Linguistic Research 42(2): 337-363
DOI: 10.17250/khisli.42.2.202506.004

Individual differences in morphological processing: The role of morphemic knowledge in Sino-Korean suffixed word recognition*

Jinwon Kang[a] · Seong-Hak Jo[b] · Joo-Hee Ahn[b] · Jung-Hye Choi[c] · Sun-Young Lee[d***]**
(Gwangju Institute of Science and Technology[a] · Korea University[b] · Cyber University of Korea[c] · Cyber Hankuk University of Foreign Studies[d])

Kang, Jinwon, Seong-Hak Jo, Joo-Hee Ahn, Jung-Hye Choi, and Sun-Young Lee. 2025. Individual differences in morphological processing: The role of morphemic knowledge in Sino-Korean suffixed word recognition. *Linguistic Research* 42(2): 337-363. This study examined how morphemic knowledge influences visual recognition of Sino-Korean suffixed words. Sixty-three Korean young adults completed a masked priming lexical decision task including morphological, semantic, and orthographic priming conditions. Overall results revealed significant priming effects across all conditions, with the morphological priming effect much larger than semantic and orthographic effects. More importantly, semantic and orthographic priming effects diminished or disappeared as morphemic knowledge increased, while morphological priming remained larger and stable. A further group comparison revealed a significant difference in semantic priming only; a significantly larger effect in low-knowledge group. These findings suggest that lexical processing mainly depends on morphological decomposition focusing on the morphological cues, shifting away from semantic or orthographic cues with an increase in morphemic knowledge in individuals. **(Gwangju Institute of Science and Technology · Korea University · Cyber University of Korea · Cyber Hankuk University of Foreign Studies)**

Keywords Korean lexical processing, visual word recognition, individual differences, morphological priming effect, morphemic knowledge

* This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2019S1A5A2A01046700).
** First Author
*** Corresponding author

1. Introduction

One of the key issues in psycholinguistics concerns understanding the process of morphologically complex words in visual word recognition. A great number of studies have found supporting evidence for the morphological decomposition hypothesis, which suggests that morphologically complex words are decomposed into separate morphemic units during early stages of processing (e.g., processing -> process + -ing). According to this view, morphemes are basic units of representation in the mental lexicon, so that morphological decomposition of a word into morphemes such as roots, prefixes, and suffixes is a default mechanism in lexical processing. It also suggests that the morphological analysis of the word occurs pre-lexically before whole-word recognition is complete (e.g., Taft and Forster 1975; Rastle, Davis, and New 2004; Gwilliams and Marantz 2015). As strong evidence for the morphological decomposition hypothesis, morphological priming effects have been used: words are typically recognized more quickly when preceded by morphologically related words (e.g., teacher → teach) than by unrelated or merely orthographically similar ones. However, previous findings on the morphological decomposition hypothesis have varied across languages and morpheme types. For example, while the effects of prefix-based priming are reliably observed across languages, those of suffix-based priming have been less consistent (e.g., Grainger et al. 1991; Giraudo and Grainger 2003, Cho et al. 2024). Specifically, in Korean, mixed results have been found in Sino-Korean words (e.g., **신**기술-**신**세계), particularly those involving suffixes (e.g., 소방**관**-경찰**관**) compared to the robust morphological priming effects found in native Korean derivations (e.g., **맏**아들-**맏**동서).

Regarding these inconsistencies, recent studies have suggested the possibility of individual differences in morphological processing based on the proposal of Lexical Quality Hypothesis (Perfetti 2007). It claims that individuals differ in how precisely orthographic, phonological, and semantic information of a word is represented in their mental lexicon. High-quality lexical representations enable more efficient access and analysis of morphemic units than low-quality representations, suggesting that morphemic knowledge may directly influence lexical processing in individuals.

This study investigates how morphemic knowledge affects visual word recognition, focusing specifically on Sino-Korean suffixed derivations. We employ a masked priming lexical decision task using morphological, semantic, and orthographic prime

conditions to examine how morphemic knowledge modulates lexical processing. We aim to find out whether morphological, semantic, and orthographic primes facilitate recognition of Sino-Korean suffixed words and whether these priming effects are modulated by individual differences in morphemic knowledge. Based on the previous findings, we hypothesize that morphological primes will yield stronger facilitation than semantic or orthographic primes, and that individuals with higher morphemic knowledge will rely more on morphological cues while reducing reliance on semantic and orthographic information. These findings would support the view that morphological decomposition is the default strategy in lexical processing affected by morphemic knowledge, accounting for individual differences in visual word recognition.

2. Literature review

2.1 Morphological decomposition

Numerous studies have proposed that morphemes are basic representational units in the mental lexicon. These claims are based on the evidence of the morphological priming effect in word recognition tasks. For instance, Rastle, Davis, Marslen-Wilson, and Tyler (2000) found that a target word is recognized faster (e.g., departure-DEPART) when it was preceded by morphologically related word (morphological prime) than by unrelated word. This facilitative morphological priming effect was significant compared to orthographic priming effect (e.g., electrode-ELECT). Similarly, Longtin and Meunier (2005) showed that both semantically interpretable and non-interpretable nonword primes that resemble real derivations (e.g., rapidifier-RAPIDE, sportation-SPORT) facilitated recognition of the target words, whereas non-morphological nonwords (e.g., Rapiduit-RAPIDE) did not. This suggests that complex words are decomposed into morphemes during early processing stages, particularly when the root morpheme is easily identifiable (Rastle, Davis, Marslen-Wilson, and Tyler 2000; Longtin, Segui, and Hallé 2003; Longtin and Meunier 2005). Priming effects have been observed not only for root morphemes but also affixes, although prefix priming effects appear more consistent across studies.

Unlike prefix priming effects, suffix priming effect has shown more variability.

Grainger et al. (1991) and Giraudo and Grainger (2003) found that suffix-derived words in French produced weaker or no priming effects compared to prefix-derived words. One explanation offered by Crepaldi et al. (2016) is positional specificity: prefixes, occurring at the beginning of words, may be more readily segmented than suffixes, which follow root morphemes and stems. However, other studies (e.g., Lázaro, Illera and Sainz 2016) have reported early decomposition effects for suffixes as well, suggesting that under certain conditions—such as clear morpheme boundaries or high morpheme frequency—suffixes can also be processed pre-lexically. These mixed findings call for further research.

Korean offers a unique opportunity to explore morphological processing due to its syllabic script and use of both native and Sino-Korean derivations. Studies on native Korean words have consistently found morphological priming effects regardless of morpheme position (e.g., Yi and Bae 2009; Nam et al. 2014; Kang et al. 2016). In contrast, studies on Sino-Korean words have yielded mixed results. For example, Yi and Yi (1999) reported no significant morphological priming effect for Sino-Korean prefixes, whereas Yi et al. (2007) found a facilitation effect.

The semantic opacity (and ambiguity) of some Sino-Korean morphemes may reduce their accessibility for decomposition because they can represent multiple meanings as homonyms (e.g., 미– for 'beauty', 'rice', or 'not yet') when written in Hangul (Korean script). However, recent findings from Bae et al. (2024) suggest that readers with higher proficiency in Sino-Korean (measured via Hanja, Chinese letters, knowledge) do show robust morphological priming effects, even across scripts. These findings seem to indicate that previously mixed results could be ascribed to the individual differences in morphemic knowledge.

2.2 Lexical quality hypothesis and individual differences

The Lexical Quality Hypothesis (Perfetti 2007; Perfetti, Yang, and Schmalhofer 2008) posits that the efficiency and accuracy of word recognition are determined by the precision of its representation in the mental lexicon, that is, the integration of orthographic, phonological, and semantic information of the words. Words with high lexical quality are recognized more quickly and accurately because their representations are clearly specified and automatically accessible. In contrast, words with low lexical

quality require more effortful, slower processing. A critical implication of this hypothesis is that lexical processing is not uniform across individuals. Rather, it is shaped by differences in lexical knowledge, such as vocabulary size and reading proficiency. More importantly, morphemic knowledge is a critical factor because morphemes are regarded as the basic unit of lexicon. Readers with high lexical quality with better morphemic knowledge can access and decompose words more effectively by recognizing their constituent morphemes, while readers with lower lexical quality may depend more on holistic word forms or surface-level cues such as orthographic or semantic information of the words.

Supporting evidence for the lexical quality hypothesis is found in recent studies particularly focusing on individual differences in lexical processing using various priming effects. For example, Yap et al. (2009) found that readers with high vocabulary knowledge exhibited smaller semantic priming effects for low-frequency words compared to those with low vocabulary knowledge. This indicates that richer lexical representations reduce the reliance on semantic-contextual facilitation. Similarly, Beyersmann et al. (2015) demonstrated that high-proficiency readers showed similar morphological priming effects for all the related conditions including even non-suffixed nonwords condition (tristald-TRISTE). In contrast, low-proficiency readers showed significantly reduced priming effect for non-suffixed nonword condition compared to the other two suffixed conditions: suffixed word (tristesse-TRISTE) and suffixed nonword (tristerie-TRIESTE). They relied more heavily on whole-word or orthographic features.

Andrews and Lo (2013) elaborates this distinction by showing that individual profiles of lexical knowledge (semantic vs. orthographic) affect how readers process morphological relationships. In their study, readers with a strong semantic profile were more sensitive to transparent morphological relationships of the word pairs, but little to pseudo-morphemic pairs, while readers with a strong orthographic profile exhibited facilitation even for pseudo-morphemic pairs. Andrews and Hersch (2010) also found differences in priming effects modulated by individuals' orthographic knowledge: the group with stronger spelling knowledge showed "inhibitory" effects for high-neighborhood words, while the group with weaker spelling knowledge exhibited "facilitative" effects. These findings suggest that readers not only differ in the depth of their lexical knowledge but also in the strategies they employ during word recognition probably due to their different lexical knowledge.

Taken together, findings of these studies seem to indicate that morphemic knowledge (i.e., the ability to identify and utilize morphemes within complex words) plays a central role in shaping the cognitive mechanisms underlying visual word recognition. As readers develop more refined morphemic representations, they seem to transition from reliance on semantic or orthographic similarities to more efficient, structure-based morphological processing.

Based on the theoretical assumptions and supporting evidence of previous research, this study investigates whether and how individual differences in morphemic knowledge affect morphological priming effects in Sino-Korean suffixed word recognition. The previous finding that Sino-Korean words showed mixed effects whereas native Korean words demonstrated morphological priming effects rather consistently needs further evidence. Sino-Korean words might be more difficult to recognize due to their multiple meanings as homonyms based on the different Chinese words (e.g., -ka, 'a person,' 'a song,' 'a street,' etc.) unlike English (e.g., '-ness' a nominalization suffix). Nevertheless, like Bae et al's (2024) finding of priming effect for Sino-Korean "prefixed" derivations modulated by the individuals' Sino-Korean knowledge, we can also expect to find priming effect for "suffixed" derivations by factoring in participants' Sino-Korean knowledge. We can predict that the suffix priming effect will be found for visual recognition of Sino-Korean words, but the pattern of priming effects will be modulated by the participants' Sino-Korean morphemic knowledge. In this study we set the following two research questions:

(1) Do morphological, semantic, and orthographic primes facilitate visual recognition of Sino-Korean suffixed words?
(2) Are these priming effects modulated by individual differences in morphemic knowledge?

3. Method

3.1 Participants

A total of 63 college students participated in this study (37 men, 26 women, mean age: 21.7, SD: 1.85). They were all right-handed and had no problem with vision

and hearing. They completed a suffix morpheme knowledge test questionnaire and a visual masked priming lexical decision task. Among them, one participant who made errors on more than 30% of the total stimuli and another participant who did not properly complete the morpheme knowledge test were excluded, resulting in 61 participants in total for data analysis.

3.2 Materials

The experimental stimuli were created using the 15 million-word frequency dictionary from the Institute of Korean Culture at Korea University, generating 78 pairs of prime and target stimuli with similar word frequencies. The target stimuli consisted of three-syllable Sino-Korean words [two-syllable stem + one-syllable suffix]. The stimuli were organized into three conditions, each containing 26 pairs of prime-target words (see Table 1).

Table 1. Experimental stimuli

Condition	Prime frequency	Target frequency	Example	
			Prime	Target
Morphologically related	59.0	54.2	작곡가 composer	혁명가 revolutionary
Morphologically unrelated	60.3	54.2	연락처 contact information	혁명가 revolutionary
Semantically related	64.5	60.1	불치병 terminal illness	시한부 terminal
Semantically unrelated	62.3	60.1	청첩장 wedding invitation	시한부 terminal
Orthographically related	52.0	55.4	입장권 admission ticket	상위권 high ranking
Orthographically unrelated	52.1	55.4	건설업 construction industry	상위권 high ranking

The first condition was the morphologically-related condition, where the prime and target shared the same suffix (e.g., 작곡가-혁명가, meaning “composer” –“revolutionary”). The second condition, the semantically-related condition, had stimuli pairs with high semantic relatedness between the prime and target words (e.g., 불치병-시한부, meaning “terminal illness” – “terminal”). The third condition, the orthographically-related

condition, involved pairs with low semantic relatedness but are shared the orthographically same final syllable (e.g., 입장권-상위권, meaning “admission ticket” – “high ranking”).

To assess the priming effects of each condition, an additional set of 78 pairs of unrelated stimuli, where the target words were identical but had no morphological, orthographic, or semantic relationship with the prime words, was included as a control. The frequency of the related and unrelated prime stimuli was carefully controlled (p = .915). Additionally, the frequencies of the prime stimuli in the morphologically-related, semantically-related, and orthographically-related conditions were controlled to ensure no statistically significant differences among them (p =.628). Moreover, the frequencies of the target stimuli across the three conditions were similarly controlled to prevent any statistically significant differences (p = .846).

Additionally, 26 filler pairs with non-derived target words were created to prevent participants from guessing the purpose of the experiment, resulting in 104 real word pairs. In addition, the same number of nonword pairs containing pronounceable but meaningless stimuli were created in order to balance the number of positive and negative responses.

Since the related and unrelated pairs shared the same target stimuli, two versions of the test were created in order to prevent the same participant from being exposed to the same target stimuli (e.g., 혁명가) twice. Therefore, each version contained halves of the related and unrelated pairs for each condition (i.e., 13 per each) without overlapping target stimuli, along with 26 filler pairs. This resulted in each version containing 78 prime-target pairs, 26 filler pairs, and 104 nonword pairs, for a total of 208 pairs. Participants were randomly assigned to one of the two versions of the task.

3.3 Morphemic knowledge test

A morphemic knowledge test was created referring to Bae, Yi, and Masuda (2016). The test was designed to assess participants’ abilities of morphemic inference, production, and comprehension regarding Sino-Korean suffixes, consisting of a total of 35 items. The morpheme inference section included 10 items and was presented in two ways. In the first session, participants were asked to infer the correct word

based on the given definition. For example, after being given the description "the history of the West," participants would correctly fill in the blank after "서양(western)" with the word "사" (history). The second session required participants to infer the meaning of the final syllable of the underlined word. For instance, in the example "총무과" (general affairs department), participants would provide the answer "업무 부서" (work department) for the meaning of the last syllable.

The morpheme production section consisted of 5 items, where participants were asked to generate words that included the underlined morpheme from the provided word. For example, when given the word "해운업" (shipping industry), participants would produce words such as "목축업" (livestock industry) or "관광업" (tourism industry).

The morpheme comprehension section included 20 items and assessed whether participants could correctly understand the meaning of the derivational suffixes. Participants were asked to determine whether the final syllable in two given words had the same meaning. For example, for stimuli like "경찰관-법무관" (police officer-legal officer), participants would mark "same," while for "호남선-걸작선" (Honam Line-masterpiece collection), they would mark "different." The test was conducted individually with all the 63 participants, and the results were calculated based on a maximum score of 35.

3.4 Procedure

The experiment was conducted individually in a sound proof booth. Each participant performed the visual masked lexical decision task. The task followed these steps: First, a fixation cross was presented in the center of the computer screen for 700 ms, and participants were instructed to focus on it. Then, a mask in the form of "#####" was displayed for 500 ms, followed by the prime stimulus for 57 ms[1]. Immediately after the prime stimulus, the target stimulus appeared. Participants were instructed to respond as quickly and accurately as possible, indicating whether the target stimulus was a real word or not. The target stimuli lasted for 1,500 ms at the longest before they pressed the button.

Participants responded using a keyboard; if the target stimulus was a real word, they

1 SOA 57ms was used to investigate unconscious automatic morphological processing (e.g., Foster and Davis 1984; Dehaene et al. 1998, Kang et al. 2016).

pressed the "Yes" button on the right; if it was a nonword, they pressed the "No" button on the left. The experiment took approximately 20 minutes to complete. After the task, they took the morphemic knowledge test.

3.5 Results

3.5.1 RQ1. Morphological, semantic, and orthographic priming effects

First, error rates of the participants' responses were calculated for each condition, and the descriptive statistics (mean error rates and standard deviations) are presented in Table 2 below:

Table 2. Error rates

Condition	Mean	SD
Morphologically related	0.03	0.16
Morphologically unrelated	0.02	0.14
Semantically related	0.02	0.14
Semantically unrelated	0.03	0.18
Orthographically related	0.03	0.17
Orthographically unrelated	0.03	0.18

The results indicate consistently low error rates across all conditions, with minimal variability as reflected by the standard deviations. Generalized linear mixed-effects models were conducted to assess differences in accuracy between related and unrelated conditions for each priming type. Prime type (morphological, semantic, orthographic) and relatedness (related vs. unrelated) were included as fixed effects, and Subject ID and Item were treated as random effects. Random slopes were excluded from the model due to convergence issues. Main effect of Prime type and Relatedness showed no significant priming effects in accuracy.[2] These findings suggest that participants

2 Generalized linear mixed-effects models were conducted to assess differences in accuracy between related and unrelated conditions across prime types (m, s, and o). Prime type and relatedness were included as fixed effects, and Subject ID and Item were included as random effects to account for individual and item-level variability (Subject ID: $\sigma^2 = 0.94$; Item: $\sigma^2 = 1.69$). Random slopes were excluded from the model due to convergence issues. To compare conditions, successive difference contrasts were applied for pairwise comparisons (m vs. s, s vs. o). In this analysis, the m prime type in the related condition was set as the baseline, with the intercept representing baseline performance for this condition ($\beta = 4.77$, $SE = 0.31$, $p < .001$). The main effect of prime type showed no significant difference in accuracy between

maintained consistently high accuracy across all conditions, regardless of the relationship between word pairs.

Next, reaction times (RTs) for correct responses were analyzed based on two factors: prime type (morphological, semantic, orthographic) and relatedness (related, unrelated). The descriptive statistics, including mean RT and standard deviation (SD) along with priming effect for each prime type, are presented below:

Table 3. Reaction time

Condition	Mean (ms)	SD (ms)	Priming effect (ms)
Morphologically related	597	125	29
Morphologically unrelated	625	138	
Semantically related	592	123	14
Semantically unrelated	606	148	
Orthographically related	622	143	15
Orthographically unrelated	636	148	

Linear mixed-effects models were conducted to assess differences in reaction times (RTs) between related and unrelated conditions across prime types (m, s, and o). Prime type and relatedness were included as fixed effects, and Subject ID and Item were included as random effects to account for individual and item-level variability (Subject ID: $\sigma^2 = 5021.13$; Item: $\sigma^2 = 1441.72$). A random slope was not included in the model due to convergence issues. To compare conditions, successive difference contrasts were applied for pairwise comparisons (m vs. s, s vs. o).

In this analysis, the m prime type in the related condition was set as the baseline, with the intercept representing baseline performance for this condition ($\beta = 603.75$, $SE = 10.29$, $p < .001$). The main effect of prime type revealed no significant difference in RTs between the m and s prime types (s vs. m: $\beta = -3.75$, $SE = 11.91$, $p = .75$),

the m and s prime types (s vs. m: $\beta = 0.12$, $SE = 0.54$, $p = .81$), or between the s and o prime types (o vs. s: $\beta = -0.28$, $SE = 0.54$, $p = .60$). In addition, relatedness (related vs. unrelated) did not have a significant main effect on accuracy ($\beta = -0.06$, $SE = 0.31$, $p = 0.82$). The interactions between prime type and relatedness were not significant for either comparison: s vs. m ($\beta = -0.98$, $SE = 0.77$, $p = .20$) or o vs. s ($\beta = 0.46$, $SE = 0.74$, $p = .53$).

whereas responses were significantly slower for the o prime type than for the s prime type (o vs s: β = 30.08, SE = 11.92, p = .01). These results suggest that the o prime type elicited slower response times compared to both the m and s prime types. Additionally, the relatedness (related vs. unrelated) had a significant main effect on RTs (β = 19.80, SE = 6.88, p < .01), indicating that RTs were faster for related conditions compared to unrelated conditions. This suggests that relatedness influenced reaction times, with faster RTs in the related condition, regardless of the prime type. The interactions between prime type and relatedness were not significant for either comparison: s vs. m (β = -15.86, SE = 16.86, p = .34) or o vs. s (β = 1.23, SE = 16.86, p = .94). The results imply that the effect of relatedness on RTs did not significantly differ across the different prime types; RTs were faster for related conditions than for unrelated conditions regardless of the prime type.

Morphological priming showed the largest effect (29) and the semantic and orthographic priming demonstrated smaller but statistically significant effects (14 and 15, respectively). These findings suggest that related word pairs facilitate faster lexical decision across morphological, semantic, and orthographic conditions, but the morphological priming effect was almost double the semantic or orthographic priming effects.

Thirdly, the mean score of the morphemic knowledge test was calculated in order to find out the overall level of participants. The mean score of the test was 22.20 out of 35 (SD = 3.31). The overall proficiency of the morphemic knowledge of the participants showed 63.43% of accuracy.

In sum, the overall results show that the participants with the morphemic knowledge of approximately 63% or higher accuracy in the morphemic knowledge test revealed almost perfect responses regardless of the condition (i.e., very low error rates across conditions). However, the response times differed radically: facilitation effect was largest in morphologically related condition, which was almost double the effects of semantically and orthographically related conditions (29 vs. 14, 15, respectively).

3.5.2 RQ2. Role of morphemic knowledge on priming effects

In order to examine the relationship between morphemic knowledge and the priming effects, linear mixed-effects models were conducted. Priming Effect (difference in RTs between unrelated and related conditions) was the dependent variable, Morphemic

Knowledge was treated as a fixed effect, and Subject ID was included as a random effect. The results are presented below:

Table 4. Morphemic knowledge and priming effect

Priming Effect	Inter-cept	Inter-cept SE	Inter-cept p-value	Morphemic Knowledge	Morphemic Knowledge SE	Morphemic Knowledge p-value	Random Effect Variance (Subject ID)
Morphological	-11.522	39.886	0.773	1.875	1.873	0.317	1272.875
Semantic	131.004	14.289	<.001	-5.279	0.41	<.001	877.076
Orthographic	61.112	8.305	<.001	-2.152	0.009	<.001	2201.871

The results showed no statistically significant relationship between morphemic knowledge and morphological priming effect (Morphological Priming Effect: Intercept: $\beta = -11.522$, $SE = 39.886$ $p = 0.773$, Morphemic Knowledge: $\beta = 1.875$, $SE = 1.873$, $p = 0.317$, Random Effect Variance (Subject ID): $\sigma^2 = 1272.875$). On the other hand, statistically significant "negative" relationships were found between morphemic knowledge and semantic priming effect (Semantic Priming Effect: Intercept: $\beta = 131.004$, $SE = 14.289$, $p < .001$, Morphemic Knowledge: $\beta = -5.279$, $SE = 0.410$, $p < .001$, Random Effect Variance (Subject ID): $\sigma^2 = 877.076$), and between morphemic knowledge and orthographic priming effect (Orthographic Priming Effect: Intercept: $\beta = 61.112$, $SE = 8.305$, $p < .001$, Morphemic Knowledge: $\beta = -2.152$, $SE = 0.009$, $p < .001$, Random Effect Variance (Subject ID): $\sigma^2 = 2201.871$). Considering the largest effect of morphological priming compared with the semantic and orthographic priming, these results indicate that the participants used morphological cues most regardless of the different morphemic knowledge with the level of morphemic knowledge of the participants of this study. In contrast, their reliance on semantic or orthographic cues diminishes as their morphemic knowledge increases (i.e., negative relationship between the morphemic knowledge and the semantic and orthographic priming effects).

In sum, our experiment of visual lexical decision task found morphological, semantic and orthographic priming effects with Sino-Korean suffixed words, with the morphological priming effect much higher than semantic or orthographic priming effects (RQ1). In addition, more importantly, negative relationship was found between the morphemic knowledge and semantic and orthographic priming effects whereas

no significant relationship was found between individuals' morphemic knowledge and morphological priming effect (RQ2). The results provide positive evidence for individual difference in visual word recognition; morphemic knowledge plays an important role in lexical processing. As morphemic knowledge increases, individuals appear to engage more actively in morphological processing while relying less on semantic or orthographic cues. This pattern suggests a qualitative shift in lexical processing strategies associated with the level of morphemic knowledge. Importantly, the critical distinction lies not in the absolute magnitude of the morphological priming effect, but in the fact that both high and low knowledge groups utilize morphological information. What differentiates the groups is the extent to which they rely on semantic and orthographic information. These findings indicate a greater dependence on morphological cues in lexical access among individuals with higher morphemic knowledge. Taken together (RQ1 and RQ2), the results show that Sino-Korean suffixed words are morphologically decomposed before lexically accessed, which seems automated by the increase of morphemic knowledge, manifesting individual difference in lexical processing.

Due to the different relationships between morphemic knowledge and the three types of primes, additional analysis was conducted in order to more closely examine the priming patterns by level of morphemic knowledge. Participants were separated into two groups by their morphemic knowledge: high morphemic knowledge group and low morphemic knowledge group. The mean score and SD of morphological knowledge in each group is shown in Table 5 below:

Table 5. Participants group by morphemic knowledge

Group	Number of Participants	Mean score	SD
High	27	25.18	1.63
Low	34	19.83	2.19

The t-test revealed a statistically significant difference in morphemic knowledge scores between the two groups ($t(59) = 93.64$, $p < 0.001$). This indicates that participants in the High Morphemic Knowledge group scored significantly higher on the morphemic knowledge measure compared to those in the Low Morphemic Knowledge group. The mean RTs and SDs are calculated for each group and the results are shown in Table 6 below:

Table 6. Reaction time by prime type and group

Morphemic Knowledge Group	Condition	Mean RT	SD RT	Priming Effect
High	m_related	574	86	26**
	m_unrelated	600	65	
	s_related	576	84	-3
	s_unrelated	573	77	
	o_related	605	95	8
	o_unrelated	613	104	
Low	m_related	610	62	33**
	m_unrelated	643	75	
	s_related	604	69	27*
	s_unrelated	631	71	
	o_related	635	71	17
	o_unrelated	652	76	

* $p < .01$

** $p < .001$

To examine whether reaction times (RTs) differed as a function of prime type (morphological, semantic, orthographic), relatedness (related vs. unrelated), and morphemic knowledge group (high vs. low), a linear mixed-effects model was fitted. The model included fixed effects for Prime Type, Relatedness, and Morphemic Knowledge Group, as well as all two-way and three-way interactions among these factors. Subject was included as a random intercept to account for within-participant variability.

The main effect of Prime Type revealed that orthographic primes tended to elicit slower RTs than morphological primes, but this difference was not statistically significant (β = 35.52, SE = 19.34, p = .066). No significant difference was observed between semantic and morphological primes (p = .672). The main effect of Relatedness (unrelated vs. related) was not significant (p = .365), indicating no general priming effect across conditions.

The main effect of Morphemic Knowledge Group was not statistically significant, either (β = 35.62, SE = 19.60, p = .069). None of the interaction terms involving Morphemic Knowledge Group reached significance. In particular, the three-way interactions between Relatedness, Prime Type, and Morphemic Knowledge Group were not significant for either the semantic (β = 19.50, p = .244) or orthographic (β = −0.16, p = .992) prime types. The lack of interaction effects indicates that the influence of prime type and relatedness on RTs is generally stable across high and low knowledge

groups.

These results of no multiple interaction effects seem plausible considering the mixed relationships between morphemic knowledge and priming effects of different types found in the above analysis for RQ 1 (i.e., no relationship between morphological priming effect and morphemic knowledge vs. negative relationship between semantic and orthographic priming effects and morphemic knowledge).

Although the overall three-way interaction between Prime Type, Relatedness, and Morphemic Knowledge Group was not statistically significant, post-hoc comparisons were conducted to explore potential group-level differences using subject-level priming effect scores (unrelated RT − related RT). Independent samples Welch's *t*-tests were used to compare the high and low knowledge groups for each prime type. The results are shown in Table 7 below:

Table 7. Post-hoc test results: High vs low morphemic knowledge groups

Prime Type	High Group M	Low Group M	Mean Difference	*t*	*p*
Morphological	26 ms	33 ms	+7 ms	−0.56	.575
Semantic	−3 ms	27 ms	+30 ms	−2.79	.007
Orthographic	8 ms	17 ms	+9 ms	−0.46	.648

The results revealed a significant difference in semantic priming effects between the two groups, $t(102.3) = -2.79$, $p = .007$. Participants in the low morphemic knowledge group demonstrated a substantially larger semantic priming effect (27 ms) compared to those in the high knowledge group (−3 ms), suggesting greater reliance on semantic cues among less morphologically skilled individuals. In contrast, group differences in morphological and orthographic priming effects were not statistically significant as shown in Table 7.

These findings indicate that while morphological and orthographic priming effects are generally stable across groups, semantic priming is significantly modulated by individual differences in morphemic knowledge, suggesting a strategic shift in processing mechanisms based on lexical skill. Individuals with lower morphemic knowledge rely more on semantic cues, whereas those with higher morphemic knowledge may shift their processing toward morphological structure.[3]

3 To address reviewer concerns, we also conducted model-based post-hoc comparisons using estimated marginal means from the fitted linear mixed-effects model. The full EMMeans-based post-hoc comparison results are reported in table below:

The comparison between high and low-morphemic knowledge groups revealed that the two groups showed different patterns in visual word recognition especially in terms of their reliance on the semantic cues. High morphemic knowledge group relies on morphological cues whereas low-morphemic group relies on semantic cues as well as morphological cues. These different processing patterns are well depicted in Figure 1 below:

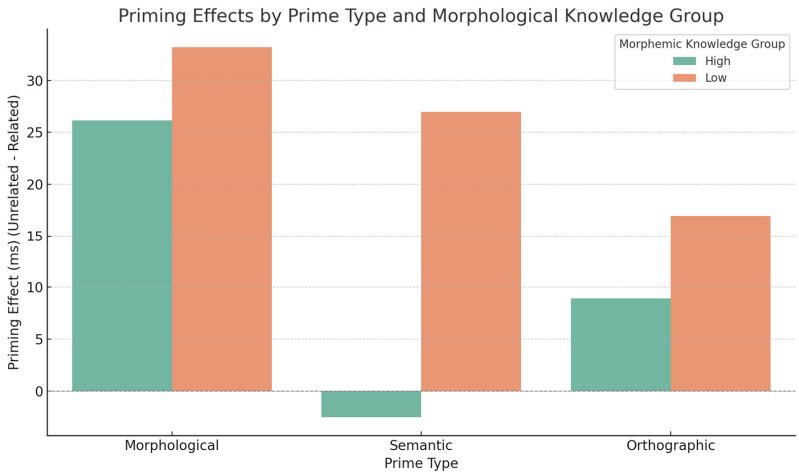

Figure 1. Priming effects by morphemic knowledge group and prime type

The differences clearly reflect the patterns we found related to RQ 2; with enough morphemic knowledge, less or no reliance on semantic or orthographic cues in lexical processing. These findings reflect the qualitative difference between the two groups in lexical processing: qualitative transition from semantic and/or orthographic post-lexical

Prime Type	Estimate (Low − High)	*SE*	*t*	*p*
Morphological	+8.33 ms	11.82	0.70	.4812
Semantic	+19.50 ms	16.74	1.17	.2440
Orthographic	−0.16 ms	16.74	−0.01	.9922

In contrast to subject-level comparisons, none of the prime types showed statistically significant differences between the high and low knowledge groups including semantic priming ($t(619) = 1.17$, $p = .244$). It seems to suggest that individual variability or covariate adjustment may have reduced the power to detect this effect within the mixed-effects model. Because subject-level tests are more sensitive to raw individual variability, especially in designs with meaningful between-subjects differences and consistent with our theoretical expectations, we have retained the subject-based results in the main text.

analysis to pre-lexical morphological analysis of the word.

In sum, overall, we found morphological, semantic and orthographic priming effects for Sino-Korean suffixed derivations, with the morphological priming effect much larger than the other two. However, with the increase of participants' morphemic knowledge, the semantic and orthographic priming effects diminished or disappeared whereas morphological priming effect remained large and stable. The modulation of morphemic knowledge was particularly pronounced in semantic priming effect which diminished in the high morphemic knowledge group. These results indicate possible qualitative differences among individuals in visual word recognition modulated by morphemic knowledge.

4. Discussion

The present study set out to examine two key research questions: (1) Do morphological, semantic, and orthographic primes facilitate visual recognition of Sino-Korean suffixed words? (2) Are these priming effects modulated by individual differences in morphemic knowledge? Our findings provide clear answers to both questions.

4.1 Morphological, semantic and orthographic priming effects in visual recognition of Sino-Korean suffixed words

First, all three types of primes, morphological, semantic, and orthographic, facilitated visual recognition of Sino-Korean suffixed words relative to unrelated primes. However, morphological priming yielded the largest effect, indicating that morphological decomposition plays a dominant role in the processing of Sino-Korean suffixed derivations. These results align with previous research supporting pre-lexical decomposition in Korean word recognition, not only for native Korean derivations but also for Sino-Korean derivations. These results suggest that Sino-Korean suffixes, like prefixes, can act as independent processing units. The magnitude of the morphological priming effect exceeded that of semantic and orthographic priming (29 vs. 14 and 15, respectively), indicating that morpheme-based recognition is faster and more efficient. Additionally, the short stimulus onset asynchrony (SOA) used in this study (57ms)

supports the view that morphological decomposition occurs rapidly, likely pre-lexically, which seems to be a more efficient, default strategy.

Notably, our findings diverge from studies like Grainger et al. (1991) and Giraudo and Grainger (2003), which found weaker or absent suffix priming effects in French. One potential explanation is that the structure of Korean stimuli used in this study (i.e., Korean disyllabic nouns followed by monosyllabic suffixes: e.g., 작곡가-혁명가) allows for clearer visual segmentation compared to French. The syllable-based orthography of Korean may make morphological boundaries more perceptually salient, facilitating decomposition of the morphemes.

From an efficiency perspective, these findings suggest that morphological decomposition is a faster and cognitively less demanding process in word recognition mechanism than post-lexical semantic or orthographic processing. For example, it seems plausible to propose that the given suffix (e.g., "입장-**권**" admission ticket) of the prime is processed as a separate morpheme with its own meaning and form, 'ticket' stored in the mental lexicon. Therefore, it is not likely to activate the target word ("상위-**권**" high ranking) as much due to the different meanings between the prime and target words (ticket vs. ranking) especially for those with high lexical quality (see below for more detailed discussion). Such morphological analysis seems to make the recognition process faster.

In sum, the results showed morphological priming effects in the visual word recognition of Sino-Korean suffix words, larger than semantic and orthographic priming effects. The results provide another piece of supporting evidence for morphological processing of Sino-Korean suffixed derivations. This finding also suggests that pre-lexical morphological decomposition is more efficient (faster and cost saving) than post-lexical semantic or orthographic processing in word recognition.

4.2 Effect of morphemic knowledge on visual word recognition: Individual differences

The second key finding relates to individual differences in lexical processing affected by the individual morphemic knowledge. While morphological priming remained larger and stable across morphemic knowledge levels (i.e., no significant relationship), semantic and orthographic priming effects diminished as morphemic knowledge increased (i.e.,

negative relationship). This pattern suggests a shift in processing strategies as lexical representations become more precise. Readers with high morphemic knowledge appear to engage in automatic morphological decomposition, conforming to the Lexical Quality Hypothesis (Perfetti 2007; Perfetti et al. 2008). Their reduced reliance on semantic or orthographic cues was evidenced by the absence of the semantic and orthographic priming effects in this group in the separate analysis of the groups. In contrast, readers with lower morphemic knowledge exhibited facilitation effects across all three priming types, indicating a broader reliance on surface-level cues in addition to the morphological cues when morphemic knowledge is insufficient. Therefore, the results provide supporting evidence for the transition of post-lexical processing to pre-lexical processing of morphology in word recognition in individuals with higher quality of lexical knowledge. Conversely, this implies the major role of morphemic knowledge in lexical processing, accounting for the possibly qualitative difference in individuals' lexical processing.

More detailed examination of reaction time comparisons between the two groups of different morphemic knowledge further supports this interpretation. High morphemic knowledge group was consistently faster than low morphemic knowledge group across all prime types (range of mean RTs: high group = 574–613ms; low group = 604–652ms). Notably, the high knowledge group showed significant priming only for morphological primes, while the low knowledge group showed facilitation in all three prime types, with morphological priming still being the largest. The low knowledge group data show this tendency clearly: priming effects are larger in the order of morphological > semantic > orthographic (33>27>17). This pattern suggests that when morphemic knowledge is well-developed, readers default to morphological decomposition, while those with weaker knowledge continue to rely on semantic and orthographic information.

In particular, the significant group difference between the high knowledge group and low knowledge group was pronounced in semantic priming, but not in morphological or orthographic priming. The results indicate that the high knowledge group with enough morphemic knowledge depends on morphological decomposition, focusing on morphemic units, whereas the low-knowledge group makes use of semantic cues in addition to morphemic cues in lexical processing. These findings also indicate the possible qualitative difference in visual word recognition modulated by morphemic knowledge.

Additional supporting evidence for the morphological decomposition by those with higher morphemic knowledge is also found in Bae et al. (2024), where the morphological priming effect was lower in high proficient group than in lower proficient group (i.e.,

28 vs. 46 respectively). The decreased morphological priming effect in high proficiency group conforms to the results of the present study (i.e., 26 for high group and 33 for low group). In addition, within the high-proficiency group, the morphological priming effect was lower in Hangul prime than in Hanja prime, indicating that their stronger knowledge with Hangul than Hanja reduced its priming effect in Hangul. Conversely, the orthographic priming had a negative effect (i.e., inhibitory effect), and it was higher in high-proficiency group than in low-proficiency group (i.e., -24 vs. -9 respectively in Hangul recognition for example). The results conform to those of our study that semantic and orthographic priming effects had negative relationships with morphemic knowledge and that morphological priming effect was lower in high knowledge group than in lower group as mentioned above. On the other hand, in our study, the inhibitory orthographic priming effect was not found in the high morphemic knowledge group (but no significant priming effect). The reason for the no inhibitory orthographic priming effect, unlike in Bae et al.'s (2024) study, seems to relate to the different word structure: Bae et al.'s study used disyllabic Sino-Korean compound where the first syllable was orthographically repeated in the prime-target pairs. The first word which can be combined with many different Sino-Korean words might have activated a lot of possible related compounds. ("오"감 – 오보, 오점, 오전, 오답, 오심, etc.). On the other hand, our items have three syllable words where the first two-syllable nouns are suffixed by one-syllable Sino-Korean word in which the possible suffixes are rather limited (e.g., 입장권 vs. 상위권). This might have avoided the inhibitory orthographic priming effect in high morphemic knowledge group. Instead, it primed positively in low morphemic knowledge group.

These results together support the claim that the readers become less reliant on orthographic or semantic cues in the visual word recognition as their morphemic knowledge increases as suggested above. In addition, as morphemic knowledge becomes strong enough, the morphological priming effect decreases as in Bae et al.'s (2024) study and the present study (i.e., 33 > 26).

These findings reflect those in second language (L2) research, where learners often rely on orthographic and semantic cues until their morphological knowledge matures (e.g., Clahsen et al. 2013; Fernandes et al. 2023). For example, Fernandes et al.'s (2023) meta-analysis of morphological priming effects showed that significant morphological priming effects were restricted to native speakers. Furthermore, Wanner-Kawahara et al.'s (2022) study found morphological priming effect only for high proficiency learners (i.e., with TOEIC 965), but not for low proficiency learners (i.e., with TOEIC 605). More

importantly, they also found that more proficient L2 learners exhibited stronger morphological priming and weaker orthographic priming effects, mirroring patterns found in our study. Taken together, these findings suggest that lexical quality, as indexed by morphemic knowledge, plays a central role in shaping not only the speed but also the strategy of visual word recognition. The evidence points to a qualitative shift from post-lexical reliance on surface features of the word to pre-lexical morphological decomposition as lexical/morphemic knowledge improves.

Finally, our study complements and extends previous research discussed in the literature review (e.g., Yap et al. 2009; Andrews and Lo 2013; Beyersmann et al. 2015; Bae et al. 2024). While these studies emphasized general proficiency or vocabulary knowledge, our focus on morphemic knowledge provides more targeted evidence for individual differences of the lexical processing. That is, the structure of the mental lexicon (and how readers process morphological information) varies meaningfully even among native speakers. Moreover, our findings suggest that this shift towards morphological decomposition may be universal across languages but affected by script characteristics and morphological transparency. In languages like Korean, where orthographic units align with morphemic boundaries, this decomposition might occur more readily than in languages with less transparent orthographies such as French. Further research is needed to explore whether this shift generalizes to other types of morphological structures (e.g., Sino-Korean prefixes, compounds) and across different populations such as L2 learners or younger generations, who may still be developing their morphemic knowledge. It would also be valuable to investigate inhibitory effects of orthographic priming found in other studies (e.g., Bae et al. 2024) and whether these effects emerge under different experimental paradigms or with alternative word structures.

In sum, this study highlights the dynamic relationship between lexical quality and word recognition strategies in lexical processing. It provides new insights into how individual morphemic knowledge modulates morphological processing in Sino-Korean suffixed word recognition. With increasing morphemic knowledge, readers depend on morphological analysis, shifting from reliance on semantic or orthographic analysis, manifesting qualitative change in word recognition.

5. Conclusion

This study examined how individual differences in morphemic knowledge influence visual word recognition of Sino-Korean suffixed derivations. Using a masked priming lexical decision task, we found that while morphological, semantic, and orthographic primes all facilitated recognition, morphological priming was the most robust. Importantly, the effects of semantic and orthographic priming diminished as morphemic knowledge increased, whereas morphological priming effect remained stable. A comparison between high and low morphemic knowledge groups revealed that high knowledge group showed facilitatory priming effect exclusively for morphologically related words, while low knowledge group exhibited priming effects across all three conditions. In particular, such group difference was most pronounced in semantic priming: low knowledge group showed large semantic priming effect whereas high knowledge group did not. These findings suggest that morphological decomposition becomes the default and most efficient processing strategy for readers with higher lexical quality, while those with lower lexical quality and weaker morphemic knowledge rely on semantic and orthographic cues in addition to morphological cues. These findings provide strong support for the Lexical Quality Hypothesis, demonstrating that individual lexical processing is qualitatively different by the precision and structure of morphemic representations in mental lexicon. As readers develop stronger morphemic knowledge, they shift from reliance on surface-level cues to deeper, structural processing based on morphemes. This study underscores the importance of morphemic knowledge in shaping not only the speed but also the nature of lexical access and provides new insight into individual variability in word recognition processes.

References

Andrews, Sally and Jolyn Hersch. 2010. Lexical precision in skilled readers: Individual differences in masked neighbor priming. *Journal of Experimental Psychology: General* 139(2): 299-318. https://doi.org/10.1037/a0018366.

Andrews, Sally and Steson Lo. 2013. Is morphological priming stronger for transparent than opaque word? It depends on individual differences in spelling and vocabulary. *Journal of Memory and Language* 68(3): 279-296. https://doi.org/10.1016/j.jml.2012.12.001.

Bae, Sungbong, Hye K. Pae, and Kwangoh Yi. 2024. Modeling morphological processing in

Korean: Within- and cross-scriptal priming effects on the recognition of Sino-Korean compound words. *Reading and Writing* 37: 943–972. https://doi.org/10.1007/s11145-021-10199-6.

Bae, Sungbong, Kwangoh Yi, and Hisashi Masuda. 2016. Morphological processing within the learning of new words: A study on individual differences. *Korean Journal of Cognitive Science* 27(2): 303-323. http://doi.org/10.19066/cogsci.2016.27.2.005.

Beyersmann, Elisabeth, Séverine Casalis, Johannes C. Ziegler, and Jonathan Grainger. 2015. Language proficiency and morpho-orthographic segmentation. *Psychonomic Bulletin and Review* 22(4): 1054-1061. http://doi.org/10.3758/s13423-014-0752-9.

Cho, Jeongwa, Acrisio Pires, and Jonathan R. Brennan. 2024. How large are root and affix priming effects in visual word recognition? Estimation from original data and a Bayesian meta-analysis. *Language, Cognition and Neuroscience* 39(10): 1291–1309. https://doi.org/10.1080/23273798.2024.2384051.

Clahsen, Harald, Loay Balkhair, John-Sebastian Schutter, and Ian Cunnings. 2013. The time course of morphological processing in a second language. *Second Language Research* 29(1): 7-31. http://doi.org/10.1177/0267658312464970.

Crepaldi, Davide, Lara Hemsworth, Colin J. Davis, and Kathleen Rastle. 2016. Masked suffix priming and morpheme positional constraints. *Quarterly Journal of Experimental Psychology* 69(1): 113-128. http://doi.org/10.1080/17470218.2015.1027713.

Dehaene, Stanislas, Lionel Naccache, Gurvan Le Clec'H, Etienne Koechlin, Michael Mueller, Ghislaine Dehaene-Lambertz, Pierre-Francois van de Moortele, and Denis Le Bihan. 1998. Imaging unconscious semantic priming. *Nature* 395(6702): 597–600. https://doi.org/10.1038/26967.

Fernandes, Ana Isabel, Karlos Luna, Ana Paula Soares, and Montserrat Comesaña. 2023. Is there an early morphological decomposition during L2 lexical access? A meta-analysis on the morphological priming effect. *Brain Sciences* 13(1): 127. http://doi.org/10.3390/brainsci13010127.

Forster, Kenneth I. and Chris Davis. 1984. Repetition priming and frequency attenuation in lexical access. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 10(4): 680-698. http://doi.org/10.1037/0278-7393.10.4.680.

Giraudo, Hélène and Jonathan Grainger. 2003. On the role of derivational affixes in recognizing complex words: Evidence from masked priming. In R. H. Baayen and R. Schreuder (eds.), *Morphological structure in language processing*, 209-232. Berlin: Mouton de Gruyter.

Grainger, Jonathan, Pascale Colé, and Juan Segui. 1991. Masked morphological priming in visual word recognition. *Journal of Memory and Language* 30(3): 370-384. https://doi.org/10.1016/0749-596X(91)90042-I.

Gwilliams, Laura and Alec Marantz. 2015. Non-linear processing of a linear speech stream: The influence of morphological structure on the recognition of spoken Arabic words. *Brain and Language* 147: 1-13. https://doi.org/10.1016/j.bandl.2015.04.006.

Kang, Jinwon, Sooleen Nam, Heuiseok Lim, and Kichun Nam. 2016. ERP indices of Korean

derivational prefix morphemes separated from the semantic and orthographic information. *The Korean Journal of Cognitive and Biological Psychology* 28(3): 409-430. http://doi.org/10.22172/cogbio.2016.28.3.002.

Lázaro, Miguel, Victor Illera, and Javier S. Sainz. 2016. The suffix priming effect: Further evidence for an early morpho-orthographic segmentation process independent of its semantic content. *Quarterly Journal of Experimental Psychology* 69(1): 197-208. http://doi.org/10.1080/17470218.2015.1031146.

Longtin, Catherine-Marie and Fanny Meunier. 2005. Morphological decomposition in early visual word processing. *Journal of Memory and Language* 53(1): 26-41. http://doi.org/10.1016/j.jml.2005.02.008.

Longtin, Catherine-Marie, Juan Segui, and Pierre A. Hallé. 2003. Morphological priming without morphological relationship. *Language and Cognitive Processes* 18(3): 313-334. https://doi.org/10.1080/01690960244000036.

Nam, Sooleen, Yeonji Baik, Heuiseok Lim, and Kichun Nam. 2014. Different time courses of orthographic, morphological, and semantic activation during Korean prefixed derivational word recognition. *The Korean Journal of Cognitive and Biological Psychology* 26(1): 1-20. http://doi.org/10.22172/cogbio.2014.26.1.001.

Perfetti, Charles. 2007. Reading ability: Lexical quality to comprehension. *Scientific Studies of Reading* 11(4): 357-383. https://doi.org/10.1080/10888430701530730.

Perfetti, Charles, Chin-Lung Yang, and Franz Schmalhofer. 2008. Comprehension skill and word-to-text integration processes. *Applied Cognitive Psychology* 22(3): 303-318. https://doi.org/10.1002/acp.1419.

Rastle, Kathleen, Matt H. Davis, and Boris New. 2004. The broth in my brother's brothel: Morpho-orthographic segmentation in visual word recognition. *Psychonomic Bulletin and Review* 11(6): 1090-1098. https://doi.org/10.3758/bf03196742.

Rastle, Kathleen, Matt H. Davis, William D. Marslen-Wilson, and Lorraine K. Tyler. 2000. Morphological and semantic effects in visual word recognition: A time-course study. *Language and Cognitive Processes* 15(4-5): 507-537. http://doi.org/10.1080/01690960050119689.

Taft, Marcus and Kenneth I. Forster. 1975. Lexical storage and retrieval of prefixed words. *Journal of Verbal Learning and Verbal Behavior* 14(6): 638-647. https://doi.org/10.1016/S0022-5371(75)80051-X.

Wanner-Kawahara, Jessie, Masahiro Yoshihara, Stephen J. Lupker, Rinus G. Verdonschot, and Mariko Nakayama. 2022. Morphological priming effects in L2 English verbs for Japanese-English bilinguals. *Frontiers in Psychology* 13: 742965. https://doi.org/10.3389/fpsyg.2022.742965.

Yap, Melvin J., Chi-Shing Tse, and David A. Balota. 2009. Individual differences in the joint effects of semantic priming and word frequency revealed by RT distributional analysis: The role of lexical integrity. *Journal of Memory and Language* 61(3): 303-325. https://do-

i.org/10.1016/j.jml.2009.07.001.
Yi, Kwangoh and Insun Yi. 1999. Morphological processing in Korean word recognition. *The Korean Journal of Experimental Psychology* 11(1): 77-91.
Yi, Kwangoh and Sungbong Bae. 2009. Morphological processing of native Korean words. *The Korean Journal of Cognitive and Biological Psychology* 21(3): 233-247. http://doi.org/10.22172/cogbio.2009.21.3.005.
Yi, Kwangoh, Jingab Jung, and Sungbong Bae. 2007. Writing system and visual word recognition: Morphological representation and processing in Korean. *The Korean Journal of Experimental Psychology* 19(4): 313-327. http://doi.org/10.22172/cogbio.2007.19.4.004.

Jinwon Kang
Postdoctoral Researcher
School of Humanities and Social Sciences
Gwangju Institute of Science and Technology
123, Cheomdangwagi-ro, Buk-gu,
Gwangju, 61005, Korea
E-mail: kasterran@gist.ac.kr

Seong-Hak Jo
M.A. Graduate
School of Psychology
Korea University
145 Anam-ro, Seongbuk-gu,
Seoul, 02841, Korea
E-mail: csh94@naver.com

Joo-Hee Ahn
Master's Student
School of Psychology
Korea University
145 Anam-ro, Seongbuk-gu,
Seoul, 02841, Korea
E-mail: annjoohee05@timf.org

Jung-Hye Choi
Adjunct professor
Department of Children's English
Cyber University of Korea
106, Bukchon-ro, Jongno-gu,
Seoul, 03051, Korea
Email: franchoi37@cuk.edu

Sun-Young Lee
Professor
Department of English
Cyber Hankuk University of Foreign Studies
107 Imun-ro, Dongdaemoon-gu,
Seoul, 02450, Korea
E-mail: alohasylee@cufs.ac.kr

Received: 2025. 04. 09.
Revised: 2025. 05. 09.
Accepted: 2025. 05. 11.