SEMANTIC CONTEXT EFFECTS IN FORWARD AND BACKWARD WORD TRANSLATION BY KOREAN LEARNERS OF ENGLISH

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BACKGROUND

Three interrelated aspects in the psycholinguistic study of second language acquisition are representation, acquisition, and processing (Jiang, 2000). According to Levelt (1989), any theory of second language acquisition is incomplete without a representation component because representation and processes cannot be studied independently of each other. In characterizing cognitive processes that support second language acquisition, one important question concerns how second language learners process words in their second languages. In other words, when a learner acquires a new language, what kinds of patterns of connections are created between words in the first and second language? Words in two languages may be connected in two different ways. English-Korean translation pairs, such as school and 학교, may be connected directly when these two words form an association in the process of learning L2. They may be also connected through shared conceptual representations because of similar semantic content.

With respect to lexical and conceptual representations in the memory of second language learners, Potter, So, Von Eckardt, and Feldman (1984) proposed the *word association model* and *concept mediation model.* In the word association model, words in the second language (L2) access concepts via words in L1. In contrast, the concept mediation model allows direct access to concepts for words in both languages. Translations across languages would be accompanied by the direct access of semantic meaning from the L2 word. Potter et al. (1984) compared these two models in a series of experiments by comparing the performance of more-fluent learners and less-fluent learners on picture naming and translation in their second language. Potter et al. reasoned that because picture naming is believed to require concept mediation, translation should

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resemble picture naming only if it is conceptually mediated. However, if translation can be accomplished at a lexical level alone, then translation should be faster than picture naming. The participants in this study showed no difference in processing times for the picture naming and the translation tasks. They argued that concept mediation was the basic form of interlanguage connection in bilingual memory because all subjects, regardless of their level of L2 fluency, appeared able to mediate conceptually.

A number of studies have been conducted concerning lexical representations in L2 (Chen & Leung, 1989; Kroll & Sholl, 1992; Kroll & Stewart, 1994). According to Altarriba and Mathis (1997), the finding that those studies had in common was that language access was influenced by the level of L2 proficiency. Second language learners initially access the meanings for second language words through the first language and later become able to conceptually mediate L2 directly. For instance, in the study by Chen and Leung (1989), the proficient group was equally fast in picture naming and translation in the L2, suggesting that they relied on conceptual mediation in both tasks. Adult beginners, however, performed the translation task faster than picture naming, suggesting that they relied on the faster lexical route.

To investigate the effects of semantic context on translation performance, Kroll and Stewart (1994) conducted categorized lists experiments, in which the stimuli were presented in semantically categorized lists (all words belonging to the same semantic category, e.g., all garments) or in mixed lists (words selected from several semantic categories and presented in a random order). They found that the semantic contexts affected forward translation, but not backward translation. It took longer for the participants to translate words from L1 to L2 than from L2 to L1. This finding suggested that directionality effects occurred when using the translation task. According to De Groot, Dannenburg, and Van Hell (1994), both forward and backward translation were affected by semantic and familiarity variables and by the cognate relation between translation equivalents. In the study by Kroll and Stewart (1994), another finding was that the translation of words in categorized lists took longer than the translation of words in mixed lists. Those findings were interpreted as evidence that forward translation is conceptually mediated whereas backward translation is mainly based on word-word associations.

On the basis of their findings, Kroll and Stewart (1994) proposed a revised version of the hierarchical model of bilingual memory representation. According the *Revised Hierarchical Model* (RHM), at the lexical level, connections from L2 to L1 are hypothesized to be stronger than connections from the L1 to the L2. This asymmetry arises in part from the differential reliance of L2 on L1, and also as a consequence of the differential nature of the mappings from a small lexicon in the L2 to a large lexicon in the L1 (Kroll & Sunderman, 2003). At the conceptual level, the model assumes strong connections for L1 words to L2 words, but relatively weaker connections for L2 words to L1 words. Also, it is assumed that the presence of semantic effects in word translation operates in favor of the concept mediation account, whereas the absence of semantic effects supports a word-word association. Taken together, the RHM makes the following predictions: (a) translation from L2 to L1 will be faster than translation from L1 to L2, (b) the difference between translation performance of less and more fluent bilinguals should be greater for translation from L1 to L2 than for translation from L2 to L1, and (c) semantic context effects will be larger in translation from L1 to L2 than in translation from L2 to L1.

There are a number of studies that have produced findings in support of the RHM. First of all, Kroll and Stewart (1994) found that Dutch learners of English were slower to translate Dutch words into English when the words were grouped by semantic category than when they were not. This result only held for L1-L2 translation, not for L2-L1 translation. In the study by Sholl et al. (1995), L1 to L2 translation was primed by the prior picture-naming task, but L2 to L1 translation was not. In addition, Keatly, Spinks, and De Gelder (1994) found semantic priming effects only from L1 to L2, but not from L2 to L1 for Chinese learners of English. Further support for the model was provided by negative priming task. In the study by Fox (1996), semantic associates and translation equivalents were used in a negative priming paradigm, which examined the priming effect of an ignored flanker on processing of a subsequent target. He found that cross-language negative priming occurred in both the L1-L2 and L2-L1 conditions. However, there was asymmetry with more negative priming occurring in the L1-L2 condition. These results are all consistent with the predictions of the RHM.

In contrast, a number of studies have challenged the view that backward translation is accomplished via a lexical route. La Heij et al (1996) addressed the question of whether or not backward translation is conceptually mediated, and their findings contradicted to the RHM. They found semantic context effects in both directions of translation and evidence for more semantic involvement in backward than in forward translation. As their participants were Dutch learners of English very similar to those used in the Kroll and Stewart (1994) study, it is unlikely that the nature of the participants' proficiency in the L2 nor the nature of the two languages can account for the observed differences (Kroll & Tokowicz, 2001). De Groot and Poot (1997) also found evidence that forward translation was faster than backward translation and the effects of a semantic context were equally obtained in both translation directions.

To summarize, the studies of lexical representations in L2 have shown converging support for the developmental shift from lexical to conceptual mappings for L2 words with increasing fluency. However, recent research has provided mixed support the claims of the RHM. On one hand, a number of studies showed that forward translation is more sensitive to semantic factors than backward translation and that more semantic processing is observed in priming tasks from L1 to L2 than the vice versa. However, other studies reported semantic effects in both directions of translation and also questioned the reliance on lexical links during early stage of acquisition.

RESEARCH QUESTIONS

The preceding review indicates that the results of previous research on the issues of the RHM are not consistent. The present study was designed to investigate this topic further with Korean learners of English. Most of the previous research on semantic context effects in lexical processing has been conducted with participants whose first and second language derive from the same Indo-European family such as Dutch learners of English. The use of Korean learners of English would provide distinct information, since the two languages differ considerably. In addition, this study sought to clarify the possible interaction of semantic context effects and L2 proficiency level. According to Chen (1990), research results have demonstrated that proficiency plays a main role for

patterns of lexical processing. In spite of the acknowledged importance of this, there are very few empirical studies of different groups of participants with varying degrees of proficiency in the L2. This study sought to answer the following research questions:

1. Is forward translation conceptually mediated? Is backward translation based on word-word association?
2. Are both or either translation directions facilitated by the presence of a semantically related context?
3. Does L2 proficiency mediate semantic effects in both or either translation directions?

METHODS

Participants

Thirty-four Korean learners of English participated in this study. In order to investigate the contrast between English proficiency levels, the Korean L1 speakers were grouped according to their proficiency level. Test of English as Foreign Language (TOEFL) scores served as the criterion to distinguish the participants' proficiency levels. Also, the length of residence in English speaking countries was taken into account. Two participants in the low proficiency level did not have a test score. However, considering that they were enrolled in a pre-university English language program and that their residence in English speaking countries was relatively short (less than 6 months), they were regarded as low proficiency speakers of English. Using this criterion, the higher proficiency group comprised 22 participants and the lower proficiency group comprised 11 participants. All of the higher proficiency level learners were graduate students at the University of Hawaii whereas all of the lower proficiency level learners were enrolled in a pre-university English language program in Hawaii.

Descriptive statistics for the participant proficiency characteristics are shown in Table 1. The mean TOEFL score for the higher proficiency group was 626.14 (ranging from 583 to 657), and the mean length of residence in an English-speaking country was 30.32 months (ranging from 12 to 68). For the lower proficiency group, the mean TOEFL score was 462 (ranging from 403 to 560), and the mean length of residence was 9.73

months (ranging from 5 to 24 months). Two-way ANOVA comparisons revealed that there was a statistically significant difference in TOEFL performance between the groups, $F(1,15)=30.78$, $p<.05$, and in the length of residence in an English speaking country, $F(1,31)=13.68$, $p<.05$.

Table 1

Descriptive statistics for participants

	Higher group (n = 22)		Lower group (n = 11)	
	Mean	*SD*	Mean	*SD*
Age	28.59	3.46	26.55	4.27
TOEFL	626.14	18.29	462	55.66
Residence [a]	30.32	17.98	9.27	6.47

[a] In months

Stimuli Materials

Forty pairs of Korean-English translation equivalents were selected. There were 10 pairs of translation equivalents in each experimental condition. All words referred to concrete nouns and were non-cognates, indicating that the translation equivalents did not have clear phonological or orthographic similarities. Seven semantic categories were selected (animal, food, clothing, furniture, vehicle, body part, and objects). For each semantic relatedness condition, the same types of categories were used. The complete set of words in Korean and English is given in Appendix A.

For the semantically related condition, the target words were paired with related words whereas the opposite was done for the semantically unrelated condition. All the words in Korean and English were presented once in the experiment to prevent the effects of repetition. In the forward translation condition, the context words were in the second language, English, and the target words were in the first language, Korean. For example, in the semantically related condition, the target word "원숭이"(to be translated into the English word "monkey") was accompanied by the word "bear". By contrast, in the

backward translation condition, the context words were in the first language, Korean, and the target words were in the second language, English. For example, in the semantically unrelated condition, the target word "turtle" (to be translate into the Korean word "거북이") was accompanied by the word "머리" (the English translation equivalent of "head").

According to De Groot, Dannenburg, and Van Hell (1994), the word frequency of the stimulus words and of the intended translation, and the length of the stimulus words and of the their translations are determinants that affect translation performance. For each translation direction, the target words and the context words were of similar mean language frequency and mean letter length. In particular, the frequency of the words in English between the related and unrelated condition was rigorously controlled to minimize a difference in the familiarity of the L2 words. If relatively unfamiliar words were used for one of the conditions, it would take longer for the participants in that condition to retrieve the L2 words. The mean rank-order of words in Korean was 6.5, with a range from 1 to 100, in a corpus of 1,484,463 words (21 Sejong Project, 2002). In this case, 1 represents the most frequent word, and 100 the least frequent word. The mean rank-order of words in English was 2.6 with a range from 1 to 100, in a corpus of 100 million words (Kilgarriff, 1998). Table 2 shows that the words in English for each semantic relatedness condition fall into similar range in terms of frequency ranking[1] of the words.

Table 2

Number of the L2 Words in the Range of Frequency Rank order

	Context word in forward		Translation word in forward		Target word in backward	
Rank order	Related	Unrelated	Related	Unrelated	Related	Unrelated
1 ~ 2000	4	4	5	6	5	4
2001 ~ 4000	2	2	1	1	3	3
4001 ~ 7000	3	3	2	1	1	2

[1] In this study, instead of mean frequency, mean rank-order of words was used to provide more accurate information. Even though mean frequency is conceptually the same as mean rank-order, it has a possibility of being distorted by a small number of words that have relatively much higher frequency.

The mean length of the words in English was 5.2 letters with a range of 3 to 10 letters. The mean length of the words in Korean was 1.93 letters with a range of 1 to 3 letters. Mean letters and standard deviations in each condition are presented in Table 3. The context and target words were presented in black letters against a white background. The Korean words were presented in boldface type, and The English words were presented in lower-case letters. The width of the words varied from 1 to 8 cm and the height of the words was 1.5 cm.

Table 3

Mean and Standard Deviation of Word Letters

	Forward			Backward	
	Related	Unrelated		Related	Unrelated
Context (L2)	4.9 (1.52)	5.5 (1.71)	Context (L1)	2 (0.67)	1.9 (0.57)
Target (L1)	1.8 (0.63)	2 (0.67)	Target (L2)	5.3 (1.95)	5.1 (2.08)
Translation (L2)	4.6 (1.26)	5 (2.11)	Translation (L1)	1.8 (0.63)	1.9 (0.74)

Procedures

Participants completed the translation tasks individually in a dimly-lit room. In written and oral instructions, they were asked to look at the stimulus words and translate the target words as fast as possible while maintaining accuracy. They were asked to avoid saying “uhm” while they thought of the translation, as this would trigger the voice key. Also, they were asked to remain silent if they did not know the translation of the word. At the beginning of each translation direction condition, instructions and four practice trials were given to familiarize the participants with the experimental procedure and the characteristics of that particular condition.

The experimental session consisted of two blocks of 20 pairs of items, forward and backward translation direction. The order of the blocks was counterbalanced across participants. Within each block, two kinds of item pairs (semantically related and unrelated) were presented with 10 items pairs for each kind. The order of different item pairs within each block was randomized. The SOA (Stimulus-Onset Asynchrony) value

of 400ms was used. This particular interval was used to ensure that the context words could be clearly read, but would still be short enough to ensure effortful and attentional processing.

Each trial involved the following sequence. First, the stimulus word was presented in a position about 4 cm from the left side of the screen center. Next, the target word was added to the display in a position about 4 cm from the right side of the screen center after 400ms. The stimulus word and target word remained until a response was made. If no response was registered within 5000ms after the onset of the target word, the next trial was started. The experiment was programmed using PsyScope software. Presentation of the stimuli and collection of the data were performed using an IBM computer. The participants were seated in front of a 17-inch monitor. Response latency (RT) was measured to the nearest millisecond by means of a voice-key. The entire session was tape recorded so that participants' responses could be transcribed and checked for accuracy.

RESULTS

Reaction latencies (RT) of error responses were excluded from the analyses. A response was regarded as an error when it was not listed among the translations of the stimulus words in a popular English-to-Korean translation dictionary (Dong-A Dictionary). Trials on which sounds other than the translation response had triggered the voice key were also excluded when calculating the RTs for the stimulus words. In particular, data from one participant at the higher proficiency level were excluded from analysis due to malfunction of the voice key. Mean reaction times for correct responses per participant and per item for each of the four experimental conditions were calculated for the remaining 33 participants (22 higher proficiency, 11 low proficiency). The descriptive statistics of the results are presented in Table 4. The average error rate for the experimental conditions was 9.5%. The lower proficiency level group showed a higher error rate than the higher proficiency level group, F (1,31)=9.08, p<.05.

Table 4

Mean RTs (in ms) and Percentages of Errors in the 4 Conditions

Group		Related Forward	Unrelated Forward	Related Backward	Unrelated Backward
Higher (n = 22)	Mean	1119	1261	1223	1260
	SD	273	309	287	293
	Min	687	903	768	841
	Max	1759	2184	2032	1981
	Error %	2.3	1.4	4.5	3.6
Lower (n = 11)	Mean	1294	1327	1478	1559
	SD	309	338	340	331
	Min	904	970	1008	1127
	Max	1897	2162	2061	1985
	Error %	9.1	7.3	10.1	7.3
Total (n = 33)	Mean	1177	1283	1308	1360
	SD	293	315	324	333
	Min	687	903	768	841
	Max	1897	2184	2061	1985
	Error %	4.5	3.3	7	4.8

Note: k = 10 for each experimental condition

In Figure 1, the higher proficiency level was faster to translate the words than the lower proficiency level in all of the experimental conditions. The difference in translation performance between the two levels was larger for backward translation than forward translation direction. The size of the difference was the largest in the unrelated backward translation condition.

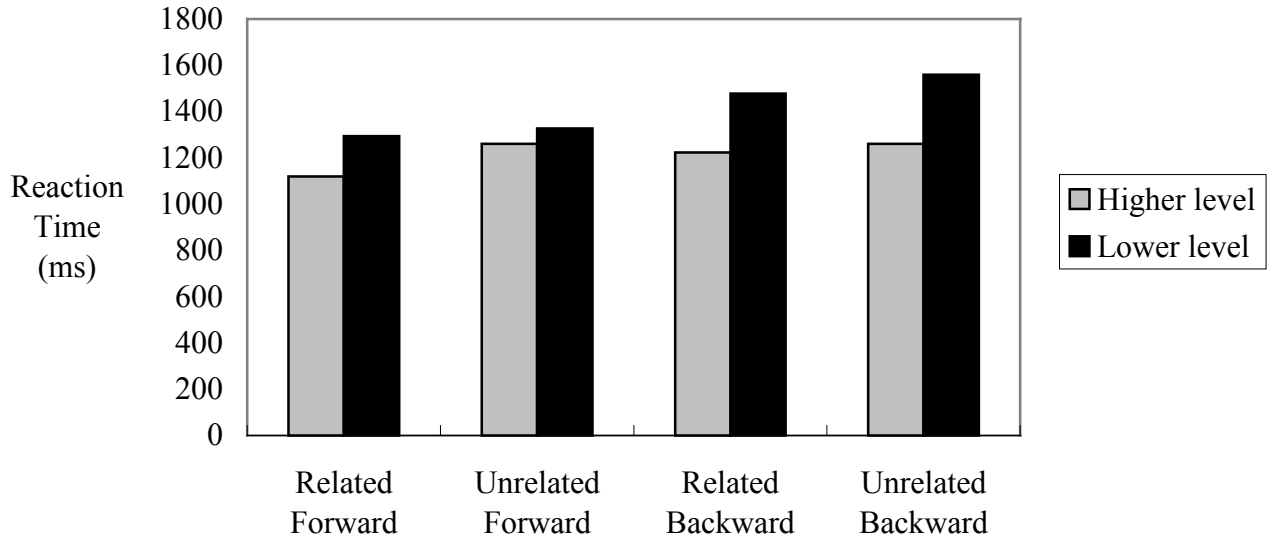

Figure 1. Comparison of Response Latencies in the Experimental Conditions

In addition, semantic relatedness effects for each translation direction are shown in Table 5. The size of the semantic context effects was larger in forward translation for the higher proficiency level, whereas it was larger in backward translation for the lower proficiency level.

Table 5

Semantic Relatedness Effects for Translation Directions

	Higher (n = 22)			Lower (n = 11)		
	Related	Unrelated	Effect [a]	Related	Unrelated	Effect
Forward translation	1119	1260	142	1294	1327	33
Backward translation	1223	1260	37	1478	1559	81

[a] Relatedness effect: RT unrelated – RT related

A repeated-measures analysis was performed on the mean response latencies per participant, with the proficiency level (lower and higher) as a between-participant factor

and translation direction (forward and backward) and semantic relatedness (semantically related and unrelated) as within-participant factors. In Table 5, no statistically significant difference was found between the two levels on the performance. Statistically significant effects were found translation direction (F (1,31)=22.24, p<.05) and semantic relatedness (F (1,31)=6.63, p<.05). However, the interaction between translation direction and semantic relatedness was not statistically significant, F (1,31)=0.29, p>.05. In addition, there was no significant difference for semantic relatedness by proficiency levels, F (1,31)=0.338, p>.05. However, there was a statistically significant effect for translation direction by proficiency levels, F (1,31)=8.05, p<.05.

Table 6

ANOVA results for Semantic Context Effects in Translation Directions across Groups

Source	Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Level	290039	1	290039	3.83	.059	.11
Error (Level)	2346020	31	75678			
Direction	495583	1	495583	22.24	.001*	.42
Direction * Level	179250	1	179250	8.05	.008*	.21
Error (Direction)	690744	31	22282			
Semantic	156974	1	156974	6.63	.015*	.18
Semantic * Level	8015	1	8015	.34	.565	.01
Error (Semantic)	734343	31	23688			
Direction * Semantic	6030	1	6030	.29	.594	.01
Direction * Semantic * Level	42828	1	42828	2.07	.161	.06
Error (Direction*Semantic)	642795	31	20735			

* p < .05

To explore the effects of each semantic relatedness and translation direction by the two levels, the mean RTs (in ms) and error percentages for each condition are shown in Table 7.

Table 7

Effects of Translation Direction and Semantic Relatedness by Proficiency Levels

	Higher			Lower		
	RT ms (*SD*)	Std. Error	% Error	RT ms (*SD)*	Std. Error	% Error
Translation Direction						
Forward (*k* = 20)	1190 (260)	55.43	1.8	1310 (317)	95.57	8.2
Backward (*k* = 20)	1241 (277)	59.11	4.3	1518 (316)	95.30	9.5
Effect [a]	51			208		
Semantic Relatedness						
Related (*k* = 20)	1171 (269)	57.28	3.0	1386 (311)	93.87	10.0[2]
Unrelated (*k* = 20)	1260 (282)	60.07	2.3	1443 (301)	90.82	4.2
Effect [b]	89			57		

[a] Direction effect: RT backward – RT forward
[b] Relatedness effect: RT unrelated – RT related

Separate ANOVAs for each proficiency level were performed. For the higher proficiency level, statistically significant effects were found for semantic relatedness condition (F (1,21)=5.65, p<.05) but not for translation direction (F (1,21)=3.45, p>.05). For the lower proficiency level, statistically significant effects were found for translation direction (F (1,10)=14.39, p<.05) but not for semantic relatedness condition (F (1,10)=4.59, p>.05).

DISCUSSION

The results of the experiment indicated that the higher proficiency group outperformed the lower proficiency group for all of the experimental conditions.

[2] The reason for relatively high error percentages is two stimulus words, "치마" (to be translated into the English word "skirt") and "수박" (to be translated into the English word "watermelon"). Those words

However, there was no statistically significant difference on average between the higher and lower proficiency groups (p = .059). This result is not surprising, given the fact that there was a relatively small number of participants for the lower group, and the higher proficiency group did not perform well in the semantically unrelated condition.

Translation Directions

On the whole, forward translation (L1-L2) was faster than backward translation (L2-L1) for the participants. The average effect of translation direction was larger for the lower proficiency group (208 ms) than the higher proficiency group (51 ms). Seemingly, the findings do not support the first prediction of the RHM that backward translation should be faster than forward translation because forward translation is more conceptually mediated. In addition, the difference between translation performance of the higher and lower proficiency level was greater for backward translation (277ms) than for forward translation (120ms). This finding is inconsistent with the second prediction of the RHM that states that the difference between translation performance of less and more fluent bilinguals should be greater for translation from L1 to L2 than for translation from L2 to L1.

However, according to Groot, Danneburg, and Van Hell (1994), the overall difference between the forward and backward translation directions is no reliable indication of asymmetrical word translation. They stated that "the finding that backward translation takes shorter than forward translation is suggestive, but does not appear to be conclusive because not length per se but the strength of the links constituting a translation route determines response speed (p. 604)." Rather than the effect of translation directions, the differential effect of semantic manipulation in forward and backward translation clearly supports the asymmetry model (Groot, Danneburg, & Van Hell, 1994).

With the two proficiency levels in mind, the higher proficiency group was faster to translate the words than the lower proficiency group in all of the experimental conditions. Also, the size of translation direction effects was larger for the lower proficiency group (208ms) than for the higher proficiency group (51ms). This difference in performance

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turned out to be conceivable cognates, indicating that the translation equivalent in English for the words are likely used by some Koreans. The two words should be excluded for further research.

between the two levels may be accounted for by a developmental hypothesis of the RHM. Kroll and De Groot (1997) claim that differential involvement of lexical and conceptual processes should be observed in the performance of more and less fluent bilinguals because of a developmental shift from lexical to conceptual mappings for L2 words with increasing fluency. The current findings also indicate that L2 proficiency may be a critical factor for patterns of lexical processing.

Semantic Relatedness

According to the results, semantically related words facilitated word translation in comparison with unrelated words, indicating that the context words induced semantic facilitation effects. The observed semantic facilitation is not consistent with findings in prior research that L2 learners are slower to process words presented in semantic clusters (Kroll & Stewart, 1994; La Heij, Hooglander, Kerling, & van der Velden, 1996; Altarriba & Mathis, 1997; Bloem & La Heij, 2003). According to Bloem and La Heij (2003), "the effect of semantic interference is widely accepted within research on language production (p. 469)." However, this effect may depend on the Stimulus-onset asynchrony interval between the presentation of the context word and the presentation of the target word. According to a study by Glaser and Dungelhoff (1984), categorical interference is obtained only within an SOA range of approximately – 200 to + 200 ms. The finding in the current experiment that there were semantic facilitation effects at SOA = – 400 ms is in line with their prediction. Bloem et al. (2004) also observed semantic facilitation effects for context words at SOA= - 400 ms. The study by Bloem and La Heij (2003) also illustrates the influence of the SOA. In their Experiment 2, context words induced semantic interference at SOA= 0 ms whereas context words induced semantic facilitation at SOA= -250 ms. On the basis of this finding, it can be assumed that semantic interference effects did not occur in the current study due to the SOA value. However, it is not clear if the size of the SOA is a determinant of the direction of the semantic context effects yet. Further investigation is necessary to make a definitive decision on the issue.

Regardless of translation direction, the size of semantic context effects was slightly larger for the higher proficiency group (89ms) than the lower proficiency group (57ms). However, they experienced semantic context effects mostly in forward translation

(142ms). This finding can be also explained by the account of the developmental hypothesis that states that fluent L2 learners are able to take more advantage of semantic context in the second language. In this study, the higher proficiency group appeared to take more advantage of the semantic context in the forward translation condition in which the context words appeared in the L2.

Semantic Context Effects in Translation Directions by L2 Proficiency Levels

The most intriguing contrast between the two levels was found in the size of semantic context effects on the directions of translation. Semantic context had a larger effect on forward translation than on backward translation for the higher proficiency group (142ms), while it had a larger effect on backward translation than on forward translation for the lower proficiency group (81ms). The effect of the higher proficiency level is in line with the third prediction of the RHM, that semantic context effects will be larger in forward translation than backward translation. By contrast, the finding for the lower proficiency level is clearly contradictory to the prediction of the model. However, the findings may be explained by another asymmetry, namely that the magnitude of cross-language semantic context depends on the language of context and target (Groot, Danneburg, & Van Hell (1994). When the contexts are presented in L1 and the targets in L2 the cross-language effect is larger than when the language of primes and targets is reversed. The reason may be that L1 contexts are more likely to activate conceptual representations than L2 contexts (Kroll & Stewart, 1990).

In the current study, the size of the semantic context effect was larger in forward translation for the higher proficiency level, whereas it was larger in backward translation for the lower proficiency level. In other words, the context effect from L1 to L2 (backward translation) was larger for the lower proficiency level whereas the context effect from L2 to L1 (forward translation) was larger for the higher proficiency. The less context effect from L2 to L1 indicates that the lower proficiency group had weaker connections between L2 words and concepts than the higher proficiency group had. This interpretation is in line with the developmental hypothesis of the RHM, as the individual becomes more proficient in the second language, direct conceptual links are acquired. Consequently, they become more able to conceptually mediate L2 words. Based on this

assumption, the higher proficiency group of this study should be more able to conceptually mediate L2 words than the lower proficiency group. In other words, the more proficient L2 learners are, the larger semantic context effects they should get in forward translation, which is compatible with the second prediction of the model. It could be argued that this developmental pattern appeared in the two different proficiency groups.

Why is there a difference in Findings?

In terms of the RHM, there are seemingly conflicting findings between the present study and other studies, and even within this study. To some extent, the inconsistency in results could have occurred because the studies differ from each other in the ways in which the theoretical questions have been implemented, even though they are conceptually similar. Regarding the research topic investigated in this study, four possible causes contributing to the difference in results are considered: the conceptual variable, experimental procedure, practice and repetition priming effect, and L2 proficiency level.

First of all, the conceptual variable is different among studies: word concreteness in the study by De Groot (1997), semantic organization of a list in Kroll and Stewart (1994), a variety of variables such as imageability, context availability, definition accuracy, etc. in Groot, Danneburg, and Van Hell (1994), and semantic context in La Heij et al. (1996) and in the current study. Although these are all semantic variables, each may affect different processing loci during translation (Kroll & De Groot, 1997). Consequently, those different conceptual variables resulted in different experimental materials. For instance, the stimuli all belonged to eight semantic categories of concrete examples in the study by Kroll and Stewart (1994) whereas the stimuli were selected to differ on many word characteristics in the study by (Groot, Danneburg, & Van Hell (1994). In addition, types of semantic context such as a word or picture is another conceptual variable to be considered. Bloem and La Heij (2003) observed that context words induced semantic interference whereas context pictures induced semantic facilitation.

Another possible cause for the differences is the experimental procedure. In the study by Kroll and Stewart (1994), the stimuli from the same semantic category were blocked

and presented to the participants while only one context stimulus was presented with s target word in this experiment. Blocking words may somehow affect the likelihood of using the conceptual route the translation response, and so for different translation directions (Groot, Danneburg, & Van Hell, 1994). In the categorized condition of Kroll and Stewart, similar meanings may cause more interference.

Further differences may be due to the practice effect where participants are first familiarized with the stimulus words and the repetition priming effect where the words appear a number of times during the course of the experiment, at the least producing very fast response latencies (Kroll & De Groot, 1997). According to Sholl et al. (1995), a single repetition of a concept prior to translation can reverse the translation asymmetry. In the study by La Heij et al (1996) and Bloem and La Heij (2003), the participants were familiarized with the words to be translated before the experiment, but not for the counterparts in the study by Kroll and Stewart (1994). In this study, the participants were not familiarized with the stimulus words and each word appeared only once in the experiment.

The L2 proficiency level is another determinant that could cause the discrepancy in results. As evidence for the developmental hypothesis displays, there is a developmental change in processing L2 words as there is an increase in fluency in the L2. This developmental pattern was also found in this study. However, most of the studies do not use or provide any criterion to indicate the proficiency level in L2, and it is difficult to compare and interpret the findings. It will be particularly critical in future research to determine the effects of such variables on lexical and conceptual representations.

CONCLUSION

The main purpose of this study was to explore whether semantic contexts and L2 proficiency affected performance on a forward and backward translation task. It was found that both directions of translations were faster with a semantically related context than with a semantically unrelated context. Further, it was revealed that translation performance was affected by L2 proficiency. The higher proficiency level participants were faster in translating the words in Korean and English than the lower proficiency

group. The present study also showed that the higher proficiency group took greater advantage of semantic context effects in forward than in backward translation, while the lower proficiency group displayed the opposite pattern.

This study provides seemingly conflicting findings concerning the assumptions of the RHM. The RHM is not supported by the findings that the participants were faster in forward than backward translation and both directions of translation were conceptually mediated. However, the patterns of results obtained in the higher proficiency level are compatible with the predictions of the RHM, especially with the developmental hypothesis. Moreover, the overall effect of the semantic contexts in the two translations supports another asymmetry, the cross-language semantic context effect. In conclusion, it cannot be argued that the results of the present study are not in line with the RHM. However, it remains to be considered what could have caused the differences in the results of the two studies. One possible reason for the discrepancy in results might be variable differences between the experiment by Kroll and Stewart (1994) and this experiment, in terms of the presentation of semantic context (out-of-context versus with context), the stimulus materials (pictures versus words), and the participants (Dutch-English versus Korean-English).

The results of this study should be interpreted with caution, not only because of the inconsistent findings, but also because of the limitations of the study. First of all, the study was restricted in terms of sampling. Random sampling was not conducted. In fact, most of the participants were students in one particular university since they were recruited by the researcher. The sample size is rather small (n=33), considering the fact that the translation and semantic relatedness are within-participants variables. Moreover, the number of participants was not equivalent for each group (22 for the higher proficiency group and 11 for the lower proficiency group). Consequently, the research findings are not generalizable to the population as a whole. In a future study, it would be interesting to see whether the results would hold with more participants and with other language groups. Moreover, it will be worthwhile to further investigate the issue with different variables such as a picture context and different time courses.

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APPENDIX A
Semantic Categories and Word Frequency Rank-Order of the Stimulus Words

Translation direction	Semantic Relatedness	Category	Target word	Rank-order	Translation	Rank-order	Context word	Rank-order
Forward	Related	Animal	토끼	4567	Rabbit	3358	Deer	5937
		Animal	개	1569	Dog	823	Sheep	2676
		Food	당근	3312	Carrot	6035	Mushroom	6083
		Food	포도	8603	Grape	[3]	Peach	
		Body part	목	1230	Neck	1598	Arm	513
		Clothing	모자	4059	Hat	2219	Bag	1389
		Furniture	책상	1653	Table	442	Lamp	3730
		Vehicle	자전거	1224	Bicycle	5144	Train	1220
		Thing	책	215	Book	252	Pencil	4439
		Thing	반지	6060	Ring	1818	Finger	1119
	Unrelated	Animal	닭	2587	Chicken	3072	Bean	3824
		Animal	호랑이	2150	Tiger	5503	Lips	1483
		Food	달걀	2438	Egg	1544	Umbrella	5671
		Food	딸기	8053	Strawberry		Fish	1017
		Body part	코	1335	Nose	1940	Church	444
		Clothing	신발	2199	Shoe	1935	Cow	3222
		Furniture	의자	2292	Chair	263	Peanut	
		Vehicle	자동차	417	Car	263	Pepper	5127
		Thing	시계	1677	Watch	2498	Flower	1366
		Thing	나무	540	Tree	695	Elephant	4371
Backward	Related	Animal	Cat	1758	고양이	1987	사자 (lion)	9616
		Animal	Horse	808	말	2624	곰 (bear)	4671
		Food	Watermelon		수박	4354	참외(melon)	5288
		Food	Potato	2999	감자	3513	옥수수(corn)	5527
		Body part	Neck	1598	목	1230	발(foot)	564
		Vehicle	Ship	1384	배	462	지하철(subway)	1755
		Clothing	Skirt	2471	치마	2457	바지(pants)	2627
		Thing	Mirror	2370	거울	2109	액자(frame)	13564
		Thing	Window	535	창문	2033	지붕(roof)	2478
		Thing	Socks	5407	양말	5248	장갑(gloves)	12501
	Unrelated	Animal	Frog	5688	개구리	4486	교회(church)	1708
		Animal	Pig	3328	돼지	2893	안경(glasses)	2659
		Food	Apple	2704	사과	3237	인형(doll)	4634
		Food	Onion	4966	양파	2166	성냥(match)	12590
		Body part	Eye	240	눈	107	집(house)	49
		Vehicle	Airplane		비행기	1171	꽃병(vase)	14155
		Furniture	Bed	578	침대	1670	배추(cabbage)	4129
		Thing	Knife	2501	칼	2273	새우(shrimp)	5367
		Thing	Telephone	1258	전화	375	공(ball)	6016
		Thing	Bottle	1624	병	1976	사다리(ladder)	17019

[3] Blanks for the rank-order are the words that are not shown in the corpus.