

# Effects of lexical competition on two types of durational contrasts in Japanese: Geminate and VOT

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Traditional phonology claims that phonological representations of words are stored using abstract phonemic units. However, recent usage-based approaches (e.g., Bybee, 2001) claim that lexical representations contain finer phonetic detail, and that the way words are produced is affected by numerous factors, including word frequency/familiarity and the presence or absence of lexical competitors, or minimal pairs. These lexical effects in production have been studied most extensively in English (e.g., Goldrick et al., 2013), but few studies have ventured into other languages, or have examined multiple contrasts simultaneously within a language. In the present study, we investigated how lexical factors influence the production of words in Japanese, focusing on two types of durational contrast: voicing contrast and singleton-geminate contrast.

A speech production experiment was conducted in which 32 native Japanese speakers read aloud lists of Japanese words that were manipulated orthogonally with respect to two lexical factors. The first factor was word status, i.e., whether the word was a real word, e.g., *gaka* “artist”, or a nonword, e.g., *\*gapa*. The second factor was competition, i.e. whether the word had a lexical competitor that minimally contrasted in voicing or singleton-geminate contrast (examples below).

Acoustic analysis of the productions revealed two main findings. First, for words containing singleton-geminate contrasts, the closure-to-word duration ratio, i.e., word-medial singleton/geminate stop closure duration divided by word duration, was significantly higher for geminate stops when the word had a lexical competitor, e.g., *gakka* “subject of study” vs. *gaka* “artist”, than when it did not, e.g., *rakka* “fall” vs. *\*raka*. No such effect was found for singleton stops. Second, for words containing voicing contrasts, VOT was significantly shorter for voiceless stops when the word had a lexical competitor, e.g., *kara* “empty” vs. *gara* “pattern”, than when it did not, e.g., *kana* “Japanese character” vs. *\*gana*. No such effect was found for voiced stops.

These results support and extend previous usage-based studies, demonstrating that lexical factors influence the phonetic realization of words, not only for voicing contrasts, but also for length contrasts which have hitherto been understudied. Moreover, while the presence of lexical competitors leads to phonetic *enhancement* in the case of singleton-geminate contrasts, it leads to phonetic *reduction* in the case of voicing contrasts, suggesting that fine-grained phonetic modifications do not always maximize the phonetic distinction among neighboring words, but likely reflect the influence of a complex mixture of multiple factors.

## References

- Bybee, J. (2001). *Phonology and Language Use*. Cambridge University Press. Cambridge, UK.  
Goldrick, M., Vaughn, C., and Murphy, A. (2013). The effects of lexical neighbors on stop consonant articulation. *Journal of the Acoustical Society of America*, 134, EL172-177.