

## L2 morphological processing of Korean nominal marker *-ka*: evidence from masked and cross-modal priming with advanced Chinese learners\*

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Ahn, Hee-Don, Yongjoon Cho, Jong-Bai Hwang, Moongee Jeon, Kisub Jeong and Jieun Kim. 2014. L2 morphological processing of Korean nominal marker *-ka*: evidence from masked and cross-modal priming with advanced Chinese learners. *Linguistic Research* 31(2), 305-323. This paper reports results from masked and cross-modal priming experiments which investigate L1 and L2 processing of Korean nominal marker *-ka* in native speakers of Korean and advanced Chinese L2 learners of Korean. In both the masked and cross-modal priming experiments, partial priming effects were found for L1, and full priming effects for L2. The results indicate that L1 speakers of Korean make less use of morphological decomposition on the processing of the nominal marker *-ka* than Chinese L2 learners of Korean. The results that there was no difference between masked and cross-modal priming either in L1 or in L2 also indicate that the observed L1/L2 difference cannot be confined to either level of processing, at the early stages of form-level access or at the central level of lexical entries. (Konkuk University)

**Keywords** L1 & L2 morphological processing, Korean nominal marker *-ka*, masked priming, cross-modal priming

### 1. Introduction

The issue of how morphologically complex words are represented in the mental lexicon has produced a considerable body of behavioral, brain imaging, and electrophysiological studies concerning morphological processing by native speakers.

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\* We would like to thank anonymous reviewers for useful comments. This paper was supported by Konkuk University in 2013.  
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Generally, two alternative approaches have been suggested to explain the mental representation of morphologically complex words. The Decomposition model (Pinker & Ullman 2002) insists that the processing of a morphologically complex word involves decomposing the word into its stem and its affix, which is slow but spares storage space in long-term memory. On the other hand, the Full-listing model (McClelland & Patterson 2002) proposes that the morphologically complex word is recognized as an unanalyzed whole, in other words, a single indecomposable word, which is faster but requires more storage space. Despite many controversial studies such as dual-mechanism vs. single-mechanism (Clahsen 1999; Pinker 1999; Pinker & Ullman 2002), Marslen-Wilson (2007) reviewed neurocognitive and psycholinguistic studies of native language comprehension and concluded that the decomposition of morphologically complex words is one of the highest priorities of the system (cited in Neubauer & Clahsen 2009: 404).

Recently, the processing and representation of morphologically complex words in a nonnative language has drawn many researchers' attention and many research studies regarding L1/L2 differences in language processing have been produced (Clahsen & Felser 2006a, 2006b; Neubauer & Clahsen 2009; Silva & Clahsen 2008). There have also been two ways to account for L1/L2 differences in processing morphologically complex words. Some researchers have argued that, although L2 processing is slower and less automatized than L1 processing, L1 and L2 processing share the same system (Hernandez, Li, & MacWhinney 2005; Indefrey 2006; McDonald 2006; Perani & Abutalebi 2005; Weber & Cutler 2003). They insisted that L1/L2 differences are due to the influence of native language or to slower and more memory-demanding processing.

In contrast, other researchers have maintained that L2 processing is fundamentally different from L1 processing (Clahsen & Felser 2006a, 2006b; Silva & Clahsen 2008; Ullman 2001, 2004, 2005; Ullman, Babcock, & Brovett 2008). For example, the 'shallow-structure hypothesis' by Clahsen and Felser (2006a) proposed that L2 learners do not make use of abstract syntactic structure during online processing and that they rely more on lexico-semantic information, associative patterns, and other surface cues for interpretation (Neubauer & Clahsen 2009: 405). In a similar vein, Ullman (2004, 2005) applied to the declarative/procedural model to the processing of morphology in L1 and L2. He argued that maturational changes occur during childhood and adolescence and L2 processing is largely dependent upon

the lexical memory system, which makes reliance on the procedural system occur to a much lesser extent than L1 processing. As a result, L2 learners mainly rely on full-form storage, while decomposition or morphological parsing is underused or absent in L2 processing of morphologically complex words.

This study investigates the processing of morphologically complex words in L1 and L2 processing through comparing the processing of Korean nominal subject marker *-ka* in groups of Korean L1 speakers and Chinese advanced adult L2 learners of Korean. Recently, several research studies have addressed the issue of morphological processing in Korean. However, few studies have attempted to compare L1 and L2 processing of morphologically complex words in Korean. Korean is an agglutinative language which includes many different types of nominal and verbal suffixes, while Chinese is an isolating language which is characterized by very limited use of inflectional suffixes. We have chosen Chinese learners of Korean to minimize the possible transfer of their L1 morphological system since Chinese morphology is known to be very meager. Thus, the present study is expected to shed light on the issue of L2 morphological processing of Korean words through a typologically different group of language such as Chinese.

In addition to the issue of L1 and L2 difference in morphological processing, the present study seeks to investigate L1 and L2 morphological processing at different levels of representation by employing two different experimental techniques: masked priming and cross-modal priming. In masked priming experiments, a visual prime word is briefly presented (with a SOA of 30ms in this study) between a forward mask and a target word and priming effects are said to be found for both semantically transparent and opaque prime-target pairs. In cross-modal priming, on the other hand, the priming word is given auditorily and the target word is given visually, and only semantically transparent pairs but not semantically opaque pairs produced robust priming effects (Neubauer & Clahsen 2009). Previous psycholinguistic research has suggested a distinction in models of the mental lexicon between access representations, which are modality specific and encode form-level information, and central lexical entries, which are modality independent and incorporate more abstract information (Marslen-Wilson, Tyler, Waksler, & Older 1994; Marslen-Wilson 2007; Neubauer & Clahsen 2009). It is usually believed that masked priming taps access-level representations and cross-modal priming taps central-level ones. Thus, the present study is designed to reveal in which

representation L2 morphological processing is similar to or different from L1 morphological processing.

The research questions to be answered in the present study are summarized as follows:

- a. Is Chinese learners' L2 processing of Korean nominal marker *-ka* different from L1 processing by Korean native speakers?
- b. Are morphologically complex words in L1 and L2 processed at the same or different levels of representations?

## 2. L1 Experiments

### 2.1 Participants

A total of 60 native speakers of Korean participated in the L1 experiments of the study. They were all recruited from among the graduate and undergraduate students of a university located in Seoul and were paid for their participation. All the participants had normal or corrected-to-normal vision and no participants had any hearing problems.

Each of the masked priming experiment and the cross-modal experiment was performed with 30 participants (20 males and 10 females for the masked priming, and 18 males and 12 females for the cross-modal priming). The mean age of the participants for the masked priming experiment was 24.5, and it was 23.4 for the cross-modal priming experiment.

### 2.2 Materials

The test materials used for the masked priming experiment and the cross-modal priming experiment were identical. The materials included three different conditions depending upon the types of prime-target pairs: (1) Identical condition, in which the primes and the targets are identical, (2) Test condition, in which a noun plus nominative case marker are presented as a prime, and (3) Unrelated condition, in which the primes and the targets are not related at all.<sup>1</sup> An example of a prime-target pair in each of the three conditions is presented in Table 1.<sup>2</sup>

Table 1. Priming conditions of the study

Condition	Prime - Target	
Identical	<i>kicha</i> - <i>kicha</i>	<i>kicha</i> 'train'
Test	<i>kichaka</i> - <i>kicha</i>	<i>kichaka</i> 'train-NOM'
Unrelated	<i>sakwa</i> - <i>kicha</i>	<i>sakwa</i> 'apple'

A total of 48 experimental prime-target pairs were used for the three conditions; sixteen for each condition. In addition, a total of 152 filler prime-target pairs, some of which were non-words, were added for all the three conditions. The targets in each condition were disyllabic with all the targets identical in length and only the primes of the Test condition were trisyllabic. All the target words used in the three conditions were chosen among high frequency words based on a Korean corpus.<sup>3</sup> The order in which the test items and fillers were presented was randomized for each participant.

### 2.3 Procedure

The participants for the present study were given a lexical decision task, in which they were asked to respond as quickly and accurately as possible whether the word presented on the computer screen is a word or a non-word by pressing a "YES" button or a "NO" button on the keyboard. Detailed description of the procedures of two priming experiments (masked and cross-modal) is given in the following subsections:

<sup>1</sup> According to Silva and Clahsen (2008), the RT differences between the three conditions are used as a measure of priming. 'Full priming' occurs when there is no RT differences between Identical condition and Test condition, and the RTs are significantly shorter in Identical condition and Test condition than in Unrelated condition. On the other hand, 'partial priming' occurs when the RTs for Test condition are longer than for Identical condition but shorter than for Unrelated condition. 'No priming' is obtained when the RTs for Test condition and Unrelated condition do not significantly differ from each other.

<sup>2</sup> We have also controlled phonological/orthographic effects and semantic effects that might arise from the test items. For reasons of space, we have not reported here the experimental results of phonological conditions and semantic conditions which didn't display any significant results for our purposes. See Ahn et al. (2011) for experimental results and related discussion.

<sup>3</sup> The target words all have high frequency of more than 1,000 according to the Yonsei Corpora (2011).

### 2.3.1 Masked Priming Experiment

The participants were seated in front of a computer and were given instructions for the experiment. They were told to focus on the '####' sign in the center of the computer screen. After the focus point disappeared, they were told that a word would appear in its place. If they thought the word is a correct word in Korean, they were told to press a button on the keyboard for 'yes'. If they thought the word was not an existing word in Korean, they were told to press another button on the keyboard for 'no'.

After 500 ms, the focus point disappeared and the prime word appeared on the screen for 30 ms. After 80 ms, the target word appeared on the screen for 500 ms. It was the target word that they were asked to make a lexical decision on. The target word disappeared after 500 ms or as soon as a response button was pressed. Response times were measured from the onset of target display. To prevent the chance of purely orthographic priming the target word and prime word were presented in different fonts.

Prior to the actual experiment, the participants were guided through 20 practice items and were given an opportunity to ask questions if they were unsure about the instructions or procedure of the experiment. Both the participants' answers to the lexical decision task and the time it took for them to respond were recorded by E-prime software. The entire experiment took about twenty minutes.

### 2.3.2 Cross-modal Priming Experiment

The procedure for the cross-modal priming experiment was almost identical with the masked priming experiment, except that the primes, recorded on a digital tape recorder by a female native speaker of Korean, were auditorily presented to the participants. The participants were seated in front of a computer and were given instructions for the experiment. They were told to focus on the '+' sign in the center of the computer screen. After the focus point disappeared, they were told that a word would appear in its place. If they thought the word is a correct word in Korean, they were told to press a button on the keyboard for 'yes'. If they thought the word was not an existing word in Korean, they were told to press another button on the keyboard for 'no'.

After 450 ms, the focus point disappeared and the auditory prime was given through the participant's headphone. After 50 ms, the target word appeared on the screen for 500 ms. The target word disappeared after 500 ms or as soon as a response button was pressed. Response times were measured from the onset of target display.

Prior to the actual experiment, the participants were guided through 20 practice items and were given an opportunity to ask questions if they were unsure about the instructions or procedure of the experiment. Practice items were the words that were completely unrelated to the main experiments to control repetition effects. Both the participants' answers to the lexical decision task and the time it took for them to respond were recorded by E-prime software. The total duration of the experiment was about thirty minutes.

## 2.4 Data Analysis

Two types of analyses were conducted for the statistical analyses of the present study. One is the subjects analysis ( $F_1$ ), in which means were obtained for each subject and submitted to a repeated measures of ANOVA, and the other was the items analysis, called  $F_2$ , in which means were obtained for each item and also submitted to a repeated measures of ANOVA. In the subjects analysis, there were one between- and one within-subject variables. The between-subject variable was used to counterbalance the variable sequences in which the three levels of conditions (i.e., the types of prime-target pairs) might occur.<sup>4</sup> The within-subject variable was the type of prime-target pairs (i.e., three levels of condition, Identical, Test, and Unrelated), and the dependent variable was the RT for the lexical decision task. In the items analysis, the type of prime-target pairs was used as the within-subject variable for the repeated measures ANOVA, and the frequency of each item was submitted as a covariate of the analysis in order to control the probable effects of frequency differences among the items. The RTs for each item by each participant were examined for outliers, and those deviated from more than two standard deviation from the mean RT of each condition were excluded from the analysis. The statistical analysis for this study was tested at the significance level of .05.

<sup>4</sup> The present study adopted a Latin Square design in order to control the probable effects of the sequence of the three conditions in the prime-target pairs.

## 2.5 Results

### 2.5.1 Masked Priming Experiment

The mean RTs and SDs for the three experimental conditions in the masked priming experiment are presented in Table 2. As mentioned before, the RTs for each item was examined for outliers, and 3.28% of them were excluded from the analysis. Incorrect responses (i.e., the participants' erroneous word/non-word decisions) were also excluded from the calculation of RTs, which accounted for 1.26% of all the participants' responses. Table 2 shows that the RTs in the Identical condition is shorter than those in the Test condition, which is shorter than those in the Unrelated condition.

Table 2. Mean RTs and SDs by condition in L1 masked priming experiment

Condition	Mean (ms)	SD
Identical	462.78	53.41
Test	487.79	56.15
Unrelated	511.84	53.83

The repeated measures ANOVA showed that there was a significant difference in the RTs for the three conditions ( $F_1(2, 60) = 33.705, p = .000$ ;  $F_2(2, 58) = 21.923, p = .000$ ), and pair-wise post-hoc comparisons (Tukey HSD) showed that statistically significant differences were found for both subjects and items between every condition ( $p = .000$  between Identical and Test;  $p = .000$  between Test and Unrelated;  $p = .000$  between Identical and Unrelated). The results that the RTs for the Test condition is significantly longer than for the Identical condition and shorter than for the Unrelated condition indicate that there occurred a partial priming in Korean native speakers' processing of the Korean nominal marker *-ka*.<sup>5</sup>

<sup>5</sup> Recall that 'full priming' occurs when there is no RT differences between Identical condition and Test condition, and the RTs are significantly shorter in Identical condition and Test condition than in Unrelated condition. On the other hand, 'partial priming' occurs when the RTs for Test condition are longer than for Identical condition but shorter than for Unrelated condition.



### 2.5.2 Cross-Modal Priming Experiment

Table 3 presents the mean RTs and SDs for the three experimental conditions in the cross-modal priming experiment. As outliers, 5.81% of the participants' responses were excluded from the analysis, and incorrect responses, 2.48% of all the responses, were excluded from the analysis, too. The results shown in Table 3 are similar to those of the masked priming experiment and the Identical condition and the Unrelated condition show the shortest and the longest RTs, respectively, and the RT for the Test condition was in-between and very close to the Identical condition.

Table 3. Mean RTs and SDs by condition for L1 cross-modal priming experiment

Condition	Mean (ms)	SD
Identical	451.55	54.81
Test	465.02	46.77
Unrelated	535.42	45.38

The repeated measures ANOVA showed that there was a significant difference in the RTs for the three conditions ( $F_1(2, 56) = 72.274, p = .000$ ;  $F_2(2, 58) = 95.209, p = .000$ ). Subsequent pair-wise comparisons (Tukey HSD) of the RT differences between conditions showed that statistically significant differences were found between every condition for items ( $F_2$ ) ( $p = .045$  between Identical and Test;  $p = .000$  between Test and Unrelated;  $p = .000$  between Identical and Unrelated), but for subjects ( $F_1$ ) analysis, there was no significant difference between Identical and Test ( $p = .059$ ), but significant differences between Test and Unrelated ( $p = .000$  and between Identical and Unrelated ( $p = .000$ ). These results signify a full priming effect in the subjects analysis and a partial priming effect in the items analysis.

## 3. L2 Experiments

### 3.1 Participants

A total of 54 Chinese learners of Korean participated in the L2 experiments of the study. They were learning Korean at a language institute of a Korean university

located in Seoul, Korea. They were taking Korean Level 5 and 6 classes, which are regarded as advanced levels.<sup>6</sup> They were all paid for their participation. All the participants had normal or corrected-to-normal vision and no participants had any hearing problems.

Of 54 Chinese participants, 24 participated the masked priming experiment (8 males and 16 females) and 30 in the cross-modal experiment (8 males and 22 females). The mean age of the participants for the masked priming experiment was 24.8, and it was 24.4 for the cross-modal priming experiment. All the Chinese learners of Korean had first been exposed to Korean after they came to Korea. The average length of stay in Korea was 27.3 months for the participants of the masked priming experiment and 32.8 months for the participants of the cross-modal priming experiments.

### 3.2 Materials

The test materials used for L2 masked and cross-modal priming experiments were identical with those for L1 processing experiments. A total of 48 experimental prime-target pairs under three different conditions (i.e., Identical, Test, and Unrelated), and 152 filler prime-target pairs (words and non-words) were added for all the three priming conditions.

### 3.3 Procedure

The procedure for the L2 processing experiments were also identical with the L1 processing experiments, whether masked or cross-modal. The participants performed a lexical decision task, in which they were asked to respond as quickly and accurately as possible whether the word presented on the computer screen is a word or a non-word by pressing a "YES" button or a "NO" button on the keyboard.

### 3.4 Data Analysis

The two analyses,  $F_1$  and  $F_2$ , were also conducted for the statistical analyses of the

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<sup>6</sup> All the participants had passed Level Four of the TOPIK (Test of Proficiency in Korean).

L2 experiments of the study. The different sequence of the three conditions was used as one between-subject variable, and the types of prime-target pairs were one within-subject variables in the  $F_1$  analysis. The types of prime-target pairs (i.e., the three levels of conditions) were the repeated factor and the frequency of each item was submitted as a covariate to the  $F_2$  analysis.

### 3.5 Results

#### 3.5.1 Masked Priming Experiments

The mean RTs and SDs for each condition in the masked priming experiment are shown in Table 4. The RTs for each item was examined for outliers, and 3.03% of them were excluded from the analysis. Incorrect responses, which were about 6.94% of all the participants' responses, were also excluded from the analysis. Table 4 shows that the Identical condition and the Unrelated condition show the shortest and the longest RTs, respectively, and the RT for the Test condition was in-between.

Table 4. Mean RTs and SDs by condition for L2 masked priming experiment

Condition	Mean (ms)	SD
Identical	731.78	80.00
Test	761.11	69.32
Unrelated	810.07	97.41

The repeated measures ANOVA showed that there was a significant difference in the RTs for the three conditions ( $F_1(2, 42) = 11.336, p = .000$ ;  $F_2(2, 58) = 10.094, p = .000$ ), and subsequent pair-wise comparisons (Tukey HSD) showed that statistically significant differences were found for both subjects and items between Test and Unrelated ( $p = .003$  for subjects /  $p = .001$  for items) and between Identical and Unrelated ( $p = .000$  for subjects /  $p = .001$  for items), but not between Identical and Test ( $p = .097$  for subjects /  $p = .307$  for items). These results indicate that there occurred a full priming effect in the Chinese speakers' L2 morphological processing of Korean nominal marker *-ka*.

### 3.5.2 Cross-Modal Priming Experiments

The mean RTs and SDs for the three experimental conditions in the cross-modal priming experiment are presented in Table 5. The RTs for each item was examined for outliers, and 3.13% of them were excluded from the analysis. Incorrect responses, which were 8.30% of all the participants' responses, were also excluded from the analysis. The table shows similar results with the masked priming experiment. The Identical condition and the Unrelated condition show the shortest and the longest RTs, respectively, and the RT for the Test condition was very close to the Identical condition.

Table 5. Mean RTs and SDs by condition for L2 cross-modal priming experiment

Condition	Mean (ms)	SD
Identical	653.58	130.76
Test	651.62	110.36
Unrelated	793.66	99.49

The repeated measures ANOVA for the cross-modal priming experiment showed the same statistical findings with those of the masked priming experiment. A significant difference was found in the RTs for the three conditions ( $F_1(2, 50) = 59.367$ ,  $p = .000$ ;  $F_2(2, 58) = 81.571$ ,  $p = .000$ ), and subsequent pair-wise comparisons (Tukey HSD) revealed statistically significant differences for both subjects and items between Test and Unrelated ( $p = .000$ ) and between Identical and Unrelated ( $p = .000$ ), but not between Identical and Test ( $p = .908$  for subjects /  $p = .665$  for items). These results also indicate a full priming effect in the Chinese speakers' L2 morphological processing of Korean nominal marker *-ka*.

## 4. General Discussion

The results from all the experiments of the present study (i.e., masked and cross-modal experiments in L1 and L2 processing each) will be discussed together in this section. The results of the experiments are summarized in Table 6, which reveals a difference between L1 and L2 experiments. In other words, the L1 processing of

morphologically complex words with nominal marker *-ka* in Korean showed partial priming in the masked priming experiment and full priming for subjects analysis and partial priming for items analysis in the cross-modal priming experiment, while Chinese participants' L2 processing showed full priming in both types of priming experiments.

Table 6. Summary of L1 and L2 experimental findings

		Significant difference bet.	Priming results
L1	Masked	<ul style="list-style-type: none"> <li>▪ Identical &amp; Unrelated (<math>F_1</math> &amp; <math>F_2</math>)</li> <li>▪ Identical &amp; Test (<math>F_1</math> &amp; <math>F_2</math>)</li> <li>▪ Test &amp; Unrelated (<math>F_1</math> &amp; <math>F_2</math>)</li> </ul>	Partial priming
	Cross-modal	<ul style="list-style-type: none"> <li>▪ Identical &amp; Unrelated (<math>F_1</math> &amp; <math>F_2</math>)</li> <li>▪ Identical &amp; Test (<math>F_2</math>)</li> <li>▪ Test &amp; Unrelated (<math>F_1</math> &amp; <math>F_2</math>)</li> </ul>	Full priming (for $F_1$ ) Partial priming (for $F_2$ )
L2	Masked	<ul style="list-style-type: none"> <li>▪ Identical &amp; Unrelated (<math>F_1</math> &amp; <math>F_2</math>)</li> <li>▪ Test &amp; Unrelated (<math>F_1</math> &amp; <math>F_2</math>)</li> </ul>	Full priming
	Cross-modal	<ul style="list-style-type: none"> <li>▪ Identical &amp; Unrelated (<math>F_1</math> &amp; <math>F_2</math>)</li> <li>▪ Test &amp; Unrelated (<math>F_1</math> &amp; <math>F_2</math>)</li> </ul>	Full priming

Table 6 clearly provides an answer to the first research question of the present study. Chinese L2 learners showed more sensitiveness to morphological structure than Korean L1 speakers. In both the masked priming and the cross-modal priming experiments, a partial priming effect was attested in L1 experiments, while a full priming effect was found in L2 experiments. The results indicate that L1 speakers of Korean make less use of morphological decomposition on the processing of the nominal marker *-ka* than adult Chinese L2 learners of Korean. It is usually assumed that full priming is indicative of morphological decomposition. Therefore, the lack of full priming in L1 processing suggests that it relies less on morphological decomposition than L2 processing (see relevant discussion in Ahn et al. 2011).

More reliance on morphological decomposition by L2 learners in this study is unexpected and rather surprising. Many previous research studies concerning morphological processing in L1 have provided abundant evidence that morphological decomposition plays an important role in native speakers' processing of

morphologically complex words, and that L2 processing is different from L1 processing and nonnative learners are less sensitive to morphological structure, relying more on lexical storage than on morphological decomposition (Clahsen, Felser, Neubauer, Sato, & Silva 2010; Neubauer & Clahsen 2009). However, a recent study on processing nominal suffixes in Korean (Ahn, et al. 2011) might provide an explanation for the incongruence of priming effects between L1 and L2 processing of the present study. Ahn, et al. (2011) investigated the processing of two types of morphological affixes on Korean nouns (morpho-syntactic case markers including *-ka* and the plural marker *-tul*) through a series of priming experiments, and reported different results for the morphological processing for the two types of affixes. Korean nouns with the plural suffix only are decomposed into the stem and affix, but no priming effects were found for the morpho-syntactic case markers. As regards the differences between the two types of affixes, the researchers argued that while plural markers in Korean are truly morphological affixes, case markers in Korean are morpho-syntactic, presupposing the existence of other syntactic elements such as the matrix verb.

The argument that the nominal case marker *-ka* is not purely morphological but rather morpho-syntactic may provide an explanation for relying more on syntactic structure than on morphological decomposition by L1 speakers of this study. However, such an account is not appropriate for the full priming effect for the same case marker by adult L2 learners, since the lack of priming effects due to the more morpho-syntactic nature of the case marker *-ka* was never found in the morphological processing of the same marker by L2 learners of Korean. Based on the argument of Ahn, et al. (2011), the results of this study indicate that the Korean case marker *-ka* is processed as a purely morphological marker by Chinese L2 learners of Korean, not presupposing the existence of any other syntactic element. In other words, the morpho-syntactic nature of the case marker *-ka* was not recognized by the Chinese learners of Korean and the case marker was decomposed as a single noun plus a case marker, resulting in full priming effects.

This study also addressed the levels of representation (i.e., access representations or central lexical entries) in native and nonnative morphological processing, and it compared between masked priming and cross-modal priming. As mentioned before, the masked priming is believed to tap an early stage of lexical processing in which formal access representations are activated and the cross-modal priming is concerned

with semantic properties in the central lexicon. Several previous studies have addressed this distinction in native or nonnative morphological processing (Basnight-Brown et al., 2007; Clahsen, Felser, Neubauer, Sato, & Silva 2010; Neubauer & Clahsen 2009; Silva & Clahsen 2008), but few of them have directly compared masked priming with cross-modal priming in L1 or L2 morphological processing.<sup>7</sup> Therefore, this study, which compares between masked priming and cross-modal priming in both native and nonnative language processing, was expected to contribute to clearly reveal the processing of morphologically complex words in L1 and L2 on the two levels of representations.

The results of the study showed difference between masked priming and cross-modal priming in L1 processing, but no difference in L2. In the L1 experiments, partial priming effects were found in the masked priming experiment, but full priming effects were found for subjects analysis and partial priming effects were found for items analysis in the cross-modal priming experiment. In the L2 experiments, however, full priming effects were found in both the masked and the cross-modal priming experiments (for both subjects and items analyses). In other words, the difference in priming between L1 and L2 was found in either representation level (i.e., at the early stages of form-level access or at the central level of lexical entries). These results may indicate that the morphological structure of Korean nominal marker *-ka* is not fully represented at an early stage of form-level access and it is slightly better represented at the central level of lexical entries in L1 morphological processing. However, the morphological structure of the Korean nominal marker is fully represented both at an early stage of lexical processing and at the central level of lexical entries in L2 learners' morphological processing. According to these results, therefore, morphologically complex words seem to be processed at different levels of representations in L1 and L2. However, this possibility seems to still remain speculative, since the present study examined the morphological processing of only one case marker in Korean. More future research studies are needed to explore this possibility. Regarding the differences between the two types of priming experiments, this study showed no difference in L2

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<sup>7</sup> Basnight-Brown et al. (2007), for example, observed that L2 learners showed similar amounts of facilitation for inflected primes as L1 speakers in cross-modal priming, while Silva and Clahsen (2008) and Neubauer and Clahsen (2009) observed no facilitation for regularly inflected prime words in masked priming by the various L2 groups.

morphological processing. The type of priming experiments affected L1 morphological processing only. This issue should also be addressed in future studies which compare between masked priming and cross-modal priming.

## 5. Conclusion

This study investigated and compared the morphological processing of a Korean nominal marker *-ka* by native speakers of Korean and Chinese L2 learners of Korean. It also addressed the issue of levels of representation by employing both masked priming and cross-modal priming techniques. The findings of the study showed, for L1, partial priming effects in the masked priming experiments and full priming effects for subjects analyses and partial priming effects for items analyses in the cross-modal priming experiments. However, the present results revealed full priming effects for L2 in the two types of priming experiments. From these results, it is concluded that L2 processing of Korean case marker *-ka* is slightly different from L1 processing of the same marker and L2 learners of Korean are more sensitive to morphological structure than native speakers and are not dependent on the lexical memory system. As mentioned before, this is rather contradictory to the findings of previous research studies, which have showed that L2 learners are less sensitive to morphological structure than native speakers, and this study tried to explain the unexpected results by the morpho-syntactic nature of the Korean nominal marker *-ka*. However, the evidence from this study and its explanation are not enough to conclude about similarity or difference between L1 and L2 morphological processing, since this study examined just one of the many inflectional endings, or morphological case markers. Therefore, future research on native and nonnative morphological processing of many different case markers or inflectional endings in Korean or other languages are required. Furthermore, since the participants of the present study were all advanced level learners of Korean, future studies, examining the different proficiency levels, including beginning and intermediate level learners, seem to be very useful for understanding whole picture of L2 morphological processing.

In addition, the results of the present study regarding the similarity or difference



between masked priming and cross-modal priming in L1 and L2 morphological processing raise the necessity of performing more extensive research on the facilitation of more inflectional endings at different levels of representations. The slight difference presented in the present study may show that masked priming and cross-modal priming are different from each other in their relationships with the different stages or levels of representations. Thus, through future extensive studies concerning more types of morphologically complex words in L1 and L2, the role of masked priming or cross-modal priming in L1 or L2 processing needs to be explored.

## References

- Ahn, Hee-Don, Duk-Ho An, Jung-Yun Choi, Jong-Bai Hwang, Moongee Jeon, and Ji Hyon Kim. 2011. Processing Nominal Suffixes in Korean: Evidence from Priming Experiments. *Language and Information* 15(1): 1-12.
- Basnigh-Brown, Dana, Lang Chen, Shu Hua, Aleksandar Kostic, and Laurie Feldman. 2007. Monolingual and Bilingual Recognition of Regular and Irregular English Verbs: Sensitivity to Form Similarity Varies with First Language Experience. *Journal of Memory and Language* 57: 65-80.
- Clahsen, Harald and Claudia Felser. 2006a. Grammatical Processing in Language Learners. *Applied Psycholinguistics* 27: 3-42.
- Clahsen, Harald and Claudia Felser. 2006b. How Native-like is Nonnative Language Processing. *Trends in Cognitive Science* 10: 564-570.
- Clahsen, Harald, Claudia Felser, Kathleen Neubauer, Mikako Sato, and Renita Silva. 2010. Morphological Structure in Native and Nonnative Language Processing. *Language Learning* 60: 21-43.
- Hernandez, Arturo, Ping Li, and Brian MacWhinney. 2005. The Emergence of Competing Modules in Bilingualism. *Trends in Cognitive Sciences* 9: 220-225.
- Indefrey, Peter. 2006. A Meta-analysis of Hemodynamic Studies on First and Second Language Processing: Which Suggested Differences Can We Trust and What Do They Mean? *Language Learning* 56: 279-304.
- Marslen-Wilson, William. 2007. Morphological Processes in Language Comprehension. In George Gaskell (ed.), *The Oxford Handbook of Psycholinguistics*: 175-193. Oxford: Oxford University Press.
- Marslen-Wilson, William, Lorraine K. Tyler, Rachelle Waksler, and Lianne Older. 1994. Morphology and Meaning in the English Mental Lexicon. *Psychological Review* 101:

3-33.

- McClelland, James L. and Karalyn Patterson. 2002. Rules or Connections in Past-tense Inflections: What Does the Evidence Rule Out? *Trends in Cognitive Sciences* 6: 465-472.
- McDonald, John. 2006. Beyond the Critical Period: Processing-based Explanations for Poor Grammaticality Judgment Performance by Late Second Language Learners. *Journal of Memory and Language* 55: 381-401.
- Neubauer, Kathleen and Harald Clahsen. 2009. Decomposition of Inflected Words in a Second Language: An Experimental Study of German Participles. *Studies in Second Language Acquisition* 31(3): 403-435.
- Perani, Daniela and Jubin Abutalebi. 2005. The Neural Basis of First and Second Language Processing. *Current Opinion in Neurobiology* 15: 202-206.
- Pinker, Steven. 1999. *Words and Rules*. New York: Basic Books.
- Pinker, Steven and Michael T. Ullman. 2002. The Past and Future of the Past Tense. *Trends in Cognitive Sciences* 6: 456-463.
- Silva, Renita and Harald Clahsen. 2008. Morphologically Complex Words in L1 and L2 Processing: Evidence from Masked Priming Experiments in English. *Bilingualism: Language and Cognition* 11: 245-260.
- Ullman, Michael T. 2001. The Neural Basis of Lexicon and Grammar in First and Second Language: The Declarative/Procedural Model. *Bilingualism: Language and Cognition* 4: 105-122.
- Ullman, Michael T. 2004. Contributions of Memory Circuits to Language: The Declarative/Procedural Model. *Cognition* 92: 231-270.
- Ullman, Michael T. 2005. A Cognitive Neuroscience Perspective on Second Language Acquisition: The Declarative/Procedural Model. In Cristina Sanz (ed.), *Mind and Context in Adult Second Language Acquisition: Methods, Theory and Practice*: 141-178. Washington, DC: Georgetown University Press.
- Ullman, Michale T., Laura Babcock, John C. Stowe, and Claudia Brovetto. 2008. *Frequency Effects, Age of Arrival and Amount of Exposure in Second Language Learning: A Study of English Past-tense Production*. Unpublished manuscript, Georgetown University, Washington, DC.
- Weber, Andrea and Anne Cutler. 2003. Lexical Competition in Non-native Spoken Word Recognition. *Journal of Memory and Language* 50: 1-25.

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Received: 2014. 06. 27

Revised: 2014. 08. 27

Accepted: 2014. 08. 27