

L1 influence on the processing of L2 collocation: An experimental study of Korean EFL learners*

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Lee, Shinwoong. 2016. L1 influence on the processing of L2 collocation: An experimental study of Korean EFL learners. *Linguistic Research* 33(Special Edition), 137-163. The current study aimed to investigate the influence of L1 on the processing of L2 collocations utilizing a phrase-acceptability judgement task. The task was conducted on 39 English collocations with 19 native speakers of English and 45 Korean EFL learners. Their error rates and reaction times were measured both on the congruent collocations that have L1 translation equivalents and the incongruent collocations that do not have ones. It was found that the advanced EFL learners responded significantly faster to and made fewer errors on both the congruent and the incongruent collocations than the intermediate EFL learners. Meanwhile, both the advanced and the intermediate EFL learners made significantly more errors and responded slower under incongruent condition, indicating a strong congruency effect. The results implied that there exists a high degree of reliance on L1 intralexical knowledge in processing L2 collocations by the EFL learners, and acquiring incongruent L2 collocations seems still challenging even to the advanced learners. However, it was also suggested that once EFL learners notice incongruent collocations as valid ones and store them in their L2 mental lexicon, they may be able to process incongruent collocations as efficiently as native speakers, directly linking L2 collocation forms to their concepts independently of L1 mediation. (Hanyang University)

Keywords L2 collocation processing, L1 influence, congruency effect

1. Introduction

As a pattern-based model of language was introduced, which assumed that human beings are predisposed to look for pattern and lexical patterning or chunking plays a key role in language processing (Ellis 2003, 2008; Hoey 2005; Schmitt and

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Carter 2004; Sinclair 1991, 2004; Wray 2002), an increasing number of L2 researchers (Nation 2013; Pawley and Syder 1983; Skehan 1998) have voiced the importance of collocation knowledge in L2 acquisition. They have argued that language fluency is largely dependent on how efficiently learners can retrieve the meaning of lexical chunks in their comprehension and use them in their production, and in this sense, collocation knowledge can substantially contribute to language fluency. Such claim prompted many L2 researchers to empirically examine whether collocation knowledge is truly related to general language proficiency (Hsu 2007; Kim 2005; Kim and Cho 2010; Kim and Ma 2011; Lee 2015; Lee and Kim 2008; Shokouhi and Mirsalari 2010), and they mostly found a significantly positive relationship between collocation knowledge and language proficiency in general.

With the importance of collocation knowledge in L2 acquisition being recognized, L2 researchers have tried to identify the sources of difficulty in learning L2 collocations, and a number of studies have revealed that L1 knowledge affects the acquisition of L2 collocation significantly (Chon and Lee 2015; Fan 2009; Kim 2012; Laufer and Waldman 2011; Lee 2015; Nesselhauf 2003; Phoocharoensil 2013; Wolter and Gyllstad 2011; Yamashita and Jiang 2010). For example, a large number of errors rooted from L1 were identified in EFL learners' writings (Hsu 2007; Nesselhauf 2003), and EFL learners' performance on the incongruent collocations (e.g., *pay a visit*) was much poorer than on the congruent collocations (e.g., *raise children*) in the test (Chon and Lee 2015; Kim 2012; Lee 2015).

As such, a relatively large number of studies were conducted on L2 collocation knowledge and the cross-linguistic influence, but there has been a paucity of research that has explored the psycholinguistic reality of L2 collocation processing with a focus on L1 influence. To the author's knowledge, there have been only two studies which centered on L2 collocation processing (i.e., Wolter and Gyllstad 2011; Yamashita and Jiang 2010) in an experimental setting, but neither of which was conducted in Korean EFL context. In this vein, the current study will attempt to explore the L2 collocation processing of Korean EFL learners in relation to L1 influence drawing on a phrase-acceptability judgment task. The findings of the current study would contribute to advancing the understanding of L2 collocation processing and provide valuable pedagogical implications for L2 learners and teachers.

2. Theoretical background and literature review

2.1 Collocation and L2 acquisition

It has been found that multi-word units such as collocations make up a large proportion of spoken and written discourse (Erman and Warren 2000; Foster 2001; Pawley and Syder 1983) and argued that the knowledge of collocation can expedite the process of language comprehension and production (Schmitt and Carter 2004). For example, learners can comprehend texts more efficiently when they utilize chunking in comprehending the meaning of multi-word units, and similarly, they can produce multi-word units with less cognitive resources if they have a large number of pre-fabricated word chunks stored in their long-term memory. In other words, lexical chunks such as collocations can enhance the efficiency of language processing by “freeing up memory and processing resources” (Schmitt and Carter 2004: 12).

Provided that multi-word units plays an important role in language processing, L2 researchers have voiced the significance of the collocation knowledge in L2 acquisition (Ellis 2001; Lewis 2000; Nation 2013; Pawley and Syder 1983). They contended that collocation knowledge can help learners comprehend and produce written or spoken texts more fluently and have native-like word selection (Pawley and Syder 1983), and expand the learners’ vocabulary retention as well (Ellis 2001). In this sense, Nation (2013) claimed that knowing a word should include what words it typically co-occurs with, and such knowledge should be taught explicitly.

As the importance of collocation knowledge in L2 acquisition has been increasingly highlighted, a flurry of empirical studies have been conducted to examine the relationship between L2 collocation knowledge and language proficiency (Chon and Lee 2015; Hsu 2007; Kim 2005; Kim and Cho 2010; Kim and Ma 2011; Lee 2015; Lee and Kim 2008; Shokouhi and Mirsalari 2010). With 203 Korean university students, Kim (2005) investigated the relationship between the participants’ English proficiency measured by TOEIC and their scores on the collocation test. The results indicated that the participants’ general language proficiency was closely related to their collocation knowledge. Along the same line, Kim and Cho (2010) examined the relationship between the collocation knowledge of Korean high school students and their language proficiency measured by a national academic ability test, which mainly assessed their reading and listening proficiency. It was found that the participants’

collocation knowledge was significantly relevant to their language proficiency.

To explore the effect of the collocation-based instruction on language proficiency, Park and Lee (2011) administered the collocation and the writing tests before and after a 7 week-experiment session to 80 high school students. They found that the group given a collocation-based instruction made significant progress in their writings and collocation knowledge. Similarly, with 51 high school students in Korea, Kim and Ma (2011) researched the effect of a collocation-based instruction on the participants' vocabulary learning, and it was revealed that the participants' vocabulary knowledge and their interest in vocabulary learning was significantly enhanced through the collocation-based instruction.

Utilizing a regression analysis, Chon and Lee (2015) probed into the predictors of Korean university students' writing proficiency, and the results showed that the participants' receptive collocation knowledge was the primary predictor of their writing proficiency. In a similar line of research, Lee (2015) investigated the relationship between the participants' productive collocation knowledge and their writing proficiency, and it was revealed that the productive collocation knowledge was the strongest predictor among the three variables: productive collocation knowledge, productive vocabulary size, and grammatical knowledge, and that it can account for the participants' writing proficiency significantly even after controlling for the other two variables.

Analyzing Korean EFL learners' essays, Chon and Shin (2009) attempted to identify the lexical collocations used in the writings, and they found a strong correlation between the number of collocations used in the essays and the raters' perceived writing proficiency. A similar result was found in Hsu's (2007) study of Taiwanese EFL college students, according to the results of which the scores of participants' online writings were positively correlated to the number of lexical collocation used in their writings.

Overall, most of the studies on collocation knowledge and L2 proficiency have confirmed that there is a significantly positive relationship between L2 collocation knowledge and language proficiency. Based on the empirical findings, it has been strongly suggested that teaching collocations should take a more pivotal role in L2 learning and teaching.

2.2 A psycholinguistic model of L2 lexical acquisition

There has been a few attempts to capture L2 lexical representation and development (e.g., Jiang 2000; Kroll, Michael, Tokowicz, and Dufour 2002). They delved into the stages and processes of L2 vocabulary acquisition and tried to identify a role of L1 in L2 lexical processing. Most relevant to the current study, Jiang (2004) proposed a model of adult L2 vocabulary acquisition on the basis of Levelt's speaking model (1989) and the findings of previous studies (Kroll and Stewart 1994; Jiang 2000, 2002). He argued that adults L2 learners, in general, are not exposed to sufficient contextualized L2 input through which they can extract or integrate lexical meanings of L2, and since they already have a well-established conceptual system linked to their L1, they do not usually develop a new conceptual system. Rather, they often make an indirect link between L2 lexical forms and their concepts through the L1 translation equivalents.

According to his model of adult L2 vocabulary development, orthographic or phonological forms are first recognized by L2 adult learners as a word, and then since L2 forms cannot be directly linked to their concepts, they are simultaneously activated with their L1 translation equivalents which have lemma information (i.e., semantic and syntactic information). As this kind of co-activation of L2 forms and L1 lemma continuously occurs, the lemma information of L1 translation equivalents is transferred or copied to L2 mental lexicon. At this stage, the transferred L1 lemma information links L2 words and their concepts directly, and the activation of L1 translation in L2 use decreases accordingly. This whole process results in a hybrid mental lexicon that has the lexeme of L2 words but that has the lemma of their L1 equivalents. He argued that this dual entity often represents the mental lexicon of a large number of adult L2 learners (see Figure 1 below) because L1 lemma mediation becomes fossilized unless they develop a L2-specific lemma through continued exposure to contextualized L2 input.

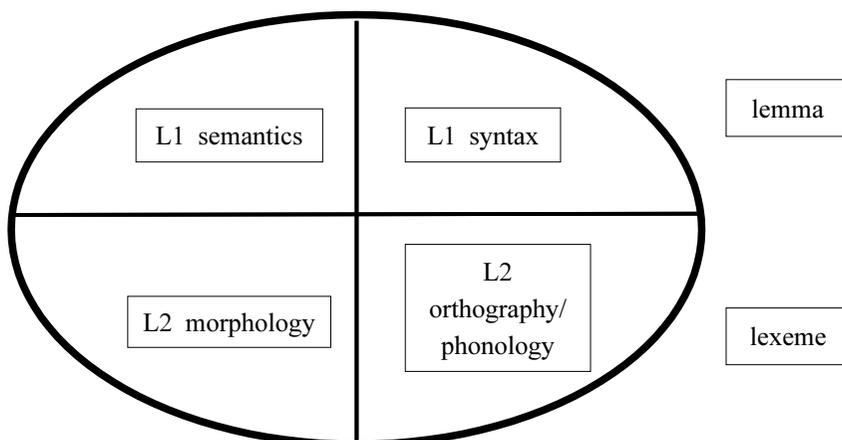


Figure 1. Mental representation of fossilized L2 lexical knowledge
[Adapted from Jiang (2000)]

Although Jiang's model focuses on an individual word, it appears that the model can be applied into the process of L2 collocation acquisition as well. For example, what words a lexical item typically co-occurs with may be part of lemma information, based on which language users decide whether a certain word combinations are semantically or collocationally possible or not. In other words, L1 lemma information about possible word combinations may be copied into L2 mental lexicon and it would influence the use of L2 collocations consequently.

2.3 Cross-linguistic influence on L2 collocation acquisition

L2 researchers have recently begun to investigate the influence of L1 on learning L2 multi-word units such as collocations (Chon and Lee 2015; Fan 2009; Kim 2012; Kim and Yoon 2008; Laufer and Waldman 2011; Lee 2015; Nesselhauf 2003; Phoocharoensil 2013; Sadeghi 2009; Wolter and Gyllstad 2011; Yamashita and Jiang 2010), and overall they have revealed that L1 plays a significant role in acquiring L2 collocations. Nesselhauf (2003) analyzed the German sub-corpus of the International Corpus of Learner English (ICLE) focusing on the learners' use of the verb-noun collocations, and found that a large proportion of the collocation errors in their writings stemmed from their L1. On the basis of the findings, he suggested that there

seemed to be a far greater influence of L1 on the use of L2 collocations than expected, and even advanced learners would often have difficulty in using appropriate L2 collocations especially when the L2 collocations are unpredictable from their L1.

Adopting a similar method, Laufer and Waldman (2011) compiled a learner corpus of Hebrew learners of English at three proficiency levels, which primarily consisted of their argumentative and descriptive writings. Then, they examined the use of the verb-noun collocations in their writings and compared them with those of the native speakers of English. The data indicated that the EFL learners produced far fewer collocations than the native speakers in general, and about half of their collocation errors were due to their L1 and such errors were recurrent in the learners' writings regardless of their English proficiency. Similar results were found in Fan's study (2009), which investigated the use of English collocations in the writings of Hong Kong ESL learners. The results showed that a number of the collocations produced by the learners were greatly affected by L1 Chinese. They often utilized a translation strategy, which was a word-for-word translation from Chinese into English, ending up producing a number of unacceptable collocations in English. These deviant collocations were claimed to be the result of cross-linguistic influence. In a same line of research, Phoocharoensil (2013) argued Thai EFL university students seemed largely dependent on L1 transfer in producing English collocations.

Meanwhile, Sadeghi (2009) examined the use of English collocations of 76 Iranian learners of English, and found a strong affect of their L1 on their performance on the collocation test. Especially, beginning learners of English were found to produce more L1 related errors than the advanced learners. He argued that the EFL learners are most likely to experience great obstacles when the collocation knowledge of L1 transfers to the use of L2 collocations.

There have been a few studies exploring the influence of L1 on L2 collocation use in Korean EFL context (Chon and Lee 2015; Lee 2015; Kim 2012; Kim and Yoon 2008). Drawing on collocation tests, they mostly compared the error rates of the two different types of collocations, the congruent and the incongruent collocations, and found that it is more challenging and difficult for Korean EFL learners to understand and produce the incongruent collocations than the congruent ones.

With 85 Korean university students, Kim and Yoon (2008) researched the comprehension and production of English verb-noun collocations. They administered

a production and comprehension test of English collocations to the students and found that Korean EFL learners had insufficient collocation knowledge of English in general and producing collocations appeared to be more difficult than comprehending collocations for them. Additionally, they found more errors of the students on the incongruent collocations than on the congruent ones.

Along the same lines, Kim (2012) studied the English collocation knowledge of 111 Korean high school students. The collocation tests included both congruent and incongruent collocations to examine congruency effect, and it was found that although the existence of synonyms in the choices for the congruent collocations caused confusion to some extent, the error rate of the incongruent collocations was significantly higher than that of the congruent collocations. In the studies of Korean University students, Chon and Lee (2015) and Lee (2015) also found that incongruency was the major source of difficulty in learning English collocations for Korean EFL learners.

Particularly relevant to the current study, Wolter and Gyllstad (2011) examined the influence of L1 intralexical knowledge on the acquisition L2 collocations utilizing priming experiments. A primed lexical decision task was administered to a group of Swedish learners of English and a group of native speakers of English as a control. Their reaction time was measured on the three conditions: L2-only condition in which collocations are unpredictable from L1, L1-L2 condition in which collocations are predictable from L1, and the unrelated items for baseline data. It was found that there was a significant mean difference between the native and non-native speakers in their reaction time under L2-only condition, implying that L1 may have considerable influence on the acquisition of L2 collocations.

Similarly, Yamashita and Jiang (2010) investigated the influence of L1 on the acquisition of L2 collocation with Japanese ESL and EFL learners and native speakers of English as a baseline. They conducted a phrase-acceptability judgement task on English collocations and found that the ESL learners made fewer errors on and showed faster reaction time to the collocations than the EFL learners in general, but they still made more errors on the incongruent collocations than the congruent ones. The results suggested that L1 congruency and L2 exposure can affect the acquisition of L2 collocations significantly.

To sum, there has been a relatively large number of studies that examined the influence of L1 on L2 collocation acquisition, but the research tools used have often

been limited to the error analysis of the learners' writings or the questionnaire about L2 collocation knowledge. Only a few studies capitalized on a phrase-acceptability judgment task in an experimental setting in investigating the psycholinguistic reality of L2 collocation processing and the role of L1 knowledge. In addition, as aforementioned, none of those studies have been conducted in Korean EFL context. Thus, the current study attempted to fill such research gap and provide implications for teaching and learning L2 collocations through the findings of the study. The following research questions guided the current study.

- 1) Are there significant differences in error rate on the collocations among the three groups (intermediate EFL learners, advanced EFL learners, and native speakers of English)?
- 2) Is there a significant difference between the error rate of the congruent collocations and the incongruent collocations?
- 3) Are there significant differences in reaction time to the collocations among the three groups?
- 4) Is there a significant difference between the reaction time to the congruent collocations and the incongruent collocations?

3. Methods

3.1 Participants

The participants of the current study included 21 native speakers of English and 45 Korean EFL learners. The native speakers were the instructors at a university in Seoul, Korea, teaching English presentation and composition courses. The EFL learners were the voluntary students from the diverse departments at the university. Only those learners who had not lived in the English-speaking countries for more than six months and who had received the formal English Education from elementary to high school in Korea were recruited, and then they were divided into two groups according to their TOEIC scores. Following ETS guideline, which delineates the ranges of the scores and their corresponding communicative level in English, 21 learners who had the score above 905 were grouped as advanced learners,

who were supposedly able to communicate effectively in any situation. Meanwhile, 24 learners who received the score between 700 and 800 were grouped as intermediate learners, and according to ETS guideline, they are normally able to satisfy most social demands and limited work requirements. The advanced learners' TOEIC scores ranged from 920 to 970, and their average score was 948, whereas the average TOEIC score of the intermediate learners was 765, ranging from 735 to 780. Most of the participants were in their early twenties, ranging from 20 to 24 (average: 22.6) and male and female students made up 40 (18 students) and 60 (27 students) percent of the participants respectively.

3.2 Item development

The collocation test items consisted of 19 congruent collocations (e.g., *break the record, high position*), 19 incongruent collocations (e.g., *kick the habit, heavy rain*), and 40 semantically implausible word combinations (e.g., *diligent window, eat a mountain*). The congruent and incongruent collocations were selected using the following procedures. First, about 100 verb-noun and adjective-noun collocations were chosen from the previous studies on collocations (Chon and Lee 2015; Jung, Park, and Kim 2010; Jung, Sur, and Kim 2007; Kim 2012) and from such reference books as *Macmillan Collocations Dictionary for Learners of English*, *Oxford Collocations Dictionary for Students of English*, *Teaching Collocation* (Lewis 2000) and *English Collocation in Use* (McCarthy and O'Dell 2005). Then, each word that comprises the collocations in the list was given to five native speakers of Korean with high English proficiency, and they were asked to translate them into Korean. Subsequently, the collocations were translated into Korean on the basis of the translation of each word, and then they were presented to another group of five native speakers of Koreans who were in the master program of Korean Language and Literature. They were asked to judge whether the translations were possible expressions in Korean. If four or five of them considered a translation plausible in Korean, it was labelled as a congruent collocation, meanwhile if four or five of them thought of a translation inviable, it was categorized as an incongruent collocation. The translations of the collocations were cross-checked using *Sejoing 21*, one of the comprehensive Korean corpora and *Naver*, one of the largest Korean portal websites. This whole process was geared toward checking whether there existed a L1

translation equivalent to each L2 collocation, and if there existed L1 translation equivalents, they were grouped as congruent collocations, whereas they were dubbed as incongruent collocations when there were no L1 translation equivalents.

The length and the frequency of the collocations were also matched as closely as possible to minimize their influence on error rate and reaction time. In the computation of the frequency of the collocations, Corpus of Contemporary American English (COCA), one of the most comprehensive English corpora that are available online, was used. In searching for the collocations, no lexical item was allowed between the two words of adjective-noun collocations whereas one word was allowed between the two words of verb-noun collocations to accommodate the possibility of the insertion of an article. The average frequency per million of the congruent and incongruent collocations was 0.95 and 1.01 respectively. The length of the collocation was also measured by calculating the number of letters and syllables of each collocation. The average number of letters was 11.11 for the congruent collocations and 10.89 for the incongruent collocations, and the average number of syllables was 3.32 for the congruent ones and 3.42 for the incongruent ones. T-tests were also conducted for each measure and no significant difference was found between the congruent collocations and the incongruent collocations. Most of the individual words of the collocations were within the most frequent 2,000 words in the New General Service List (Browne, Culligan, and Philips 2013) and it was to minimize the influence of an individual lexical item of the collocations on the processing of L2 collocations. Meanwhile, forty semantically implausible word combinations served as fillers (e.g., *delicious calender*) and their data were not analyzed since they were irrelevant to the research purpose of the current study.

3.3 Procedures and analysis

The experiment was conducted in the researcher's office room individually. The test items were presented one at a time on the computer screen and the participants were instructed to decide whether an English expression on the screen was acceptable or not. They were asked to respond as quickly as possible by clicking one of the two keys 'a' and 'd' which represented 'yes' and 'no' respectively. Prior to the experiment, they were given an instruction about how the experiment would proceed and had a practice session with 30 practice items. The experiment began

with a short introduction, followed by a fixation point (i.e., an asterisk) that was shown for 500 milliseconds (ms) in the middle of the computer screen, and by a test item to which the participants were supposed to respond. The fixation point was presented between each collocation item for 500 ms to the end of the experiment. In the experiment, 38 test items and 40 fillers in total were presented randomly, and each participant's reaction time was recorded automatically.

Shortly after the experiment, every EFL participant was interviewed for ten minutes. They were given a list of collocations presented in the experiment and asked whether they knew the meaning of each word of the collocations. It was revealed that all of the individual words of the L2 collocations were known to the EFL learners in the current study. This was to ensure that the knowledge of individual words did not influence the L2 collocation processing. Moreover, they were also asked if they truly knew the meanings of the collocations to which they hit 'yes.' It was because there could be some cases that the participants just wrongly hit 'yes' or hit 'yes' because they believed that they knew the meaning of the collocations when their perceived meanings of the collocations were actually incorrect. There were six such cases and those six cases were excluded in the analysis.

The experiment was programmed by 'Psychopy,' a program that is primarily used for priming experiments and thus enables one to measure the participants' reaction time to lexical items automatically. Additionally, an average error rate for each item of each group was obtained using Microsoft Excel. In the computation of reaction time, all of the incorrect answers were excluded in the analysis and any response time that was two standard deviation away from each person's mean score was not included following Yamashita and Jiang's (2010) suggestion.

As for the analysis, drawing on a split-plot design, a 2 x 3 repeated analysis of variance (ANOVA) was performed and the influence of the two factors on error rate and reaction time was examined separately. In the analysis, English proficiency (native speakers of English, advanced EFL learners, and intermediate EFL learners) was used as a between-subject factor and collocation type (congruent vs. incongruent) as a within-subject factor. Subsequently, one-way ANOVAs were performed as a post-hoc procedure for the between-subject variable and paired t-tests for the within-subject variable to locate significant mean differences.

4. Results

4.1 Error rates

Table 1 below summarizes the means and the standard deviations of the error rates by the native speakers, the advanced EFL learners, and the intermediate EFL learners. The native speakers showed the lowest error rate on both the congruent (.87%) and the incongruent (.43%) collocations, followed by the advanced EFL learners (3.95% and 24.43% respectively), and finally by the intermediate EFL learners who showed the highest error rate on both types of collocations (9.77% and 40.60% respectively). The intermediate EFL learners made much more errors on the incongruent collocations in general compared to the other two groups. The difference between the error rates of the congruent and the incongruent collocations was the smallest with the native speakers, whereas it was the largest with the intermediate EFL learners, followed by the advanced EFL learners (see Figure 2).

Table 1. Error rate (%) on congruent and incongruent collocations by three groups

	Native Speakers		Advanced EFL Learners		Intermediate EFL Learners	
	Mean	SD	Mean	SD	Mean	SD
Congruent	.87	1.51	3.95	2.43	9.77	7.70
Incongruent	.43	2.04	24.43	4.29	40.60	15.40

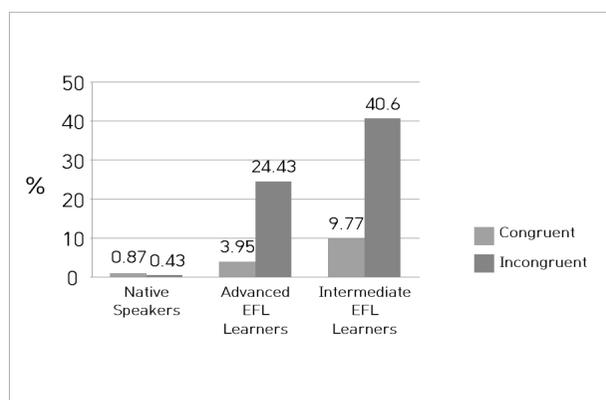


Figure 2. Mean error rates (%) on two types of collocations

In order to examine the effect of English proficiency and the type of collocation (i.e. congruent vs. incongruent collocations) on error rate, a 2 x 3 repeated ANOVA was conducted. As detailed in Table 2, there was a significant main effect of English proficiency, $F(2,63) = 49.58(\eta^2=.81)$, $p<.05$ and collocation type (congruent vs. incongruent), $F(1,63) = 124.85(\eta^2=.84)$, $p<.05$ on error rate. The significant interaction effect between the two factors (i.e., English proficiency and collocation types) was also identified, $F(2,63) = 40.82(\eta^2=.77)$, $p<.05$, implying that the effect of proficiency on error rate was conditional upon the collocation type or the effect of congruency on error rate was contingent upon the level of proficiency. Since the main effect of the proficiency involved more than two levels, a follow-up post hoc procedure (Tukey's HSD) was performed to evaluate pairwise differences among the three groups and it was found that the means of error rates were all significantly different from each other ($p<.05$).

Table 2. A 2 x 3 repeated ANOVA on error rate

	SS	df	MS	F	Sig.
Between-Subject Factor					
Group	5547.85	2	2773.92	49.58	.000*
Error	3524.82	63	55.94		
Within-Subject Factor					
Congruency	3685.74	1	3685.74	124.85	.000*
Congruency x Group	2410.24	2	1205.12	40.82	.000*
Error	1859.89	63	29.52		

* $p<.05$

For a finer analysis of the effect of proficiency, a one way ANOVA was conducted within each type of collocation (see Table 3), followed by post-hoc procedures (Tukey's HSD). Under incongruent condition, the mean differences between the groups were all significantly different from each other (see Table 5), but under congruent condition, the difference in error rate between the native speakers and the advanced EFL learners was not significant (see Table 4). The result suggested that the proficiency effect on error rate was more conspicuous under incongruent condition than congruent one. The results echoed the findings of Wolter

and Gyllstad's (2011) studies, which showed that the gap of collocation knowledge between the native speakers and EFL learners was much larger under incongruent condition than congruent one.

Overall, the native speakers were significantly more accurate than the EFL learners, but the results indicated that L2 collocation knowledge of advanced learners of English approximated that of native speakers to some extent when there existed L1 translations equivalents. Meanwhile, the L2 collocation knowledge of intermediate EFL learners seemed still distant from that of the native speakers even with the congruent collocations. The findings implied that EFL learners may not simply transfer L1 intralexical knowledge when they learn L2 collocations even if there exist identical expressions in L1.

Table 3. A one-way ANOVA on error rate in each type of collocation

	SS	df	MS	F	Sig.
Congruent Collocations					
Group	350.19	2	175.01	9.58	.001*
Error	1150.64	63	18.26		
Incongruent Collocations					
Group	7607.95	2	3803.97	56.21	.000*
Error	4263.50	63	67.67		

*p<.05

Table 4. Multiple comparisons on error rate (Congruent collocations)

Dependent Variable	Group		Sig.
Error Rate	Native Speakers (NS)	AL	.28
		IL	.001*
	Advanced EFL Learners (AL)	NS	.28
		IL	.04*
	Intermediate EFL Learners (IL)	NS	.001*
		AL	.04*

*p<.05

Table 5. Multiple comparisons on error rate (Incongruent collocations)

Dependent Variable	Group		Sig.
Error Rate	Native Speakers (NS)	AL	.000*
		IL	.000*
	Advanced EFL Learners (AL)	NS	.000*
		IL	.002*
	Intermediate EFL Learners (IL)	NS	.000*
		AL	.002*

*p<.05

In an attempt to identify the congruency effect within group, the paired t-tests on error rate were conducted between the congruent and incongruent collocations in each group. As expected, there was no significant effect of congruency on error rate with the native speakers, whereas the congruency effect was significant with both the advanced and the intermediate EFL learners (see Table 6). The results also revealed that the congruency effect on error rate became stronger as the proficiency level decreased.

Table 6. Paired t-tests on error rate between congruent and incongruent collocations

	t	Sig.
Native Speakers	-.561	.586
Advanced EFL Learners	6.09	.001*
Intermediate EFL Learners	9.69	.000*

*p<.05

4.2 Reaction time

Table 7 below displays the means and the standard deviations of the reaction time by the native speakers, the advanced EFL learners, and the intermediate EFL learners. The native speakers showed the fastest reaction time both on the congruent and the incongruent collocations (987 and 1011 milliseconds respectively) followed by the advanced EFL learners (1170 and 1300) and the intermediate EFL learners (1824 and 2327). Similar to the results on error rate, the discrepancy between the

reaction time of the congruent and incongruent collocations was the smallest with the native speakers, whereas it was the largest with the intermediate EFL learners, followed by the advanced EFL learners (see Figure 3).

Table 7. Reaction time (in milliseconds) to congruent and incongruent collocations by three groups

	NativeSpeakers		Advanced EFL Learners		Intermediate EFL Learners	
	Mean	SD	Mean	SD	Mean	SD
Congruent	987	234	1170	242	1824	452
Incongruent	1011	236	1300	252	2327	472

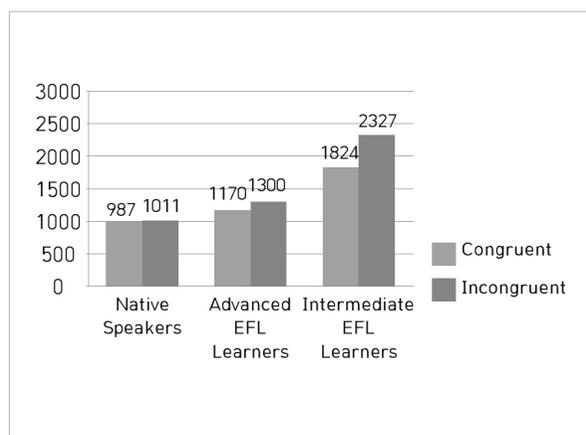


Figure 3. Mean reaction time (in milliseconds) to two types of collocations

To investigate the effect of English proficiency and the type of collocation (i.e., congruent vs. incongruent collocations) on reaction time, a 2 x 3 repeated ANOVA was conducted and the result is shown in Table 8 below. In accordance with the results on error rate, there was a significant main effect of English proficiency, $F(2,63) = 18.48(\eta_p^2=.61)$, $p < .05$ and collocation type (congruent vs. incongruent), $F(1,63) = 19.18(\eta_p^2=.44)$, $p < .05$ on reaction time. A significant interaction effect between the two factors was also found, $F(2,63) = 6.06(\eta_p^2=.34)$, $p < .05$, implying that the effect of proficiency on reaction time was contingent upon the collocation types. Subsequently, a follow-up post hoc procedure (Tukey's HSD) was also

performed for multiple comparisons between the groups. It was found that the mean difference in reaction time between the native speakers and the intermediate EFL learners and the advanced EFL learners and the intermediate EFL learners were statistically significant ($p < .05$), but it was not significant between the native speakers and the advanced EFL learners ($p = .08$).

Table 8. A 2 x 3 repeated ANOVA on reaction time

	SS	df	MS	F	Sig.
Between-Subject Factor					
Group	9.98	2	5.00	18.48	.000*
Error	17.05	63	.27		
Within-Subject Factor					
Congruency	.75	1	.75	19.18	.000*
Congruency x Group	.47	2	.24	6.06	.000*
Error	2.43	63	.04		

* $p < .05$

In order to locate a significant mean difference in reaction time in each condition (i.e., congruent vs. incongruent condition), a one-way ANOVA was conducted within group (see Table 9), followed by post-hoc procedures (Tukey's HSD). As in the case of error rate, under congruent condition, the mean difference between the native speakers and the advanced EFL learners was not significant, but the mean differences were all significant in the rest of the pairwise comparisons (see Table 10). Under incongruent condition, unlike the results on error rate, the difference in reaction time between the native speaker and the advanced EFL learners was not significant (see Table 11). It seemed that the proficiency effect on reaction time was not evident between the native speakers and the advanced EFL learners in both conditions. The results suggested that even though the advanced EFL learners made more errors on incongruent collocations, presumably showing that L1 influence was still persistent in their acquiring L2 collocations, they appeared to be able to processing the incongruent collocations as fast as the native speakers once they recognized those collocations as valid ones. The result is compatible with that of Yamashita and Jiang's (2010) study, according to the result of which the L1 influence disappeared on reaction time more quickly than on error rate, implying that

it usually takes a longer time to acquire incongruent collocations than congruent ones, but once acquired, the reliance on the L1 lemma information in recognizing L2 collocations seems to disappear quickly.

Table 9. A one-way ANOVA on reaction time in each type of collocation

	SS	df	MS	F	Sig.
<u>Congruent Collocations</u>					
Group	3.05	2	1.53	15.30	.001*
Error	6.13	63	.10		
<u>Incongruent Collocations</u>					
Group	7.40	2	3.70	18.50	.000*
Error	12.71	63	0.20		

*p<.05

Table 10. Multiple comparisons on reaction time (Congruent collocations)

Dependent Variable	Group	Sig.	
Reaction Time	Native Speakers (NS)	AL	.09
		IL	.000*
	Advanced EFL Learners (AL)	NS	.09
		IL	.003*
	Intermediate EFL Learners (IL)	NS	.000*
		AL	.003*

*p<.05

Table 11. Multiple comparisons on reaction time (Incongruent collocations)

Dependent Variable	Group	Sig.	
Reaction Time	Native Speakers (NS)	AL	.07
		IL	.000*
	Advanced EFL Learners (AL)	NS	.07
		IL	.002*
	Intermediate EFL Learners (IL)	NS	.000*
		AL	.002*

*p<.05

To identify the congruency effect on reaction time within group, paired t-tests were conducted in each group. Similar to the results on error rate, there was no significant effect of congruency on the error rate with the native speakers whereas a significant congruency effect was found with both the advanced and the intermediate EFL learners. The effect was particularly apparent with the intermediate EFL learners (see Table 12). Similar to the case of error rate, the results showed that the congruency effect on reaction time became stronger as the proficiency decreased, implying that the congruency effect was conditional upon the participants' proficiency level.

Table 12. Paired t-tests on reaction time between congruent and incongruent collocations

	t	sig.
Native Speakers	0.43	.695
Advanced EFL Learners	2.5	.04*
Intermediate EFL Learners	5.18	.003*

*p<.05

5. Discussion and pedagogical implications

To summarize the findings of the current study, the advanced EFL learners made significantly fewer errors on and responded faster to both the congruent and the incongruent collocations than the intermediate EFL learners, but still made significantly more errors on the incongruent collocations than the native speakers. In addition, a strong congruency effect on the EFL learners' reaction time and error rate was identified. Their error rate on the incongruent collocations was significantly higher than on the congruent collocations and their reaction time was also significantly slower under incongruent condition than under congruent one. The results implied that there existed a high degree of reliance on L1 intralexical knowledge in processing L2 collocations, which supposedly lead to slower reaction time to and higher error rate on the incongruent collocations by the EFL learners. It appears that L1 mediation in L2 collocation processing is persistently long-lasting and acquiring incongruent L2 collocations seems still challenging even to the advanced EFL learners.

The findings of the current study are in line with the results of some previous

studies (Jiang 2000, 2002, 2004; Wolter and Gyllstad 2011; Yamashita and Jiang 2010) that revealed a strong influence of L1 on L2 lexical processing, and appeared to endorse Jiang's (2004) L2 vocabulary development model. According to his model, L1 equivalents (translation) of L2 words play a significant role in accessing the meaning for L2 words. Particularly relevant to L2 collocation acquisition, it could be postulated that the intralexical knowledge of L1 (i.e., a particular word sequence is semantically or collocationally possible or not in L1) may be transferred or copied to L2 mental lexicon, which would possibly influence the comprehension and production of L2 collocations ultimately. This would more likely to happen when EFL learners' L2 collocation knowledge is insufficient and weak. For example, if the Korean EFL learners who do not know "heavy rain" is a possible word combination in English, they would perceive "heavy rain" to be implausible as they would rely on the intralexical knowledge of L1 translation equivalent, according to which it is not a viable word sequence in Korean.

Meanwhile, the difference in reaction time between the native speakers and the advanced EFL learners was not significant both under congruent and incongruent condition. Although the advanced EFL learners' error rate was still significantly higher than that of the native speakers under incongruent condition, the result suggested that once EFL learners perceive L2 incongruent collocations as valid ones and store them in their L2 mental lexicon, they may be able to process them as efficiently as the native speakers, directly linking L2 collocation forms to their corresponding concepts, independently of L1 mediation.

It should be also noted that the intermediate EFL learners made significantly more errors and their reaction time was evidently slower than the native speakers even under congruent condition. Provided that EFL learners heavily rely on L1 in accessing the meaning of L2 collocations, EFL learners are expected to readily accept the congruent L2 collocations and process them as fast as the native speakers. However the result does not seem to support this view. Rather, it implies that L1 mediation may not always occur in processing the congruent L2 collocations. As Yamashita and Jiang (2010) suggested, even if a L2 collocation has an exact translation equivalent in L1, L1 transfer may not occur because the EFL learners' perceived distance between L2 collocations and their L1 translation equivalents may differ individually. For example, some of the EFL learners in the current study may have doubted that L2 collocations and their L1 translation equivalents truly

coincided, and thus did not utilize their L1 intralexical knowledge in processing the L2 collocations. According to Kellerman (1977, 1979), when there exists great similarity between the L1 and the L2, the L2 learners may doubt that the similarities are real. In this sense, even if the L2 collocations have their L1 translation equivalents, and thus their meanings can be effectively transferable from L1, it may be a necessary step to notice them as valid L2 collocations through contextualized input or an explicit instruction.

On the basis of the findings of the current study, a few pedagogical implications could be drawn for EFL learners and L2 professionals. As Jiang (2004) implied, acquiring incongruent L2 collocations by directly linking L2 collocation forms to appropriate concepts may require extensive encounters in natural settings due to the initial heavy reliance on L1 translation equivalents in their meanings. Besides, the amount of input that most EFL learners receive is often not sufficient enough to make such incongruent collocations salient. Thus, given limited access and exposure to L2 input, a deliberate instruction on such collocations might be more effective for EFL learners. The first step of such effort would be to identify different lexical patternings in two languages involved and contrast them, developing a list of incongruent L2 collocations. In this vein, Laufer and Girsai (2008) and Lee (2015) suggested that in coping with incongruent L2 collocations, it is necessary to adopt a cross-linguistic approach in which L2 collocations and their L1 translation equivalents are explicitly contrasted. In so doing, EFL learners' awareness of incongruent L2 collocations can be raised and they become more salient to the learners, enhancing the chances of learning them. Although rote learning has been somewhat downplayed since it is often reminiscent of the outdated teaching methods, it seems indispensable that incongruent L2 collocations should be taught and learnt deliberately. Furthermore, in order to firmly establish the link between L2 collocations and their appropriate concepts directly, independently of L1 influence, they should be repeatedly encountered through contextualized input (e.g., extensive reading) or interaction.

Last but not least, L2 teachers need to help students fully understand the importance of collocation knowledge in relation to their L2 proficiency and additionally, L2 learners themselves should be cognizant that a large proportion of errors on collocations are rooted from their L1. Such awareness about collocation knowledge seems essential in that it can influence EFL learners' vocabulary learning strategies in general (Lee 2015). They would shift their focus from a single lexical item to a

multi-word unit and pay more attention to the collocations that are unpredictable from their L1, all of which would contribute to enhancing their English proficiency.

6. Conclusion

The findings of the current study showed that there exists a long-lasting L1 influence on the acquisition of L2 collocations, and it is not easy to integrate the knowledge of incongruent L2 collocations into their developing L2 mental lexicon. In this sense, incongruent L2 collocations deserve immediate attention at the early stage of L2 learning. The value of the current study is the fact that it explored the psycholinguistic reality of L2 collocation processing focusing on cross-linguistic influence, which was hard to capture otherwise. However, there exist some limitations that should be noted. First, a familiarity test on the test items should have been administered to another group of Korean EFL learners to check whether the two different types of collocations (i.e., congruent vs. incongruent collocations) have a similar degree of familiarity. The frequency of the collocations obtained from COCA may not represent the degree of exposure or familiarity to Korean EFL learners. It is because some collocations may receive more attention than others from Korean EFL learners with the influence of their cultural, linguistic, and pedagogical environments in which they are situated. For example, some of the collocations used in the current study might be often encountered in the textbooks that most Korean EFL learners use, and thus they may become more salient to them. Also of note is that a relatively small number and limited lexical types of the collocations were used in the current study (19 items each and two type of lexical collocations). A more comprehensive perspective on collocation knowledge would have been gained with a larger number of and different types of collocations.

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Appendix I. Test items

	Congruent Collocations	Incongruent Collocations
	tell lies	bend a rule
	write a song	kick the habit
	drink wine	do damage
	pass the exam	drop hints
	ride a bike	exercise power
	finish homework	draw a conclusion
	lose patience	deliver a speech
	grow a beard	pay a visit
	make lunch	raise objections
	share data	run a risk
	organize a team	kill time
	pay a salary	serve a purpose
	raise a flag	strike a deal
	break the record	throw a party
	final outcomes	tough luck
	heavy stone	slim chance
	high position	heavy rain
	little knowledge	narrow escape
	quick comment	strong coffee
Average frequency per million	0.95	1.01
Average number of syllables	3.32	3.42
Average number of letters	11.11	10.89

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