

# The effect of phonological-orthographic consistency on the processing of reduced and citation forms of Japanese words: Evidence from pupillometry

Yoichi Mukai, Benjamin V. Tucker, Juhani Järvikivi

University of Alberta

Research shows that orthographic representations are activated during the recognition of spoken words. Evidence for this activation comes from studies which investigate the effect of phonological-orthographic (P-O) consistency. These studies indicate the extent to which pronunciation is consistently reflected in spelling influences the speed of word recognition (e.g., Ziegler & Ferrand, 1998; Veivo & Järvikivi, 2013). Inconsistent spelling delays the recognition of spoken words. In English, for example, the rhyme /-ʌk/ is consistent because it has only one possible spelling “-uck”, but the rhyme /-ip/ is inconsistent as it has two possible spellings “-eap” or “-eep”. Words with /-ʌk/ are recognized faster than words with /-ip/ (Ziegler, Stone, & Jacobs, 1997). However, additional inconsistency could arise in a daily conversation, as we often reduce or even delete multiple segments of words. For instance, *yesterday* /jɛstəˌreɪ/ could be pronounced [jɛʃeɪ] (Ernestus & Warner, 2011). If these reduced forms of words which occur frequently in conversational speech lead to additional effects of P-O inconsistency, it could further affect our online comprehension of spoken words in spoken interactions.

In this study, we used pupil dilation measurement during a Go-NoGo task to examine the effect of P-O consistency during the perception of reduced and citation forms of Japanese words. Pupil dilation reflects cognitive effort without the influence of task-specific strategies (Papesh & Goldinger, 2012). Further, the Go-NoGo task in this experiment does not require any decision on target items as participants only respond to filler items. For statistical analysis, we used generalized additive modeling (Wood, 2006), which allows for modeling non-linear relationships and controlling for autocorrelation in time-series data like pupil dilation measures (Baayen, Vasishth, Bates, & Kliegl, 2016).

Our results indicate that reduced word forms demand more cognitive effort to process than citation word forms replicating previous studies (e.g., Tucker, 2011). We also find a P-O consistency effect in both reduced and citation word forms. Further, the magnitude of the effect was comparable between the two forms, suggesting that additional phonetic inconsistencies in reduced word forms do not create additional effects of P-O inconsistency. Even though the presence of the P-O consistency effect for reduced word forms suggests that orthographic representations were activated, the orthographic activation for reduced word forms was not a one-to-one mapping between the actual phonetic forms of the reduced words, but rather a one-to-one mapping with the phonological form of the words. This suggests that reduced forms are linked to the phonological form of these words in the mental lexicon, and the deleted segments in reduced forms are restored (Kemps, Ernestus, Schreuder, & Baayen, 2004). This result is in contrast to Mitterer & Reinisch (2015) who find that orthographic representations are not activated in the perception of conversational speech in German and Maltese. In our presentation, we will discuss the implications of our results to models of spoken word recognition.

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