Allophonic variation in English /l/: production, perception, and segmentation
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The distribution of allophones often depends on word, morpheme, or syllable boundaries, and thus encodes prosodic or morphological information. One such case is the distribution of dark and light /l/ in North American English. Light [l] is often claimed to appear in onsets and dark [ɫ] in rimes (e.g. Halle & Mohanan 1985). Instrumental studies have provided evidence for a more complex pattern, with the darkness of intervocalic /l/ being affected by morphological constituency (e.g. Sproat & Fujimura 1993, Lee-Kim et al. 2013). If the distribution of dark and light /l/ reliably correlates with the location of word, morpheme, and syllable boundaries, it may provide important cues to speech segmentation in perception. This talk reports on a series of experiments on the production and perception of dark and light /l/. These studies investigate the question of how speakers use allophonic cues to encode linguistic boundaries and whether listeners make use of these cues in determining the location of boundaries in perception.

In the perception study, subjects listened to two-word nonce strings. All strings had a C₁VC₂VC₃VC₄V shape in which C₁ is ambiguous between the final C of word 1 and the initial C of word 2 (e.g. [desiledul]). For each string they heard, subjects were asked to choose between two, 2-word orthographic representations with the choices varying only in the location of a space indicating a word boundary (e.g. desi ledu vs. desil edu). Some strings contained a dark /l/ in C₃ position and others contained a light /l/. Stimuli were produced by one of the authors reading the strings aloud without a pause. Sound files were cross-spliced; the dark [ɫ] condition consists of a C1VC2VC3 string containing a dark [ɫ] followed by a VC4V originally produced following a light [l] and vice versa.

Results from 60 participants show that presence of dark versus light /l/ played a significant role in segmentation. Light [l] was a strong cue to word-initial position, with listeners choosing the orthographic representation with /l/ in the initial position of word 2 at a rate of 92.4% when presented with a string containing light /l/. When participants heard a string containing dark [ɫ], they chose the orthographic form with /l/ in the initial position of word 2 43.8% of the time.

This perception study shows that listeners make use of the distinction between light and dark /l/ when locating word boundaries. However, because word boundaries coincide with morpheme and syllable boundaries, this result does not clarify the specific environments which condition the variation in production - or the type of boundaries which listeners’ recover in perception. We attempt to address these questions in a series of production studies which elicit productions of /l/ in a variety of morpho-syntactic contexts. Productions of /l/ were measured for F2-F1 values, an acoustic property known to play a role in the distinction between light and dark /l/ (e.g. Sproat & Fujimura 1993). We found word-initial /l/s (woo lasses) to be lighter than word-final ones (fool asses). Within words, we found morpheme-initial /l/s (free-ly) to be lighter than morpheme-final /l/s (meal-y). Contrary to Hayes (2000) and Sproat and Fujimura (1993), we found no difference in /l/ darkness between morpheme-final /l/s (knee-ing) and morpheme-internal ones (ceiling), with /l/ being realized as dark in both environments.

Overall, our production studies found light /l/ only in morpheme-initial position and dark /l/ in morpheme-final and morpheme-internal position. This is consistent with an account in which dark /l/ is the basic variant for our speakers and /l/-lightening is a form of articulatory strengthening which occurs following prosodic boundaries with the presence of such boundaries being triggered by morphological structure. This constituent-initial /l/-lightening serves as a cue for listeners to disambiguate between multiple structural parses of a segmental string.

References

