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Filtering out place assimilations in perception I: Context-sensitivity at an acoustic/phonetic level

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In fluent speech, the acoustic realisation of a single word is dependent on the context due to connected speech processes. One of these processes is place assimilation, due to which, for instance, the Dutch word /tœyn/ ('garden') may be pronounced as [tœym] in the composite /tœynbank/ ('garden bench'). Gaskell and Marslen-Wilson (e.g., 1998) proposed that there is a mechanism that filters out the consequences of place assimilation in perception. Gaskell and Marslen-Wilson assume that this filter is 1) perceptual in nature and 2) works on an abstract phonological level.

If filtering is indeed perceptual, the perceptual distance between a canonical form [tœynbɑnk] and a viable change, i.e., an assimilation, as [tœymbɑnk] should be smaller than the perceptual distance between a canonical form [tœynstul] ('garden chair') and an unviable change [tœymstul]. We tested whether this holds in passive listening by measuring event-related potentials. The MisMatchNegativity was measured for two stimulus pairs: a canonical form vs. a viable change and a canonical form vs. an unviable change. Although the acoustical difference between both stimulus pairs was identical (cross-spliced stimuli), the MMN to the impossible change was larger than the MMN to the possible assimilation. This provides strong evidence for the perceptual nature of the filter for phonological assimilation.

However, identification experiments showed that participants often (mis)identified assimilations ([tœymbɑnk]) as canonical forms ([tœynbɑnk]). This pattern holds even when participants are forced to attend to acoustic-phonetic detail and receive immediate feedback on the accuracy of their identification. Control experiments with non-native listeners and masking noises ruled out the possibility that this was due to lexical knowledge or perceptual masking. These result contrast with the assumption that filtering phonological assimilations occurs at a late phonological stage. Instead, it seems more likely that filtering occurs at early, acoustic-phonetic levels of processing. Filtering phonological assimilation may therefore be another instantiation of well-known context-dependencies such as 'compensation for coarticulation.'

Gaskell, G., and Marslen-Wilson, W.D. (1998) Mechanisms of phonological inference in speech perception. *Journal of Experimental Psychology: Human Perception and Performance* 24, 380-396.