

Korean speakers' perception of cues to liquid contrasts: an EEG study

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In Korean, the lateral liquid and tap [r] are in complementary distribution, with a single liquid pronounced as [l] in syllable coda and as tap [r] in syllable onset (e.g., [mul][mur-i] ‘water/water+NOM’). However, for words borrowed into Korean, English intervocalic [r] is adapted as [r] ([tɕ^heri]) ‘cherry’), as expected, but intervocalic single [l] is generally adapted as geminate [ll] ([k^holla] ‘cola’), even though Korean [ll] is considerably longer than English [l] [1]. This suggests that Korean listeners are more sensitive to the lateral/non-lateral contrast than to the singleton/geminate contrast for liquids. We present evidence from an event-related potential (ERP) study testing the hypothesis that Korean listeners are more likely to process intervocalic single [l] (illegal in Korean) as geminate [ll] than as [r], to explain why Korean listeners realize the English [r-l] contrast in terms of the Korean [r-ll] contrast ([dari] ‘bridge’, [dalli] ‘differently’).

We conducted an ERP experiment in which Korean participants were presented with auditory stimuli consisting of Korean sentences and asked to decide whether the sentence was semantically well-formed. Three different types of auditory stimuli were created: (i) semantically well-formed sentences containing either an [ll]-word or a [r]-word, each in a semantically congruent context; (ii) semantically ill-formed sentences in which an [ll]-word was replaced by an [r]-word (or vice versa), where the substituted word was incongruent with the preceding context; and (iii) ambiguous sentences in which a context-appropriate word containing either [r] or [ll] was edited to contain a single [l], inducing a change from the target word either in duration (ll→l) or in laterality (r→l). We expected semantically anomalous sentences to elicit an N400, a negative-going ERP component found about 400 milliseconds following semantic stimuli that are incongruous given the preceding context. Given the loanword adaptation pattern, in which English single [l] is mapped to Korean [ll], we predicted that Korean listeners would also display a larger N400 to stimuli that were anomalous by virtue of a change in laterality than a change in duration. That is, the stimuli containing a word with single [l] should elicit a larger N400 in contexts where an [r]-word was appropriate than in contexts where an [ll]-word was appropriate.

The behavioral results from 27 Korean participants show that, as expected, Korean listeners were much more likely to accept ambiguous sentences with a single [l]-word as well-formed when the [l]-word appeared in a context where an [ll]-word was expected (81.4%) than a context where an [r]-word was expected (39.4%) (Figure 1). Similarly, a larger N400 amplitude was observed in response to an [l]-word presented after an [r]-word context than in a context where an [ll]-word was expected (see the red line in the rectangle box in figure 2). However, although both the behavioral results and the N400 patterns were consistent with the adaptation of intervocalic single [l] as geminate [ll], N400 to /l/ forms was unexpectedly large in both contexts. That is, while almost 40% of the ambiguous sentences containing an [l]-word were accepted as well-formed, the N400 response elicited by the same sentences was as large as the response elicited by clearly ill-formed sentences. We propose that the N400 pattern reflects a response to the illegality of the single [l] stimuli at early levels of processing, while the behavioral results reflect the higher level mapping of these stimuli to legal native structures.

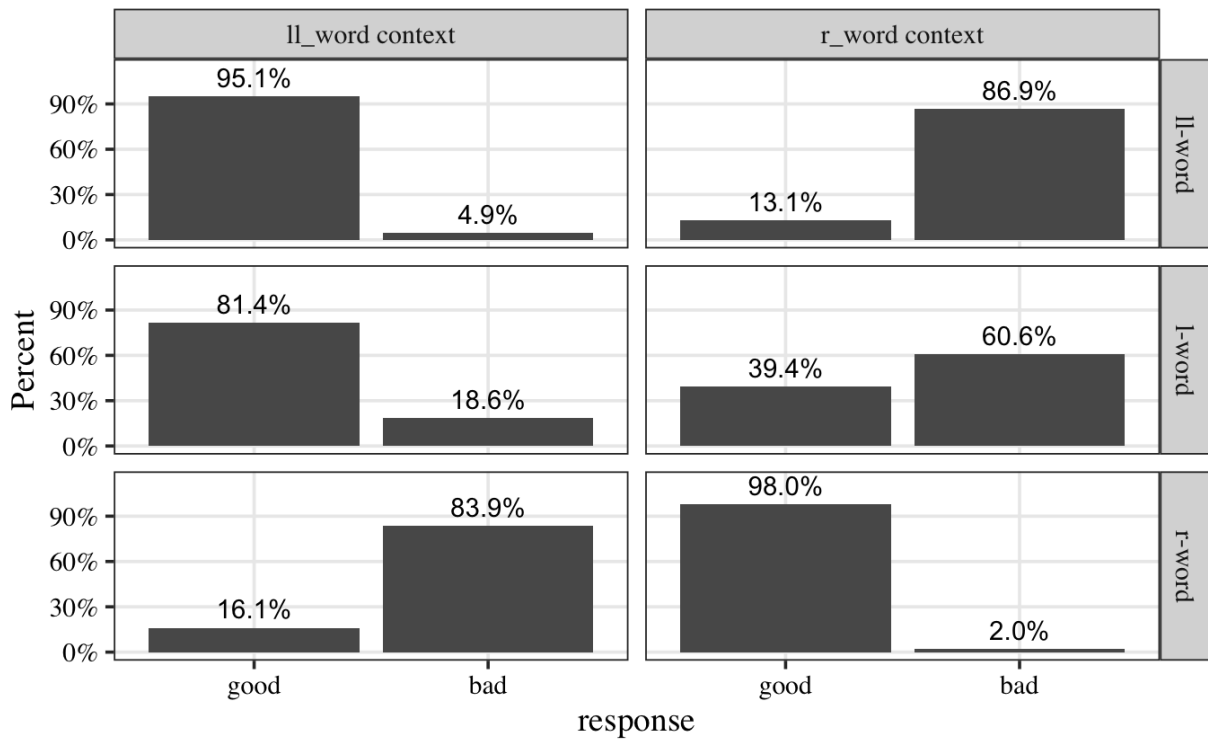


Fig 1. SENTENCE WELL-FORMEDNESS JUDGEMENT TASK

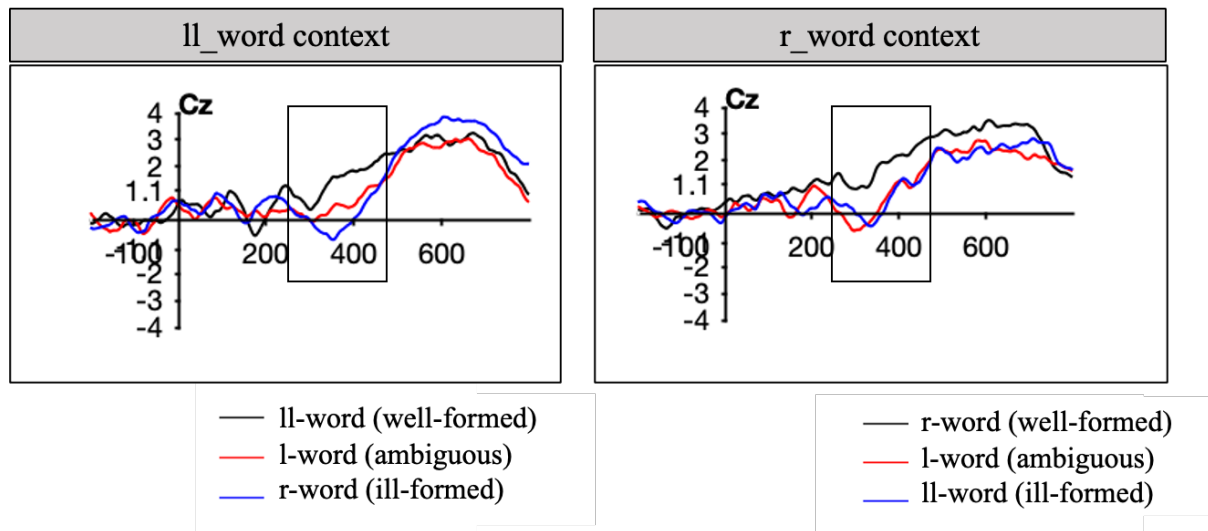


Fig 2. ERP WAVEFORMS AT ELECTRODE SITE CZ: WAVEFORMS REFLECT THE AVERAGE ACTIVITY AND THE ONSET OF DEVIANCE (BEGINNING OF THE VOWEL BEFORE [ll], [l], [r] IN EACH TARGET WORD) IS INDICATED BY THE VERTICAL BAR

References

[1] Oh, M. (2005). Phonetic and spelling information in loan adaptation. *Korean Journal of Linguistics* 20, 347-368.