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Lexical Inferencing in L2 Japanese Reading: L2 Proficiency and L1 Reading as Predictors of Semantic Gap Filling (SGF) at Word Level

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[Abstract]

This exploratory study was conducted to seek the relationships of L2 proficiency and L1 reading to L2 Japanese Semantic Gap Filling (SGF) at word level, or lexical inferencing. Research questions were asked to investigate (1) which of the subcomponents of L2 linguistic knowledge correlates with L2 SGF, and (2) to what extent the variance of L2 SGF can be explained from L1 reading and L2 linguistic knowledge. Nineteen learners were tested for (1) L2 lexical inferencing in Japanese, (2) reading in English, and (3) L2 Japanese proficiency. While the participants had various native language backgrounds, they were assumed to be proficient enough to function academically in English because they were studying at institutions where English was the medium of instruction. Therefore, English was operationalized as their L1. Results of correlations and multiple regressions suggest that L2 proficiency, particularly knowledge of kanji meaning and semantic radicals account for variance in SGF while L1 reading appeared to be a predictor for SGF when participants were limited to those with (1) no prior exposure to kanji before studying Japanese and (2) ten years or longer of studying in English as a medium of instruction.

[Key Words]

L2 reading, Semantic Gap Filling (SGF), lexical inferencing

L2 Reading and Semantic Gap Filling

L2 reading is a complex phenomenon involving many subskills (Koda, 2007). One of the most crucial subskills is Semantic Gap Filling (SGF). Reading is essentially a continuous process of filling in the gaps in meaning at the local and global levels to reach comprehension. In order to reach reading comprehension, L2 readers must integrate the text information and the readers' prior knowledge (Koda, 2005). While SGF may occur at many levels, one of the most frequent instances of SGF may be found at a local (i.e. word) level. This is more commonly referred to as Lexical Inferencing in L2 reading literature (e.g. Haastrup, 1991; Nassaji, 2003; Paribakht & Wesche, 1999; Wesche & Paribakht, 2010) and has been defined as:

> "making informed guesses as to the meaning of a word in the light of all available linguistic cues in combination with the learner's general knowledge

of the world, her awareness of the context and her relevant linguistic knowledge"(Haastrup, 1991, p. 13).

Lexical Inferencing has been found to be the most common comprehension strategy for coping with an unknown word in the text (de Bot, et al, 1997) and also directly related to incidental vocabulary learning (Huckin & Coady, 1999; Nation & Waring, 1997) which is initiated by inferring the meaning of words and eventually leading to learning through multiple exposures in context such as while reading for comprehension. Beyond the high frequency core vocabulary, just as in L1 vocabulary acquisition (Nagy, Herman, & Anderson, 1985; Sternberg, 1987), incidental learning of vocabulary in context has been deemed to be an essential part of a L2 vocabulary development program since explicit instruction can focus on only a select number of words and limited aspects of those words at a time (Nation, 2008). But what would contribute to L2 SGF? If L2 reading is both a reading and a L2 problem (Alderson, 1984), both reading skills and L2 proficiency are assumed to be the major predictors of L2 SGF. This study explored the contribution of these components to L2 SGF to understand how local SGF works in L2 Japanese.

L2 Japanese reading and the burden of vocabulary learning

Reading comprehension requires high vocabulary coverage. L2 Japanese readers (Komori, Mikuni, & Kondo, 2004) need to know 96% or more of the vocabulary used in the text to reach adequate comprehension just as L2 English readers need to know 95% (Laufer, 1989) to 98 % (Hu & Nation, 2000). L2 Japanese readers therefore face an enormous task of having to learn thousands of words to achieve such a high coverage of known words in a text to access authentic texts in Japanese (Chujo & Utiyama, 2005). Moreover, while the initial 1,000 frequent words will cover 60 to 70 % of running texts, every additional 1,000 words only add a few percent of coverage (NIJLL, 1962; Yamazaki, 2006). This can cause a plateau effect on the progress of L2 Japanese learners who may paradoxically experience less leverage per word with more vocabulary they learn.

Learning those thousands of words entails another challenge. While Japanese is written with phonetic kana syllabaries and logographic kanji, more than half of the content words in Japanese are written in kanji (Matsushita, 2010). Kanji used in Japanese are often visually complex with an average of 10.8 strokes (Tamaoka, Kirsner, Yanase, Miyaoka, & Kawakami, 2002, p. 264). For example, kanji that have 11 strokes look like 渇 , 猛 , and 執 . It has been estimated that in order to learn those thousands of vocabulary items, L2 Japanese readers need to learn at least 1,500 (Matsushita, 2011a) to 1,945 kanji in the *Jooyoo Kanji* (Regular Use Chinese Characters) list by the Ministry of Education (Tamaoka et al., 2002) which increased the number of kanji on the list to 2,136 in 2010. As the demand for the vocabulary

written in kanji increases at an accelerated pace for L2 Japanese learners from the beginning level, this creates an obstacle for L2 Japanese learners as they try to make their way into intermediate and advanced level (Kano, 2000; Terajima & Kobayashi, 2009).

Developing morphological awareness, which is "the ability to analyze and identify a word's morphological constituents" (Zhang & Koda, 2012, p. 1195), might facilitate the reader's local SGF and the consequent incidental vocabulary learning in L2 Japanese. As mentioned before, because content words in Japanese tend to be written in kanji, a particular kind of morphological awareness for kanji should facilitate L2 Japanese readers' local SGF. That would include radical awareness (Shu & Anderson, 1997) or the ability "to recognize and make productive use of the relationship between a word and the radical of a character in the word" (p. 82). A radical is a component in kanji that appears across many characters which may or may not be an independent kanji on its own. A radical may be a semantic radical or phonetic radical. Kanji with the same semantic radical not always but very often share a certain meaning. For example, 言 is an independent kanji that means "to say" or "words." It works like a free morpheme and appears as a radical in kanji such as 話 (talk, story), 読 (read), and 記 (record, account) which all share a similar meaning relating to language. However, it also appears in a kanji which is not directly related to the meaning of language such as 訪 (visit). Thus semantic radical provides some clue to the meaning of the character at least some of the time.

The role of semantic radicals in L2 Japanese lexical inferencing

The most common type of kanji in terms of formation is semantic-phonetic type in Japanese (59.85 %) (Tamaoka et al., 2002, p. 263). Semantic-phonetic kanji is composed of two major parts. One is semantic (radical) which provides the information about the meaning of the character and the other is phonetic which provides the information about the character's pronunciation (Shu et al., 2003, p. 28). For lexical inferencing of unknown words in Japanese, as more often than not content words are written in kanji and kanji are semantic-phonetic, the unknown word is most likely to be written with a semantic-phonetic kanji. Semantic radical in the kanji may facilitate lexical inferencing as it provides semantic information to the L2 reader. However, semantic radicals can provide information only partially related to the meaning of the unknown kanji (Koda, 2005, p. 83; Shu & Anderson, 1997, p.83). Therefore, successful inferencing cannot rely solely on word-internal information. Rather, it would require integration of word internal information from the semantic-radical in the unknown word and word external information from contextual clues. This need for integration of information from two sources has been suggested in studies on lexical inferencing of novel kanji compounds in L2 Japanese (Mori & Nagy,

1999) as well as compounds in L1 Chinese (Shu, Anderson, & Zhang, 1995).

Semantic radicals may not be created equal in terms of salience and their function to facilitate lexical inferencing. Fujiwara (2004) conducted a study in which she attempted to measure varying degrees of salience of semantic radicals based on the responses from native speakers of Japanese. She defined salience as "consistency in perceived meanings among native speakers, and determined by how systematically native speakers identify the meaning of given semantic radicals" (p. 35). Fujiwara classified semantic radicals into three categories by native speaker ratings: high-salience radicals, low-salience radicals, and no-salience radicals.

Another aspect of semantic radicals is their transparency. The degree of transparency depends on how much of a clue the semantic radical contributes to the meaning of the character. Shu et al. (2003) set three levels of semantic transparency. Semantic transparency is considered to be high when the character "[contains] a radical that provides an obvious and direct clue to meaning" (p.28). For example, the semantic radical 木 (wood) in the character 松 (pine) provides an obvious and direct clue to the meaning. Secondly, semantic radicals can be considered "semi-transparent" when the semantic radical provides a weak or indirect clue to the meaning. Examples are 猟 (hunting) and 狡 (sly, crafty like a fox), both of which contain the radical 犭 (animal) (Shu et al., 2003, p.28). Finally, semantic transparency is considered to be low when the semantic radical "provides no clue to the meaning" such as in 錯 (mistake) with a 金 (metal) radical.

While semantic saliency is a static property of a radical as a morpheme, semantic transparency is a dynamic property of a radical which may change when used in different characters. For example, the radical 木 (wood) was one of the semantically salient radicals in Fujiwara's (2004) study. When it is used in 松 (pine) from the above example, it can be semantically transparent. However, when it is used in 横 (side, selfish/unethical), it is not semantically transparent even though 木 (wood) remains as a salient radical. Furthermore, in certain situations, the saliency of the radical could negatively contribute to local SGF as it might interfere with the contextual clues while a non-salient radical would not interfere nor would it facilitate lexical inferencing. For a semantic radical to be able to facilitate local SGF, it can be assumed that the semantic radical has to be semantically salient on its own and transparent in the particular kanji it is used in.

However, it is unclear whether L2 Japanese readers can indeed infer the meaning of the unknown word when the radical used in the word is semantically salient and transparent. How proficient do they have to be able to perform Lexical Inferencing? Will they be more successful in Lexical Inferencing when they are more proficient in the L2? If so, which components of L2 linguistic knowledge are more closely correlated to L2 SGF performance? Can the variance in L2 SGF be explained

by the readers' difference in L2 linguistic knowledge and/or L1 reading? In order to explore the relationship between the assumed predictors of L2 SGF, this study posed the following research questions:

1. Which of the subcomponents of L2 linguistic knowledge is correlated with L2 SGF?
2. To what extent can L2 SGF be explained from (1) L1 reading, (2) L2 linguistic knowledge?

Methods

Participants

The participants of this study were L2 Japanese learners of low-intermediate to advanced level in a summer study abroad program in Japan. This proficiency requirement was to ensure their minimum L2 linguistic knowledge which would enable them to read texts and perform L2 SGF. A total of 19 learners participated and completed all of the tasks. Participants included 13 females and 6 males with the mean age of 21.5. Their native languages (L1) were English (12), Chinese (5), Korean (1), and Hebrew (1). They all came from universities where the medium of instruction was English. Therefore, it was assumed that all had cognitive academic language proficiency (CALP) (Cummins, 1979) in English for this study. This led to the decision to operationalize English as their L1 for the L1 Reading task below.

Tasks

Tasks included L1 Reading, L2 SGF, and L2 Linguistic Knowledge as explained below.

L1 Reading

L1 Reading was measured by a gap-filling task, or cloze test (Bachman, 1985), in which participants had to fill in the blanks in a text written in English based on their comprehension of the text. The text had a blank every 15 words with 30 blanks total among 466 words. The difficulty of the text was comparable to the ones found in Graduate Record Examination (GRE) by Educational Testing Service to ensure that there would be enough variance among the participants. The answers were rated by four raters who were all L1 English-speaking graduate students in an applied linguistics program in North America.

L2 SGF

The L2 SGF task involved reading a text and choosing the meaning of the single pseudo-kanji word that is consistent with both the context created by the co-text that surrounds the target word (word-external information) and the meaning of the salient and transparent semantic radical used in the target word (word-internal information). The whole task had sixteen texts with an average of 311 characters

each and two target words in each text with a total of 32 target words. For the placement of two target words in the text, effort was made to place the two words far apart, with one toward the beginning of the text and the other toward the end so that the participants would read the entire text for contextual clues. The texts were adapted from elementary-level reading materials and intermediate-level listening comprehension materials for L2 Japanese learners.

Each L2 SGF item had four choices for the possible meanings. They were: (1) morphologically and contextually congruent (correct answer); (2) morphologically incongruent, contextually congruent; (3) morphologically congruent, contextually incongruent; and (4) morphologically and contextually incongruent. To avoid order effect, the order of the four choices was randomized for all items. The pseudo-kanji of the target word all had a highly salient and transparent semantic radical (see Table 1 below). Nineteen radicals were used for 32 items with each radical used up to three times. The radicals used three times (#3,4,5) were all high-frequent radicals determined by the number of kanji with the same radical in the *Jooyoo Kanji* list (Tamaoka, et al., 2002).

Table 1

Semantic radicals for L2 SGF task

Number	Shape	Salience Fujiwara (2004)	Frequency Tamaoka et al. (2002)	Meaning	L2 SGF item
1	雨	4.5	13	rain	1
2	車	4.3	11	vehicle	2, 31
3	亻	4.1	86	person	3, 9, 15
4	扌	4.3	76	hand	4, 11, 20
5	氵	4.5	103	water	5, 17, 21
6	糸	4.1	52	thread	6, 10
7	火	4.5	13	fire	7
8	言	4.4	60	say / language	8, 28
9	目	4.2	5	eye	12, 25
10	艹	4.4	38	grass / plant	13
11	食	4.1	8	food, eating	14, 19
12	心	4.1	40	heart / mind	16
13	疒	4.2	12	sickness	18, 23
14	女	4.2	24	woman	22
15	土	4.3	20	earth	24
16	貝	4	10	shell / money	26, 30
17	金	4.3	28	metal	27
18	耳	4	3	ear / auditory	29
19	月	4	32	moon/body	32

The following is a portion of the text in one of the SGF items as an example. The underlined is the pseudo word the participants had to infer the meaning by integrating the information from

the semantic radical and the context by the surrounding text. Four choices were a combination of morphological (m) and contextual (c) congruence (+) or incongruence (-) which are marked in the example for illustration. Obviously, they were not marked for morphological or contextual congruency in the actual task. The participants had been told that there might be words that they may not know but were not specifically forewarned of the presence of pseudo characters in the passages.

私たちが涙をながすのは、悲しいときだけではない。私たちは気がつかないが、実はまばたきをしているのだ。そして、まばたきをするたびに、涙が目の表面をゆっくりと (1) 湲ているのだ。しかし、パソコンを長い時間使っていると、まばたきの回数が減る。そうすると、涙の量も減ってしまうので、目の表面が乾きやすくなる。それがドライアイだ。

a. flow (morphologically congruent +, contextually congruent + = **correct**)
b. cover (m -, c +)
c. vaporize (m +, c -)
d. drop (m -, c -)

L2 Linguistic Knowledge (L2 LK)

L2 Linguistic Knowledge task had five subsections: (1) phonological decoding of kanji (Kanji Reading); (2) semantic decoding of kanji (Kanji Meaning); (3) Grammar; (4) Vocabulary; and (5) Semantic Radical. In the Kanji Reading, participants were presented with kanji in which they had to provide the pronunciation in hiragana, a Japanese syllabary. For the semantic decoding, they had to provide the meaning of those kanji in English. The grammar task had 30 multiple choice items in which the participants had to choose the best possible item that grammatically fit the blank in a sentence. Kanji and grammar items were selected from previously administered JLPT levels four, three and two to cover a low-intermediate to high-intermediate range.

The vocabulary task was in a format similar to the Vocabulary Knowledge Scale (VKS) (Wesche & Paribakht, 1996). The task elicited a response to indicate how familiar the learners were with the word and provide their meaning in English. JLPT vocabulary items were not used because they required reading a sentence and choosing the particular meaning as used in the sentence. This would have been more time-consuming and the format may have enabled the participants to choose the right answer solely based on the contextual cue. Therefore, a decision was made to use the more efficient format which strictly targeted vocabulary knowledge.

There were 100 items in the vocabulary test which were chosen on the basis of frequency, part of speech, and JLPT level. In order to sample words across frequency and JLPT levels, the Vocabulary Database for Learners of Japanese Ver. 1.0 (for General Learners) (Matsushita, 2011b) was consulted. The Database listed most frequently used 2,500 words in written Japanese based on Balanced Corpus of

Contemporary Written Japanese 2009 monitor version by National Institute for the Japanese Language and Linguistics (NINJAL, 2009). In order to find 100 items, 30 words for JLPT level 4, 50 words for level 3 and 20 words for level 2 were chosen. The final sample reflected the ratio of words by part of speech in each level.

The last subsection in the L2 LK was for semantic radicals. The format resembled the previously explained vocabulary section. From Fujiwara (2004), 44 semantic radicals were selected based on their salience (p.34). Half were high salience radicals and half were either low salience or no salience radicals. Radicals were placed in such a way that a high salience radical would be followed by either low salience or no salience radical. The items elicited the learners' familiarity with the radicals and their meaning if they were familiar with the radical.

Results

Descriptive statistics and reliability scale for L1 Reading, L2 SGF, L2 Linguistic Knowledge

Table 2 below shows the descriptive statistics of L1 Reading, L2 SGF and the five subsections in L2 LK task and their reliability. Reliability measures were Cronbach's alpha for internal consistency and Intra-Class Correlation for inter-rater reliability. Cronbach's alpha indicates how closely the items in the test are measuring what they are designed to be measuring. Inter-rater reliability indicates how much the raters agreed on their ratings.

Table 2
Descriptive Statistics and Reliability Scale for L1 Reading, L2 SGF and L2 Linguistic Knowledge by Subsections

	N	Maximum score	Range	Min	Max	M	SD	Cronbach's alpha	Intra-Class Correlation
L1 Reading	19	30	14	11.5	25.5	19.1	3.87	0.767	0.796
L2 SGF	19	32	14	11	25	19.5	3.88	0.596	-
L2 Kanji Reading	19	44	18	24	42	35.9	5.66	0.863	-
L2 Kanji Meaning	19	44	15	29	44	37.8	3.72	0.742	-
L2 Grammar	19	30	15	14	29	20.8	4.36	0.755	-
L2 Vocabulary	19	100	58	38	96	71.3	15.3	0.943	-
L2 Radical	19	44	23	12	35	27.2	6.14	0.885	-

Table 3
Correlations among Variables for the Whole Group (n=19)

	L2 SGF	L1 Reading	L2 LK KR	L2 LK KM	L2 LK Gra.	L2 LK Voc.	L2 LK Rad.	L2 LK Total	L2 LK Comp.
L2 SGF (Max32)	-								
L1 Reading (Max30)	.057	-							
L2 LK Kanji Reading (Max44)	-.036	-.182	-						
L2 LK Kanji Meaning (Max44)	.608**	-.247	.456*	-					
L2 LK Grammar (Max30)	-.074	-.048	.718**	.450	-				
L2 LK Vocabulary (Max100)	.429	-.435	.482*	.798**	.534*	-			
L2 LK Radical (Max 44)	.596**	-.234	-.022	.566*	.098	.607**	-		
L2 LK Total (Max262)	.424	-.363	.629**	.849**	.669**	.959**	.632**	-	
L2LK Composite (KM+Voc+Rad)	.604**	-.362	.329	.862**	.402	.920**	.845**	.925**	-

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

The scores for L1 Reading ranged from 11.5 to 25.5 out of a possible 30 maximum score with the mean of 19.1 and standard deviation of 3.87. The internal reliability of L1 Reading shown by Cronbach's alpha was 0.767 for the 30 items, which is at acceptable level (Larson-Hall, 2010, p. 171). The inter-rater reliability (intra-class correlation under a two-way random effects model) was 0.796, which was also acceptable (Graham, Milanowski, Miller, & Westat, 2012, p. 9). Thirty-two items in the L2 SGF task had a range from 11 to 25 out of a possible 32 maximum score with the mean of 19.5 and standard deviation of 3.88. Cronbach's alpha for L2 SGF was 0.596 for 32 items, which suggests relatively low internal consistency and need for revision. Among the subsections of L2 LK, the Vocabulary section had the highest Cronbach's alpha at 0.943 indicating high reliability.

The first research question asked which of the subcomponents of L2 linguistic knowledge is correlated with L2 SGF. In order to answer this, correlations among the variables were calculated (see Table 3 above). The table shows that there were moderate correlations between L2 SGF and L2 Kanji Meaning (KM), and L2 Radical. Since successful L2 SGF would have required knowledge of the radical used in the pseudo-character, correlation between L2 SGF and radical knowledge was expected. However, the table shows that L1 Reading showed negative correlation with all other variables though all without significance. This was rather unexpected because better reading skills should provide better access to contextual cues in the passage and thus may well be an essential contributor to more successful L2 SGF performance. This unexpected trend toward negative correlation between L1 Reading

and L2 Linguistic Knowledge implies the need to improve the design of the study (i.e., operationalization of L1 in L1 Reading). While the participants with Chinese proficiency had transferable linguistic knowledge in L2 Japanese and perform higher on L2 Linguistic Knowledge, they might have not performed well in L1 Reading in English to truly reflect their baseline reading proficiency even though they were assumed to be proficient enough to function academically in English. This point is further analyzed in the next Discussion section.

Another unexpected result was that simply adding the raw scores of all subsections of L2 LK (L2 LK Total) did not show correlation with L2 SGF though it correlated with all its subsections. In order to seek a stronger predictor, a composite score was calculated by averaging L2 Kanji Meaning, L2 Vocabulary, and L2 Radical. The composite score showed significant correlation with L2 SGF at 0.604 ($p < 0.01$). This suggests that for this group of learners as a whole, this composite score of L2 LK may explain the variance in the L2 SGF performance. This will be verified in the next section relating to the second research question.

The second research question asked to what extent L2 SGF (outcome variable) can be explained from predictor variables (1) L1 Reading, and (2) L2 Linguistic Knowledge. In other words, the question was how much of the two elements (baseline reading proficiency and knowledge of L2 Japanese) help to be successful in inferring an unknown word when reading L2 Japanese texts. In order to determine how much each predictor contributed to the variance of L2 SGF, hierarchical multiple regressions were performed in which the two predictor variables were entered into the regression in different orders. The results of the hierarchical multiple regression analyses are given in Table 4 (see below). The upper half of the table (Analysis A) shows the results in which L1 Reading was entered first and L2 LK was entered second. Analysis A examined how much L1 Reading explained the variance in L2 SGF alone and how much L2 LK could explain the variance in L2 SGF after the variance from L1 Reading was removed. The bottom half of the table (Analysis B) shows the results in which L2 LK was entered first and L1 Reading was entered second. Analysis B examined how much L2 LK explained the variance in L2 SGF alone and how much L1 Reading could explain the variance in L2 SGF after the variance from L2 LK was removed.

As Analysis A shows, when L1 Reading was entered in the first step, it accounted for only 0.3 % of variance and it was not significant. However, L2 LK, when entered in the second step, explained 44.9 % of additional and significant proportion of the variance in L2 SGF ($p < 0.01$). In Analysis B, when L2 LK was entered in the first step, it explained 36.5 % of significant proportion of variance in L2 SGF ($p < 0.01$). However, L1 Reading accounted for only 8.7% of variance, which was not significant. The results of these analyses suggest that, of these two predictors, only L2 LK is a

significant predictor of L2 SGF by L2 Japanese learners.

Table 4

Multiple Regression Analyses with L1 Reading and L2 Linguistic Knowledge as Predictors and L2 SGF as Criterion Variable for the Whole Group (n=19)

Predictor	β	Final *R*2	*R*2 change	*P*
Analysis A				
Step 1				
L1 Reading	0.057	0.003	0.003	0.818
Step 2				
L2 Linguistic Knowledge	0.718	0.452	0.449	0.002
Analysis B				
Step 1				
L2 Linguistic Knowledge	0.604	0.365	0.365	0.006
Step 2				
L1 Reading	0.317	0.452	0.087	0.130

Discussion

SGF had significant correlations with Kanji Meaning, Radical, and Composite (Kanji Meaning, Vocabulary, Radical). Regression showed that significant portion (36.5 to 44.9 %) of variance in SGF could be explained by L2LK while L1 Reading unexpectedly did not contribute significantly. This may be due to the fact that for some of the participants, L1 Reading was not quite testing their reading proficiency in their L1 even though all of the participants were studying at an institution of higher education where English was the medium of instruction and presumably they possessed advanced proficiency in English meeting or exceeding cognitive academic language proficiency (CALP) (Cummins, 1979). This could mean that for a more robust construct validity of "L1 Reading," and better interpretability of results, inclusion and exclusion criteria should be tightened from "studying at an institution of higher education where English is the medium of instruction."

Another unexpected finding was that L2 Grammar only correlated with L2 Kanji Reading, and strongly so at 0.718 (Table 3 above). This is interesting because kanji used in the Grammar section had reading (pronunciation) over them. This was to ensure those items would be testing the participants' grammatical competence rather than their knowledge of kanji reading. A possible explanation for the correlation might be that those with more knowledge of kanji pronunciation (reading) tended to know more grammar as both develop along the similar timeline. As for the non-correlation between Kanji Reading and other subsections (Vocabulary, Kanji Meaning, and Radical), it may be that those with prior kanji exposure such as those with L1 Chinese or learners of Chinese had already been equipped with access

to meaning expressed by kanji, whether it was in the Kanji Meaning section or Vocabulary section where the majority of the content words were written in kanji. Therefore, those with prior kanji exposure, without accumulating the knowledge of Japanese kanji pronunciation (reading) and grammar were able to readily access Japanese vocabulary, meaning of words in kanji (Kanji Meaning) and also the meaning of radicals by transferring their knowledge of hanzi (kanji) from Chinese.

To further explore this possibility, the correlation between the L2 SGF scores and the composite scores of L2 LK of all participants is plotted on the Figure 1 below. The number is the participant ID. The markers indicate the status of the participants regarding their prior exposure to kanji. If they had known kanji or Chinese by being a L1 Chinese speaker or having formally learned Chinese before studying Japanese, their coordinates on the graph is shown by a triangle. Otherwise, they are depicted by a circle. The scatter plot shows moderate correlation between L2 SGF and L2 LK. This suggests that the more they had L2 LK, the more successfully they tended to infer the unknown words and score higher on L2 SGF. However, closer examination of the plot, focusing on whether or not the participant knew kanji before learning Japanese, showed that those with prior exposure to kanji (i.e., triangle markers) tended to fall closer to the reference line, implying their correlation of these two variables is stronger. In contrast, those without prior exposure to kanji (i.e., circle markers) tended to scatter further away from the reference line, indicating their correlation was weaker. Also, those with prior kanji exposure seemed to cluster on the upper right corner suggesting that they tended to have more L2 LK and scored higher on L2 SGF than others without prior exposure to kanji. Those with prior kanji exposure included participants with L1 Chinese (#4, 5, 15,17,19) and history of formally studying Chinese before Japanese, for example participant #1 was a Ph. D. student in Chinese literature.

A subgroup was created by excluding those with prior kanji exposure and including only those with English L1 with at least 10 years of studying in an environment where English was a medium of instruction. Using these criteria, eleven participants were excluded leaving eight participants in the subgroup. Correlations were calculated for this subgroup (see Table 5 below). In contrast to the whole group which had only L2 LK correlated with L2 SGF, now only L1 Reading significantly correlated with L2 SGF. Another change from the whole group was found in the subsections of L2 LK which now all correlated positively with L2 SGF though the correlations were not significant. The correlation between L1 Reading and L2 SGF is graphically shown in the scatter plot (see Figure 2 below).

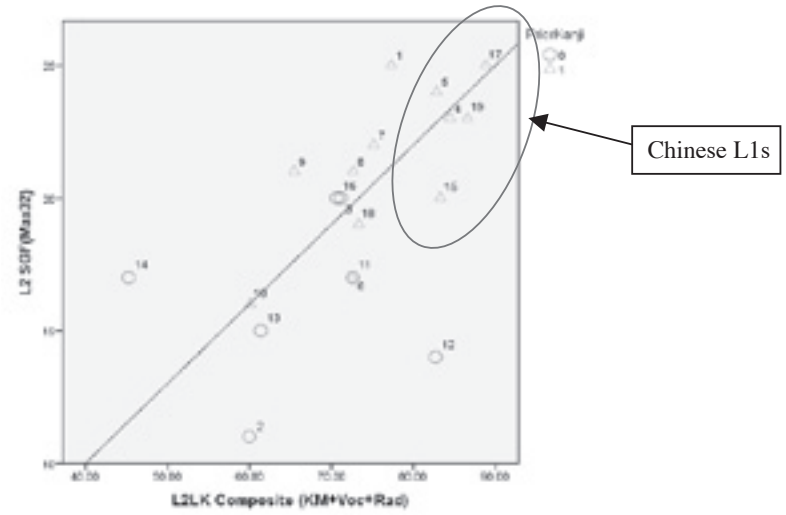

Figure 1 *Scatter plot of L2 SGF and L2 Linguistic Knowledge Composite Scores*

Table 5

Correlations among Variables for the Subgroup (n=8)

	L2 SGF	L1 Reading	L2 KR	L2 KM	L2 Gra.	L2 Voc.	L2 Rad.	L2LK Total	L2LK Composite
L2 SGF (Max32)	-								
L1 Reading (Max30)	.710*	-							
L2 LK Kanji Reading (Max44)	.468	.151	-						
L2 LK Kanji Meaning (Max44)	.402	.323	.903**	-					
L2 LK Grammar (Max30)	.195	.240	.507	.635	-				
L2 LK Vocabulary (Max100)	.234	-.284	.863**	.696	.490	-			
L2 LK Radical (Max 44)	.340	-.039	.355	.283	.337	.410	-		
L2 LK Total (Max262)	.371	-.041	.905**	.821*	.670	.932**	.607	-	
L2LK Composite (KM+Voc+Rad)	.394	-.057	.832*	.747*	.576	.864**	.774*	.968**	-

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Table 6

Multiple Regression Analyses with L1 Reading and L2 Linguistic Knowledge as Predictors and L2 SGF as Criterion Variable for the subgroup (n=8)

Predictor	β	Final *R*2	*R*2 change	*P*
Analysis A				
Step 1				
L1 Reading	0.710	0.504	0.504	0.049
Step 2				
L2 Linguistic Knowledge	0.436	0.693	0.189	0.139
Analysis B				
Step 1				
L2 Linguistic Knowledge	0.394	0.155	0.155	0.334
Step 2				
L1 Reading	0.735	0.693	0.538	0.032

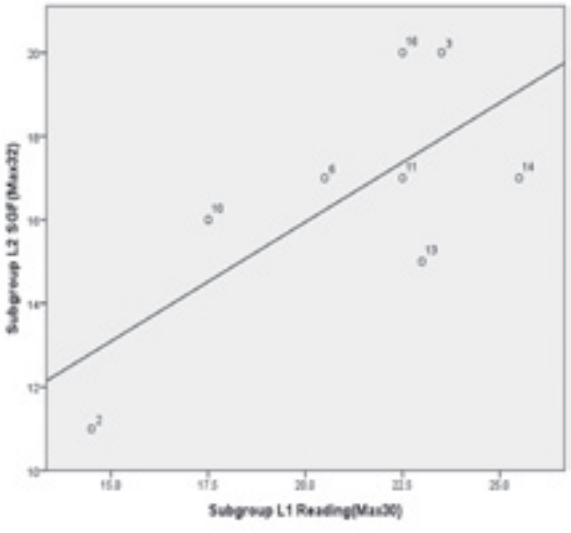

Figure 2 *Scatter plot of L2 SGF and L1 Reading for the subgroup*

Regression analyses were performed on the subgroup and the results are provided in Table 6 (see above).

When L1 Reading was entered in the first step (Analysis A), it significantly accounted for 50.4 % of variance ($p < 0.05$) while L2 LK, entered in the second step, explained 18.9 % of additional variance in L2 SGF, which was not significant. In Analysis B, when L2 LK was entered in the first step, it explained 15.5 % of the variance in L2 SGF, which also was not significant. But L1 Reading that was entered in the second step accounted for additional and significant proportion, 53.8%, of variance in L2 SGF ($p < 0.05$). The results of these analyses suggest that, of these two predictors, only L1 Reading was a significant predictor of L2 SGF in this subgroup.

This is in stark contrast to the results of the entire group, which had only L2 LK as significant predictor. Previous studies on the relative contribution of L1 reading and L2 proficiency in L2 Dutch / L1 Turkish (Bossers, 1991), in L2 Spanish with L1 English (Bernhardt & Kamil, 1995), and in L2 English with L1 Korean (Lee & Schallert, 1997) all seemed to indicate that (1) L2 proficiency was a stronger predictor than L1 reading but that (2) at higher levels of L2 proficiency, L1 reading became a stronger predictor. The participants in the subgroup ranged from low-intermediate to advanced. However, the texts used in the L2 SGF task were relatively easy to ensure high readability for all participants. This may have had an effect on the results, thereby lowering the threshold level of L2 proficiency to the degree where L1 reading became a stronger predictor.

The limitations of this study may be the small sample size and relatively low

reliability of L2 SGF task. Cronback's alpha for L2 SGF was 0.596 for 32 items. While this level of internal consistency may be acceptable, there is a need for improvement. Item Discrimination (Corrected Item-Total Correlation) indicates how well the item could discriminate high performers and low performers with 1 being the best. A negative value means more overall low achievers could answer correctly than high achievers indicating that the item is not well designed. They ranged from -0.301 to 0.657 for these 32 items. Seventeen items were below 0.2, and 10 of those had a negative value. By removing these 10 items, alpha was found to improve from 0.596 to 0.760 with 22 items. The immediate goal is to reach this level by reviewing the distractors of those items whose item discrimination was lower than 0.2.

Conclusion

For the entire group of 19 participants, their performance in the semantic decoding of Kanji Meaning (KM) and knowledge of Semantic Radicals (Radical) correlated with L2 SGF while their L1 Reading showed no correlation with any of the variables. Multiple regression analyses indicated that, for the entire group, L2 proficiency was the only predictor accounting for 36.5 to 44.5 % of the variance in L2 SGF performance. This was in contrast to the results from the subgroup with only L1 English with more than 10 years schooling in English and no prior exposure to kanji before learning Japanese. For the subgroup, L1 reading was the only predictor, accounting for 50.4 to 53.8 % of the variance in L2 SGF performance. L1 reading may have been the stronger predictor because of the relative easiness of the texts in L2 SGF and the inclusion of advanced learners. However, any inferences made in this study should be considered tentative because of the limited sample size.

For future studies, the sample size should be substantially increased for more power in the statistical analyses. Also to reduce subject-to-subject variability and attain more robust construct validity of L1 Reading, participants' L1 should be more strictly controlled. Similarly participants should be controlled for their prior exposure to kanji. Lastly, the instruments used in the study, especially L2 SGF may benefit further refinement.

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第二言語としての日本語読解における未知語の意味推測に対する第二言語能力および第一言語読解能力の関係

畠山　衛

［要　旨］

第二言語の言語的知識および第一言語の読解能力が高ければ高いほど第二言語での未知語の意味推測の成功率が上がることが予想されるが、どちらのほうが貢献度が高いのだろうか。本研究は第二言語としての日本語の読解中に起こる様々なレベルの意味構築の中で、頻繁に発生する未知語の意味推測に焦点をあて、第二言語能力と第一言語の読解能力の関係を探った。研究課題として、(1) 第二言語能力のうちどの構成要素が意味推測との相関が高いのか (2) 意味推測の成功度の分散はどの程度、第二言語能力と第一言語の読解能力によって説明されるのか、の二つを設定した。19 名の学習者に (1) 意味の透明性の高い部首を含む未知語の意味推測、(2) 第一言語（もしくは認知・学習言語能力を有する言語）の英語における読解能力、(3) 第二言語能力（漢字（読み、意味、部首）、語彙、文法）を測り相関分析、重回帰分析を行ったところ、意味推測は第二言語能力、特に漢字意味と部首知識との相関が高く、第二言語能力によってのみ説明される分散が四割程度あったものの、第一言語の読解能力は相関もなかった。しかし、対象を 10 年以上英語で教育を受けた英語母語話者で、かつ中国語の学習経験がない者に限ると、意味推測は第一言語の読解能力と高い相関を示し、意味推測の分散の五割が第一言語の読解能力によって説明された。これらの結果は、標本数を増やしさらに検討するべきものと思われる。