree to honor his wishes. This decision deeply upsets Michael's grandmother, however, and on their next visit Michael says, "Why does Grandmother always have to pray the rosary over me—doesn't she know it doesn't work?"

In the team conference, a new registered nurse expresses frustration with the grandmother's "constant interference"; she says that by praying the rosary over him, the grandmother may be upsetting Michael further. The nurse says she can't support the grandmother and the boy at the same time, and asks the team for help. The team decides to meet every two weeks, or more often if necessary.

The team also schedules a meeting to discuss Michael's **prognosis** and communication within the family. As usual, the patient and his parents are encouraged to bring anyone they want. Michael immediately says that he wants only his parents present, and his parents agree. At the meeting the **pediatric oncologist** initially presents information, with the palliative care nurse practitioner summarizing or restating important points to ensure that everyone understands. Decisions are made by consensus.

Note. In the test passage, each of the underlined words was presented with its L1 translation provided underneath. The target words are shown here in bold letters.

Appendix B

1. Statistical Results for Event Recall

Event recall as a function of familiarity, task, and passage (with language proficiency and vocabulary knowledge as covariates)

Levene's Test of Equality of Error Variances a Dependent Variable: Recall

F	df1	df2	Sig.
1.642	11	133	.094

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.
a Design: Intercept + LP + VK + Familiarity + Task + Passage + Familiarity x Task + Familiarity x Passage + Task x Passage + Familiarity x Task x Passage

Tests of Between-Subjects Effects
Dependent Variable: Recall

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	33905.405a	13	2608.108	15.439	.000	.605
Intercept	996.508	1	996.508	5.899	.017	.043
LP	950.192	1	950.192	5.625	.019	.041
VK	1735.394	1	1735.394	10.273	.002	.073
Familiarity	1432.330	1	1432.330	8.479	.004	.061
Task	8685.424	2	4342.712	25.707	.000	.282
Passage	14384.949	1	14384.949	85.154	.000	.394
Familiarity x Task	1658.962	2	829.481	4.910	.009	.070
Familiarity x Passage	175.284	1	175.284	1.038	.310	.008
Task x Passage	157.721	2	78.861	.467	.628	.007
Familiarity x Task x Passage	341.813	2	170.906	1.012	.366	.015
Error	22129.602	131	168.928			
Total	215064.000	145				
Corrected Total	56035.007	144				

a .R^2 = .605 (Adjusted R^2 = .566)

Interest*Task
Dependent Variable: Recall

Group	Task	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
High familiarity	L1-L1	52.440 a	2.700	47.099	57.780
	L1-L2	31.185 a	2.784	25.677	36.693
	L2-L2	26.873 a	2.822	21.291	32.455
Low familiarity	L1-L1	36.189 a	2.717	30.814	41.564
	L1-L2	27.035a	2.624	21.844	32.227
	L2-L2	26.561 a	2.644	21.331	31.792

a. Evaluated as covariates appeared in the model: LP = 69.0114, VK = 72.41928.

2. Statistical Results for Vocabulary Acquisition Scores

2.1. Vocabulary acquisition as a function of familiarity, task, and passage (with language proficiency and vocabulary knowledge as covariates)

Levene's Test of Equality of Error Variances a Dependent Variable: Vocabulary Acquisition Total

F	df1	df2	Sig.
3.853	11	133	.000

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.
a Design: Intercept + LP + VK + Familiarity + Task + Passage + Familiarity x Task + Familiarity x Passage + Task x Passage + Familiarity x Task x Passage

Tests of Between-Subjects Effects
Dependent Variable: Vocabulary Acquisition Total

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2290.828a	13	176.218	4.025	.000	.285
Intercept	25.471	1	25.471	.582	.447	.004
LP	.454	1	.454	.010	.919	.000
VK	345.175	1	345.175	7.883	.006	.057
Familiarity	530.560	1	530.560	12.117	.001	.085
Task	539.632	2	269.816	6.162	.003	.086
Passage	437.179	1	437.179	9.985	.002	.071
Familiarity x Task	15.892	2	7.946	.181	.834	.003
Familiarity x Passage	24.901	1	24.901	.569	.452	.004
Task x Passage	32.049	2	16.024	.336	.694	.006
Familiarity x Task x Passage	12.737	2	6.369	.145	.865	.002
Error	5735.834	131	43.785			
Total	16958.000	145				
Corrected Total	8026.662	144				

a . R^2 = .285 (Adjusted R^2 = .214)

Custom Hypothesis Tests
Contrast Results (K Matrix)
Dependent Variable: Vocabulary Acquisition Total

Task Difference Contrast	Contrast Estimate	Hypothesized Value	Difference (Estimate-Hypothesized)	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
L1-L1 vs. L1-L2	.596	0	.596	1.354	.660	-2.082	3.275
L2-L2 vs. Previous	4.102	0	4.102	1.178	.001	1.772	6.433

Test Results
Dependent Variable: Vocabulary Acquisition Total

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Contrast	539.632	2	269.816	6.162	.003	.086
Error	5735.834	131	43.785			

2.2. Vocabulary acquisition as a function of familiarity, task and passage (with language proficiency, vocabulary knowledge and event recall as covariates)

Levene's Test of Equality of Error Variances a Dependent Variable: Vocabulary Acquisition Total

F	df1	df2	Sig.
3.606	11	133	.000

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.
a Design: Intercept + LP + VK + Recall + Familiarity + Task + Passage + Familiarity x Task +

Familiarity x Passage + Task x Passage + Familiarity x Task x Passage

Tests of Between-Subjects Effects
Dependent Variable: Vocabulary Acquisition Total

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2479.153a	14	177.082	4.025	.000	.285
Intercept	4.361	1	4.361	.582	.447	.004
LP	4.513	1	4.513	.106	.746	.001
VK	201.357	1	201.357	4.719	.032	.035
Recall	188.325	1	188.325	4.413	.038	.033
Familiarity	358.696	1	358.696	8.406	.004	.061
Task	718.895	2	359.448	8.423	.000	.115
Passage	619.549	1	619.549	14.518	.000	.100
Familiarity x Task	27.728	2	13.864	.325	.723	.005
Familiarity x Passage	14.092	1	14.092	.330	.567	.003
Task x Passage	41.003	2	20.501	.336	.694	.007
Familiarity x Task x Passage	3.702	2	1.851	.043	.958	.001
Error	5547.510	130	42.673			
Total	16958.000	145				
Corrected Total	8026.662	144				

a . R^2 = .309 (Adjusted R^2 = .234)

Custom Hypothesis Tests
Contrast Results (K Matrix)
Dependent Variable: Vocabulary Acquisition Total

Task Difference Contrast	Contrast Estimate	Hypothesized Value	Difference (Estimate-Hypothesized)	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
L1-L1 vs. L1-L2	1.999	0	1.999	1.494	.183	-.957	4.955
L2-L2 vs. Previous	5.025	0	5.025	1.243	.000	2.565	7.484

Test Results
Dependent Variable: Vocabulary Acquisition Total

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Contrast	718.895	2	359.448	8.423	.000	.115
Error	5547.510	130	42.673			

About the Authors

Yukie Horiba is a professor of Language Education and Applied Linguistics at the Graduate School of Language Sciences, Kanda University of International Studies, Japan. Dr. Horiba is interested in reading, vocabulary, task and instruction, and assessment. She has published in *The Modern Language Journal*, *Language Learning*, *Studies in Second Language Acquisition*, *Acquisition of Japanese as a Second Language*, *Discourse Processes*, and *Reading in a Foreign Language*, and some edited books. E-mail: horiba@kanda.kuis.ac.jp

Keiko Fukaya worked as associate professor of English at St. Luke's College of Nursing for twenty years. Her research and pedagogical interests included second language reading, vocabulary learning, and English for specific purposes. E-mail: keiko.fukaya@utopia.ocn.ne.jp