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A Masked Priming Study on Morphological Parsing in Lexical Access by Korean Learners of L2 English*

Jeonghwa Shin (Korea Military Academy)

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Jeonghwa Shin
Associate Professor
Department of English
Korea Military Academy
574 Hwarang-Ro, Nowon-gu
Seoul 01805, Korea
E-mail: jshinling@gmail.com

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ABSTRACT

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This study examines how word composition and phonological transparency affect the processing of L2 lexical items. To investigate this, Korean-speaking learners of English were engaged in a lexical decision task using a forward masked priming paradigm. The task involved three types of words: regular inflections, phonologically transparent derivations, and phonologically opaque derivations (e.g., boil, blind, brutal). During the experiment, participants were presented with a forward mask (######), followed by a prime word (e.g., boiled), and finally a target word (e.g., BOIL). Participants had to make lexical decisions for the target word. The prime word was identical to the target word (e.g., boil-BOIL), a suffixed form (e.g., boiled-BOIL), or unrelated (e.g., troll-BOIL). The results showed no significant differences in accuracy across the different word types. However, the response latency was longest for phonologically opaque derivations, followed by regular inflections, and shortest for phonologically transparent derivations. Additionally, the unrelated prime resulted in the longest response latency, while the suffixed prime led to longer reaction times than the identical prime. This priming effect was only observed for derivations, particularly phonologically transparent ones. These findings suggest that the processing of English derivational words by Korean L2 English speakers involves morphological decomposition, with a higher parsing cost for phonologically opaque derivations compared to phonologically transparent ones. In contrast, inflected forms did not show evidence of structural parsing in the L2 learners, indicating that regular inflections are stored as whole words by Korean learners of English.

KEYWORDS

forward masked priming, lexical decision, morphological decomposition, L2 lexical access

1. Introduction

Language, as a complex and dynamic system, heavily relies on the intricate relationship between words and their morphological structure. The morpheme, the smallest unit of meaning, serves as the building block of words, carrying out their semantic and syntactic functions. Morphemes are classified into various types based on their semantic and syntactic functions. Free morphemes, such as nouns, verbs, adjectives, and adverbs, can independently stand as words, conveying meaningful content. In contrast, bound morphemes, including prefixes, suffixes, and infixes, need to be attached to free morphemes in order to convey meaning and often contribute to grammatical information. Derivational morphemes, a subset of bound morphemes, modify the meaning (e.g., *worker*) or grammatical category (e.g., *happiness*) of the base word they are attached to, thus creating new words in the process. On the other hand, inflectional bound morphemes, another category of bound morphemes, indicate grammatical features such as tense, number, gender, or case without altering the fundamental meaning or category of the base word (e.g., *walked*). The combinatorial interaction between different types of morphemes enables us to construct words, modify the meanings of words, and establish syntactic structures within sentences, contributing to the intricate and dynamic nature of linguistic expression.

Therefore, understanding how individuals recognize, store and retrieve morphological information during spoken word recognition is crucial for unraveling the cognitive mechanisms that underlie language acquisition and processing. Previous studies in psycholinguistics have explored whether individuals employ morphologically structured representations during real-time processing of morphologically complex words, that is, inflected or derived words. This inquiry has given rise to a debate between associative single-route models and a family of dual-route models, with implications extending beyond morphology and impacting our understanding of language use (Jackendoff and Pinker 2005). Dual-route models (Andrew et al. 2004, Clahsen 1999, Fiorentino and Poeppel 2007, Pinker 1999, Pinker and Ullman 2002, Pollatsek and Hyönä. 2005, Taft 2004) propose two distinct representational systems and processing mechanisms for morphologically complex words. In the dual-route models of lexical access, both decompositional and whole-word processing routes are available. Various factors such as transparency, affix regularity, lexicality, productivity and the frequency of roots and suffixes determine which routes will be taken for processing a word. For example, Prasada and Pinker (1993) demonstrated that high base-frequency words are accessed with shorter response times compared to low base-frequency words for regular inflectional forms. However, this constituency effect was not observed for irregular words. This finding suggests that irregular past-tense forms are stored as whole-word representations in memory and retrieved directly during processing. In contrast, regular past-tense forms have morphologically structured representations, making them suitable for morphological parsing.

On the other hand, associative single-route models, as advocated by Seidenberg and Gonnerman (2000) and McClelland and Patterson (2002), argue that all word forms, including inflected and derived forms, are stored in an associative lexicon, without direct involvement of morphological structure in lexical processing. In the distributed connectionist model proposed by Seidenberg and Gonnerman (2000), morphologically complex words and their constituents are connected through phonological, semantic, or orthographical similarities. Thus, similar to simple words like *dog* or *run* which are accessed without morphological analysis, morphologically complex words like *waited* or *went* are processed through a single route. For example, the word *walked* can be directly processed because it has phonological overlap with *walk*, and *went* is also retrieved as a whole unit due to its semantic similarity to *go*. In their model, there's no need to distinguish between different types of complex words or regular and irregular inflections during processing - all complex words are stored and retrieved as whole units. This approach suggests that the mental lexicon operates without parsing words into morphemes, instead relying on a network of associative connections of word forms.

Although numerous behavioral studies have explored the processing of morphologically complex words in adult native speakers, the theoretical interpretation of the findings remains contentious (Clahsen 2006, Penke 2006). Morphological processing in second language (hereafter, L2) learners has also been a contentious subject over the past decade, focusing on whether early processing of morphologically complex forms in L2 speakers mirrors the fundamental mechanisms observed in first language (hereafter, L1) processing. To address L2 morphological lexical access, numerous studies have employed the masked priming method (Forster and Davis 1984), where participants engage in a lexical decision task involving morphologically related forms, presented briefly and subliminally. In a typical masked priming task, a morphologically complex form like *walked* is followed by a target word like *walk*. The hypothesis is that if the parser rapidly decomposes the prime into its stem and affix, it should facilitate the processing of the target word. The brevity of the presentation (30 to 70 ms) and the visual mask prevent conscious perception, tapping into an early, automatic processing stage. This methodological approach, although challenging to compare with other morphological priming studies, provides a unique insight into the early stages of morphological processing in L2 speakers.

In the early masked priming studies on L2 morphological processing, Silva and Clahsen (2008) found differences between L1 and L2 speakers for both inflected and derived forms. While the L1 group showed efficient priming for both types of word forms, the L2 learners demonstrated no priming for inflected forms and reduced priming for derived forms. They argued that this contrast supports the view that adult L2 learners rely more on lexical storage and less on combinatorial processing of morphologically complex words than native speakers. In another study by Neubauer and Clahsen (2009), substantial morphological priming effects were observed for both regular and irregular German participles among native speakers. However, among a group of highly proficient Polish L2 learners of German, priming was evident only for irregular forms. The authors concluded that L2 processing might place less emphasis on the morphological structure of complex words, instead relying more on the storage and retrieval of whole-word-form representations in the mental lexicon. A similar pattern emerged in Clahsen and Neubauer's (2010) investigation involving derived forms, specifically *–ung* nominalizations. The study found significant facilitation effects in L1 German speakers, but no priming was observed in L2 speakers. The conclusions of these early studies are based on the dual route 'decompositional' psycholinguistic model, which posits that L1 speakers efficiently decompose morphologically complex words into their constituent aprts,while L2 speakers are more likely to rely on whole-word storage and retrieval.

However, other research has proposed an alternative perspective on L2 processing, raising questions about the strict opposition between native and non-native processing and challenging the decompositional perspective. For example, Voga et al. (2014) used the same experimental items as in Silva and Clahsen (2008) and found that Greek-speaking learners of English showed significant priming effects of similar magnitude for both derivation and inflection. This finding suggests that there might not be significant differences between derivation and inflection in L2 processing. Feldman et al. (2010) conducted a masked priming study on the processing of English inflected verbs by Serbian speakers and revealed analogous priming effects for regular and irregular past tense forms in both L1 and L2 groups. A subsequent analysis comparing high- and low-proficient L2 speakers indicated significant priming effects solely for the high-proficient group, suggesting that differences in L1 and L2 processing might be confined to lower proficiency levels. Dal Maso and Giraudo (2014) investigated morphological processing in Italian as the L2 and found L1/L2 differences only in forms with infrequent derivational affixes. For derived forms with frequent and productive affixes, L2 speakers exhibited priming effects similar to native Italian speakers. Additionally, Coughlin and Tremblay (2015) examined decomposition of *–er* (Class I) French verbs by comparing latencies for morphologically related, orthographically related, and semantically related prime–target combinations to latencies for identical and unrelated prime–target combinations. The results revealed full morphological priming for both native and non-native speakers, with this effect increasing with French proficiency for L2 learners. There was partial orthographic priming but the phonological condition involved greater priming than the orthographic condition for both groups, with no semantic priming for either group. They concluded that L1 and L2 speakers have similar lexical access mechanisms for the processing of morphologically complex words. These studies collectively suggest that L1 and L2 processing might not be as fistinct as previously thought and that proficiency level and the nature of morphological affixes play significant roles in L2 morphological processing.

The studies on non-native speakers' processing of morphologically complex words in L2 speech have thus far yielded somewhat mixed results. These variations can be attributed to several factors, including the influence of L1 lexical morphology and the transfer of its processing to L2 lexical access, participants' fluency in the target language, the task paradigm, and the frequency of whole words and their constituents. The present study extends this line of research to Korean-speaking learners of English to explore the masked priming effect of derived and inflected forms in the early stages of L2 lexical access.

Given that most L2 masked priming studies have focused on the priming effect at the levels of morphology, orthography, or semantics, the present study turns its attention to phonological transparency in the processing of derived words. Phonological transparency refers to the degree to which the phonological structure of a derived word faithfully reflects its morphological components. When derivations are phonologically transparent, the pronunciation of the derived word clearly indicates its relationship to the base word and any added morphemes. For instance, in the formation of the noun *happiness* from the adjective *happy*, the addition of the suffix *-ness* results in a phonologically transparent derivation, as the base does not undergo phonetic change with affixation. Conversely, in cases where the phonological relationship between the base word and its derived form involves phonetic or phonological (e.g., stress) change or resyllabification, such as in the noun *severity* (*se-ve-ri-ty*) derived from the adjective *severe* (*se-vere*), the derivation is considered phonologically opaque. This distinction in phonological transparency is expected to clarify the processes underlying the production and recognition of morphologically complex words, providing valuable insights into the cognitive mechanisms involved in L2 language processing.

The specific research question of the present study concerns how Korean-speaking learners of English process different types of English lexical affixation – regular inflection (e.g., *played*), transparent derivation (e.g., *happiness*), and opaque derivation (e.g., *severity*). The latency differences in the lexical decision tasks for the three types of affixed words are expected to answer questions regarding whether affix type influences L2 lexical access and whether phonological transparency interacts with morphological processing, especially in the context of derived words. By investigating these factors, the study aims to contribute to a more nuanced understanding of L2 morphological processing and to determine whether phonological transparency plays a significant role in how L2 learners access and process complex words. This research could potentially reveal important aspects of L2 lexical access mechanisms, including the extent to which L2 learners rely on decompositional versus whole-word processing strategies and how these strategies are influenced by the phonological characteristics of derived words.

2. Methods

2.1 Participants

A total of twenty two Korean-speaking learners of English (3 females, 19 males) participated in the experiment voluntarily. All of them were college-level students at the time of participation, ranging in age from 18 to 23 years old (*Mean* = 19.9, *SD* = 1.3). The age of acquisition (AOA) of English as a foreign/second language ranged from 4 to 14 years old (*Mean* = 8.6, *SD* = 2.8). Participant were asked to evaluate one's English fluency for reading, writing, speaking and listening on the Likert scale of 1 (beginner) to 5 (highly advanced) - Reading (*M* = 3.7, *SD* = 0.7), writing (*M* = 2.9, *SD* = 0.9), speaking (*M* = 2.6, *SD* = 1.0), listening (*M* = 3.3, *SD* = 0.9). The average of all four skills is 3.1 (*SD* = 0.1), the intermediate level. All partcipants did not have immersion experience at the time of participation. None of them reported hearing impairment, nor vision impairment.

2.2 Materials

The design contained three types of morphological complexities in English words: Regular inflection vs. Phonologically transparent derivation vs. Phonologically opaque derivation. The characteristics and examples of these three morphological complexities are provided in Table 1.

Table 1. Morphological Conditions and Characteristics by Prime Conditions

Morphological Complexity	Prime Condition	Example	Mean LogFreq[1] (*SD*)	Mean Length[2] (*SD*)	Mean NSyl[3] (*SD*)	Targets
Regular Inflection	Identity	boil	9.26(0.9)	4.00(0.0)	1.00(0.0)	BOIL
	Test	boiled	7.71(0.6)	5.88(0.4)	1.25(0.5)	
	Unrelated	troll	9.41(1.1)	4.50(0.5)	1.00(0.0)	
Transparent Derivation	Identity	blind	9.41(0.6)	4.38(0.5)	1.00(0.0)	BLIND
	Test	blindness	7.03(0.8)	8.38(0.5)	2.00(0.0)	
	Unrelated	rough	9.59(0.4)	4.75(0.5)	1.25(0.5)	
Opaque Derivation	Identity	brutal	9.37(0.8)	5.62(0.5)	2.00(0.5)	BRUTAL
	Test	brutality	7.77(0.9)	8.25(0.5)	4.00(0.0)	
	Unrelated	fresh	9.54(0.2)	5.13(0.8)	1.13(0.4)	

1) Log_Freq refes to log-transformed HAL frequency(log-transformed HAL frequency norms; Balota et al. 2007), 2) Length indicates the number of letters in the word, and 3) NSyl indicates the number of syllables.

For each morphological complexity, three prime conditions were paired with the target: Identity, Test, and Unrelated. The regular inflection type consisted of 8 regular past-tense verbs as targets (e.g., *boil*) preceded by either an inflected Test prime (e.g., *boiled*), an Identity prime (e.g., *boil*), or a Unrelated control prime (e.g., *troll*) in the experiment. The transparent derivation set consisted of 8 phonologically transparent derivational adjectives as targets (e.g., blind) preceded by either a transparently derived Test prime with the suffix *-ness* (e.g., *blindness*), an Identity prime (e.g., *blind*), or a Unrelated control prime (e.g., *rough*) in the experiment. The opaque derivation set consisted of 8 phonologically opaque derivational adjectives as targets (e.g., *brutal*) preceded by either an opaque Test prime with the suffix *-ity* (e.g., *brutality*), an Identity prime (e.g., *brutal*), or a Unrelated control prime (e.g., *fresh*) in the experiment. The target in all prime-target pairs was the unmarked bare stem.

Part of word stimuli was taken from Silva and Clahsen (2008), with additional words newly adopted to match stem frequencies of prime words (Test/Identity vs. Unrelated) across the three morphological complexities (all *p*s > 0.55) (frequency data obtained from English Lexicon Project at https://elexicon.wustl.edu/index.html). The mean Log Frequency of stems was 9.34 (*SD* = 0.8) in the Identity condition and it was 9.51 (*SD* = 0.6) in the Unrelated condition. The mean number of letters was 4.6 in the Identity (*SD* = 0.8) and 4.8 in the Unrelated condition (*SD* = 0.7). The items in the Test condition were longer (*M* = 7.5, *SD* = 1.3) due to the presence of the affixes. The full lists of word stimuli and their lexical characteristics (number of letters, log-transformed HAL frequency, number of syllables, number of morphemes) are presented by morphological complexity types in the Appendix.

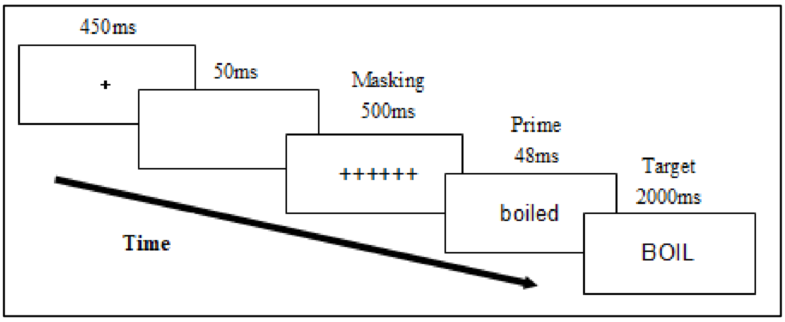
The prime–target pairs were distributed over three experimental lists in such a way that no participant saw the same target more than once. Each list included 24 different critical prime–target pairs: 8 from each prime condition and no target appeared more than once in a list. This counterbalanced design allows repeated measures of responses to all three types of morphological complexities and all three prime conditions.

To prevent participants from developing any expectations about prime–target relations, 200 filler items were constructed, including semantically unrelated inflected word pairs (e.g., plays – LAUGHING; n = 40), semantically unrelated derived word pairs (e.g., possible – DESIGNER; n = 40), nonword-word pairs (e.g., aarod – EASTERN; n = 40), word-nonword pairs (e.g., lift – OLANTOPE; n = 40), nonword-nonword pairs (e.g., tafler – SOATEE; n = 40). Each experimental list consisted of 224 prime–target pairs (24 critical items and 200 fillers).

2.3 Procedure

Each experimental list was presented with the forward masked priming paradigm (Forster and Davis, 1984) as shown in Figure 1.

Figure 1. Structure of a Trial



Each trial began with a 450 ms fixation cross, followed by a 50 ms blank screen. A masking pattern (######), matched in length to each prime word, then appeared for 500 ms. Prime words were presented for 48 ms, followed immediately by target words, which remained visible until participants responded or 2000 ms had elapsed. All stimuli were center-justified on a 17-inch laptop monitor with a white background. Stimuli were presented in black letters, with primes in lowercase and targets in uppercase to minimize visual overlap. Font: Arial, size: 36 for primes; 18 point Courier font for targets. The randomized stimuli presentation and response recording were controlled by the *E-Prime* 3.0 software (Psychology Software Tools, Pittsburgh, PA). Participants responded to each target word using a lexical decision task. They pressed the key "A" (marked with a red-colored sticker on the keyboard) for nonwords and the key "L" (marked with a blue-colored sticker) for words. The inter-trial interval was 1000 ms. No reaction time or accuracy feedback was provided during the experiment.

Both written and verbal instructions were provided to the participants prior to the experiment. Each experiment began with a practice session consisting of ten prime–target pairs. Participants were asked to make a quick and accurate lexical decision about the target by pressing one of the designated buttons on the keyboard. Only the two buttons on the keyboard were set to receive signals during the experiment. Each experiment lasted between 25 and

30 minutes in a silent room.

At the end of each masked priming experiment, participants were asked if they were aware of the presence of a prime during the experiment. No participant reported awareness of the primes, indicating that the priming effects observed were not due to conscious perception of the prime-target relationship. Yet previous studies have shown strong priming effects on target processing in similar masked priming paradigms (Cheesman and Merikle 1986, Debner and Jacoby 1994, Forster and Davis 1984, Forster et al. 1987, Marcel 1983).

Finally, participants had to choose whether they knew the target word by its meaning, pronunciation, or both. None of the targets were reported as new words by the participants.

2.4 Scoring and Analysis

To account for any differences in the normality of the distributions, proportional accuracy scores were transformed to rationalized arcsine units for statistical analyses (Studebaker 1985). However, the actual percentage correct values are reported here.

Prior to the calculation of lexical decision times, incorrect responses to targets (n = 32) and outliers (n = 22), i.e. extreme reaction times that lie outside the interval formed by the 25 and 75 percentiles, were excluded from any further analysis. This resulted in the removal of 10 % (n = 54/528) of the responses to critical items. The vocabulary test did not require any further data trimming and confirmed that the critical items were familiar words to the participants.

The RTs and the accuracy data were submitted to mixed-design analyses of variance (ANOVA) with two independent variables – Morphological complexity (Inflection vs. Transparent Derivation vs. Opaque Derivation) and Prime (Identity vs. Test vs. Unrelated). In the by-subjects analysis (*F*1), the two conditions were treated as repeated. In the by-items analysis (*F*2), both variables were treated as repeated factors. Additional planned within-group comparisons were conducted using *Tukey HSD* test. These post-hoc tests were performed in cases where respective ANOVAs showed significant main effects and interactions of Morphological complexity type and Prime condition.

As the masked priming experiments presented three critical types of prime–target pairs - Identity (e.g., *boil → BOIL*), Test (e.g., *blindness → BLIND*), and Unrelated (e.g., *fresh → BRUTAL*), the difference between the Test and Identity conditions on the one hand and the difference between the Identity and Unrelated conditions on the other are taken as a measure of priming. The response pattern in which the RTs on the target are shorter in the Test and Identity conditions than in the Unrelated condition, and in which there are no RT differences between the Test and Identity conditions is called "full priming". In this case, the items of the Test condition are as effective in priming as an Identity prime. If, on the other hand, the RTs to the targets for the Test condition are longer than the ones for the Identity condition but shorter than for the Unrelated condition, the pattern is considered as "partial priming". "No priming" is obtained if the RTs for the Test and the Unrelated do not significantly differ from each other.

3. Results and Discussion

The mean error rates in the lexical decision of the target words by the function of the morphological complexity types and prime conditions is presented in Table 2.

The results of the ANOVAs for the arcsine-transformed accuracy indicate that there were no significant main effects or interactions of morphological complexity and the prime in both the subject and item analyses (*ps* > .24). Although phonologically transparent words induced numerically higher accuracy than the other two morphological complexities, all three morphological complexities did not differ in the accuracy of lexical decisions for the target words. Similarly, among the three types of primes, the primes that were identical to the targets showed the highest accuracy, but there were no significant differences in the lexical decision accuracy across the three prime conditions.

Table 2. Mean Accuracy (SD) by Morphological Complexity and Prime Condition

	Prime			
Morphological Complexity	Identity	Test	Unrelated	Mean(*SD*)
Regular Inflection	95.3% (0.2)	89.3% (0.3)	94.6% (0.2)	93.2% (0.3)
Transparent Derivation	98.2% (0.1)	96.4% (0.2)	95.3% (0.2)	96.6% (0.2)
Opaque Derivation	92.9% (0.3)	93.8% (0.2)	89.3% (0.3)	92.0% (0.3)
Mean(*SD*)	95.5% (0.2)	93.2% (0.3)	93.2% (0.3)	

Table 3 shows the mean RTs for the morphological complexity types and prime conditions in the forward masked priming experiment. Overall, of the three morphological types, Transparent derivation showed the shortest RTs, while Opaque derivation took longer lexical decision on the target words compared to Regular Inflection. As for the prime effect, the mean RT for the targets in the Test condition was longer than that for the Identity condition, but it was shorter than the one for the Unrelated condition, indicating "partial priming".

Table 3. Mean RTs (SD) by Morphological Complexity and Prime Condition

	Prime			
Morphological Complexity	Identity	Test	Unrelated	Mean(*SD*)
Regular Inflection	720.2ms (169.7)	698.7ms (171.0)	746.2ms (173.2)	722.2 (171.2)
Transparent Derivation	639.1ms (155.3)	677.9ms (175.2)	768.1ms (171.4)	697.9 (175.4)
Opaque Derivation	694.5ms (207.8)	803.5ms (180.5)	837.9ms (204.4)	777.6 (204.5)
Mean(*SD*)	685.7 (180.2)	730.6 (183.7)	780.6 (184.6)	

The ANOVAs performed on RTs yielded main effects of Morphological complexity ($F1$ (2,32) = 12.46, $p < .001$; $F2$ (2,126) = 6.47, $p < .001$) and Prime condition ($F1$ (2,32) = 14.67, $p < .001$; $F2$ (4,126) = 8.77, $p < .001$) for both subjects and items. The interaction of Morphological complexity and Prime was significant for items, but not for subjects ($F1$ (2,32) = 0.83, $p = .45$; $F2$ (4,126) = 4.32, $p < .001$).

Post-hoc tests were conducted to find the locus of the main effects and significant interaction. For the main effect of Morphological complexity, Post-hoc comparisons using the *Tukey HSD* test were performed. The results showed that the mean RT of the Transparent derivation (M = 697.9, SD = 175.4) was significantly shorter than the Opaque derivation (M = 777.6, SD = 204.5; $p < .001$). The difference was also significant between the Regular inflection (M = 722.2, SD = 171.2) and the Opaque derivation (M = 777.6, SD = 204.5; $p < .05$). However, the difference between Regular inflection (M = 722.2, SD = 171.2) and Transparent derivation was not significant (M = 697.9, SD = 175.4; $p = .46$). The results indicate that the general processing loads are comparable for phonological transparent words and regularly inflected past-tense words in L2 English, while the processing load is greatest for the derived words that involve resyllabification and phonological change in the derived forms.

For the main effect of Prime, the *Tukey HSD* test revealed a significant difference between the Identity prime (*M* = 685.7, *SD* = 180.2) and the Unrelated prime (*M* = 780.6, *SD* = 184.6) ($p < .001$) as well as between the Test (*M* = 730.6, *SD* = 183.7) and the Unrelated primes (*M* = 780.6, *SD* = 184.6) ($p < .05$). The difference in lexical decision latency between the Test (*M* = 730.6, *SD* = 183.7) ($p < .05$) and the Identity primes (*M* = 780.6, *SD* = 184.6) was not significant ($p = .07$). The results indicate that when a morphologically related prime (Identity/Test) is presented before a target word, it influences the processing of the target in such a way that word recognition or lexical access is facilitated. Given that the RTs on the target were shorter in the Test and Identity primes than in the Unrelated prime and there were not significant RT differences between the Test and Identity primes, we can say that "full priming" occured at the early stage of L2 lexical access by Korean-speaking learners of English when the prime and target shared the morphological structure, such as the same root or affix.

However, as there was a significant interaction of the Morphological complexity and Prime condition in the item analysis, we need to further explore whether the "full priming" effect is valid across all three morphological complexities. *Post-hoc* comparisons with *Tukey HSD* test were conducted on the interaction of Morphological complexity and Prime. The results show that there are significant differences in lexical decision latencies between the Identity and the Unrelated primes in the Transparent Derivation (*M* = 639.1, *SD* = 155.3 for the Identity condition vs. *M* = 768.1, *SD* = 171.4 for the Unrelated condition; $p < .05$) and also in the Opaque Derivation (*M* = 694.5, *SD* = 207.8 for the Identity condition vs. *M* = 837.9, *SD* = 204.4 for the Unrelated condition; $p < .05$). However, no significant difference was found in the Regular Inflection condition (*M* = 720.2, *SD* = 169.7 for the Identity vs. *M* = 746.2, *SD* = 173.2 for the Unrelated; $p = 1.0$). The results suggest that Korean-speaking learners of English were sensitive to the masked priming at 48 ms in the present study, especially evident in the processing of derived words. The differences between the Test and the Unrelated primes were not significant in all three Morphological complexities (*p*s > .2). However, the difference between the Identity (*M* = 694.5 *SD* = 207.8) and the Test (*M* = 837.9, *SD* = 204.4) was significant in the Opaque derivation only ($p < .05$), with significantly longer RTs for the target words preceded by phonologically opaque derived words. This suggests that the opaque derivation costs more for lexical processing in Korean L2 learners of English compared to the phonologically transparent derivation and regular inflection.

Taken altogether, the findings demonstrate that only for the derived words, the RTs to the targets were significantly shorter in the Test and Identity primes than in the Unrelated prime, and there were no significant RT differences between the Test and Identity primes in the Transparent derivation only. These results suggest that "full priming" takes place at the early stage of lexical access to the phonologically transparent words in Korean learners of English. It is also noted that there is partial/reduced morphological parsing in the lexical access to the phonologically opaque words. This indicates that phonologically opaque derived words pose more parsing load for Korean learners of English. The Inflection condition, which involved English regular verbs, showed no priming effect of the Identity and Test primes. There was no significant difference between the Identity and Test primes and also between the Test and Unrelated conditions, indicating "no priming" in this condition.

4. Conclusion

The study examined how Korean-speaking learners of English process different types of English lexical affixation in their L2 English lexical access using a masked priming paradigm. The specific morphological complexities under investigation were regular inflection (e.g., *played*), phonologically transparent derivation (e.g., *happiness*), and phonologically opaque derivation (e.g., *severity*). The study aimed to determined if the types of affixation influence L2 lexical parsing and if phonological transparency interacts with the morphological processing of derived words by analyzing latency differences in lexical decision to the target words based on morphological complexities and prime conditions.

The majority of stimuli were taken from Silva and Clahsen (2008), where native English speakers showed priming effects for regularly inflected past-tense forms and *-ness* and *-ity* derivations. This suggests that native English speakers rely on morphologically structured representations for these word forms during lexical processing. In the present study, we found that Korean learners of English are still sensitive to masked priming, as shown by the facilitating effect of identity primes for the two derivation conditions. Korean learners of English exhibited full priming in the Test condition for phonologically transparent derived words and a reduced priming effect for phonologically opaque derived word forms. However, they did not show any priming for regularly inflected past-tense forms.

The absence of stem-priming effects in inflection and their reduction in the case of opaque derivation in Korean L2 learners of English support the argument that L2 lexical processing relies less on structural parsing compared to native speakers. The finding that the primary distinction between L1 and L2 processing emerged in the realm of regular inflection suggests that L2 learners store regularly inflected forms as unanalyzed wholes, unlike native English speakers. Additionally, we found that the phonological transparency in the base of derived words affects lexical processing in L2 as opaque derivation slows down morphological parsing at the early stage of lexical processing but is still considered for structural parsing.

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Examples in: English
Applicable Languages: English
Applicable Level: All

Appendix

A. Stimuli for Regular Inflection

Item No.	Prime															Target
	Identity	**Length**[1)]	**Freq**[2)]	**NSyl**[3)]	**NMor**[4)]	**Test**	**Length**	**Freq**	**NSyl**	**NMor**	**Unrelated**	**Length**	**Freq**	**NSyl**	**NMor**	
1	boil	4	8.25	1	1	boiled	6	7.57	1	2	Troll	5	9.34	1	1	**BOIL**
2	cure	4	9.05	1	1	cured	5	7.76	1	2	watch	5	10.95	1	1	**CURE**
3	fold	4	8.50	1	1	folded	6	7.88	2	2	wink	4	7.31	1	1	**FOLD**
4	heat	4	10.25	1	1	heated	6	8.14	2	2	dump	4	9.32	1	1	**HEAT**
5	kick	4	9.90	1	1	kicked	6	8.87	1	2	cloth	5	9.32	1	1	**KICK**
6	lack	4	10.62	1	1	lacked	6	7.35	1	2	hide	4	9.55	1	1	**LACK**
7	pray	4	9.17	1	1	prayed	6	7.06	1	2	ease	4	9.18	1	1	**PRAY**
8	warn	4	8.35	1	1	warned	6	7.04	1	2	block	5	10.41	1	1	**WARN**
	Mean (SD)	4.00 (0.0)	9.26 (0.9)	1.00 (0.0)	1.00 (0.0)	Mean (SD)	5.88 (0.4)	7.71 (0.6)	1.25 (0.5)	2.00 (0.0)	Mean (SD)	4.50 (0.5)	9.41 (1.1)	1.00 (0.0)	1.00 (0.0)	

1) Length indicates the number of letters 2) Freq refers to Log_Freq_HAL, 3) NSyl indicates the number of syllables, 4) NMor indicates the number of morphemes.

B. Stimuli for Transparent Derivation

Item No.	Prime															Target
	Identity	Length[1)]	Freq[2)]	NSyl[3)]	NMor[4)]	Test	Length	Freq	NSyl	NMor	Unrelated	Length	Freq	NSyl	NMor	
1	blind	5	9.52	1	1	blindness	9	7.20	2	2	rough	5	9.23	1	1	**BLIND**
2	thick	5	9.34	1	1	thickness	9	7.70	2	2	cute	4	9.31	1	1	**THICK**
3	sweet	5	9.65	1	1	sweetness	9	6.51	2	2	brief	5	9.88	1	1	**SWEET**
4	soft	4	10.01	1	1	softness	8	6.39	2	2	Quiet	5	9.48	1	1	**SOFT**
5	sick	4	10.00	1	1	sickness	8	7.48	2	2	rapid	5	9.12	2	1	**SICK**
6	rude	4	8.90	1	1	rudeness	8	6.37	2	2	heavy	5	10.40	2	1	**RUDE**
7	weak	4	9.75	1	1	weakness	8	8.59	2	2	proud	5	9.72	1	1	**WEAK**
8	sore	4	8.12	1	1	soreness	8	6.02	2	2	mere	4	9.15	1	1	**SORE**
	Mean (SD)	4.38 (0.5)	9.41 (0.6)	1.00 (0.0)	1.00 (0.0)	Mean (SD)	8.38 (0.5)	7.03 (0.9)	2.00 (0.0)	2.00 (0.0)	Mean (SD)	4.75 (0.5)	9.59 (0.4)	1.25 (0.5)	1.00 (0.0)	

1) Length indicates the number of letters 2) Freq refers to Log_Freq_HAL, 3) NSyl indicates the number of syllables, 4) NMor indicates the number of morphemes.

C. Stimuli for Opaque Derivation

Item No.	Prime															Target
	Identity	Length[1)]	Freq[2)]	NSyl[3)]	NMor[4)]	Test	Length	Freq	NSyl	NMor	Unrelated	Length	Freq	NSyl	NMor	
1	brutal	6	8.08	2	2	brutality	9	6.95	4	3	fresh	5	9.66	1	1	**BRUTAL**
2	fatal	5	8.72	2	2	fatality	8	7.08	4	3	thin	4	9.57	1	1	**FATAL**
3	divine	6	9.46	2	1	divinity	8	7.00	4	2	bright	6	9.53	1	1	**DIVINE**
4	stable	6	9.66	2	1	stability	9	9.09	4	2	tired	5	9.86	1	2	**STABLE**
5	mobile	6	9.13	2	1	mobility	8	7.50	4	2	narrow	6	9.22	2	1	**MOBILE**
6	moral	5	9.96	2	1	morality	8	8.74	4	2	crowd	5	9.47	1	1	**MORAL**
7	severe	6	9.32	2	1	severity	8	7.22	4	2	wise	4	9.51	1	1	**SEVERE**
8	equal	5	10.60	2	2	equality	8	8.58	4	3	smooth	6	9.51	1	1	**EQUAL**
	Mean (SD)	5.62 (0.5)	9.37 (0.8)	2.00 (0.0)	1.38 (0.5)	Mean (SD)	8.25 (0.5)	7.77 (0.9)	4.00 (0.0)	0.00 (0.5)	Mean (SD)	5.13 (0.8)	9.54 (0.2)	1.13 (0.4)	1.13 (0.4)	

1) Length indicates the number of letters 2) Freq refers to Log_Freq_HAL, 3) NSyl indicates the number of syllables, 4) NMor indicates the number of morphemes.