Are vowels more nasalized in American than in British English?

Conceição Cunha [1], *Jonathan Harrington*[1], *Phil Hoole*[1]

[1]*Institute of Phonetics and Speech Processing, LMU Munich*
cunha|jmh|hoole@phonetik.uni-muenchen.de

This study analyzes regional differences in the production of vowel nasalization and their relation to sound change. Following the model of articulatory phonology (Browman&Goldstein,1992; Fowler&Smith,1986), tongue and velum gestures for a vowel are autonomous and can be variably phased. In the sound change model (Beddor, 2009, 2012; Beddor et al, 2013; Coetzee et al. 2022), the increasing vowel nasalization comes about due to the earlier synchronization of the velum with the tongue for the preceding vowel. The rephasing of a stable velum gesture and the consequent trade-off between coarticulatory effect and source form a path to the sound change by which vowel nasalization can be phonologized.

In this context, the study tests whether American (USE) and Standard Southern British English (SBE) are at different stages on the sound change path. Because regional variation in tongue height has been shown for nasalization in USE (Mielke et al,2017), the physiological analysis of velum and tongue-tip movement collected using real-time MRI includes three different regions of USE and 43 speakers. The main predictions are for an earlier peak of the velum gesture and shorter nasal consonants for USE.

Peak velum showed a significant influence of dialect ($F_{1, 41.05}$=26.90,p<0.001), vowel ($F_{4, 1969.14}$ = 342.94,p<0.001) and of coda ($F_{2,1969.10}$=16.00,p< 0.001), but the articulatory duration was significantly influenced by the vowel (F4,1099.80 = 59.19,p < 0.001), coda (F2,1904.70 = 365.62, p<0.001), but not by dialect. There were differences between the US regions, but the peak velum was earlier in all single US regions and in all contexts, showing that vowels were indeed more nasalized in the American varieties then in SBE. The tongue tip gesture in nasal codas was shorter, but not slower in USE, providing empirical evidence for the trade-off between increased nasalization in the vowel and greater tongue tip lenition of the nasal consonant.

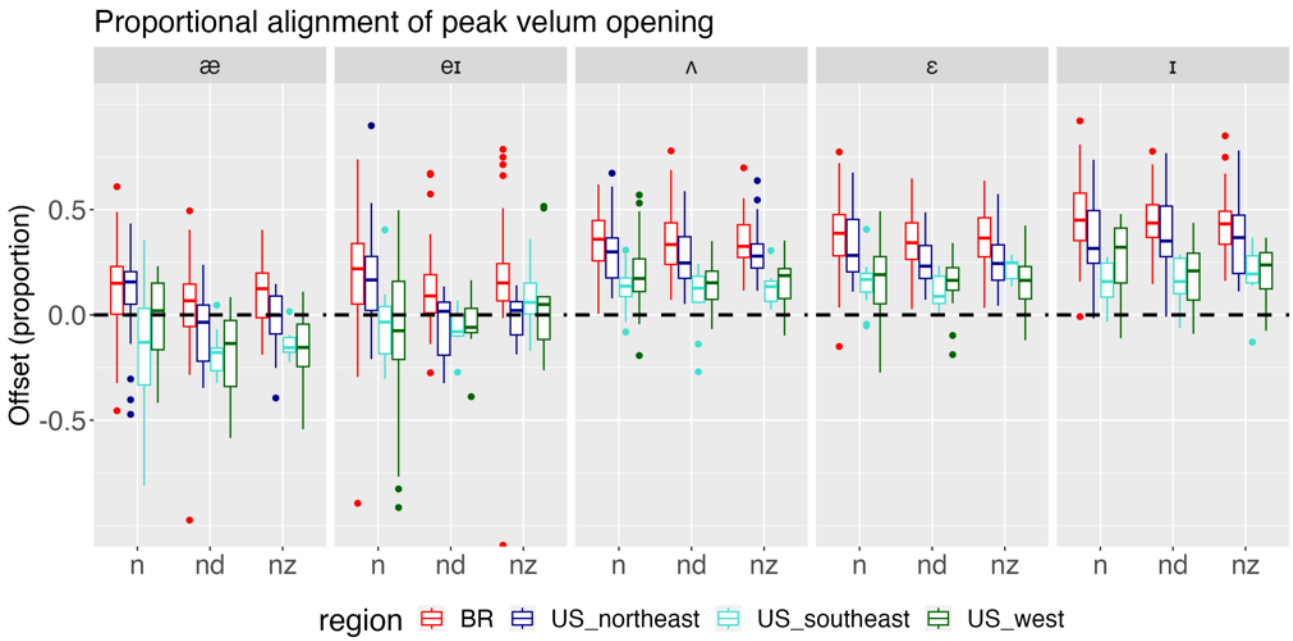

Fig.1: The proportional time of the peak velum gesture relative to the acoustic /VN/ boundary. The horizontal dashed line in row 1 is when the time of the peak velum opening gesture coincides with the acoustic boundary between /V/ and /N/.

Literatur

Beddor, P. S. (2009). A coarticulatory path to sound change. Language 85, 785-821.

Beddor, P. (2012). Perception grammars and sound change. In M-J Solé & D. Recasens (Eds.) The Initiation of Sound Change. Benjamins: Amsterdam. (p. 37-55).

Beddor, P., McGowan, K., Boland, J., Coetzee, A., and Brasher, A. (2013). The time course of perception of coarticulation. Journal of the Acoustical Society of America, 133. 2350–66.

Browman, C., & Goldstein, L. (1992). Articulatory phonology: An overview. Phonetica, 49, 155–180.

Coetzee, A. W., Beddor, P. S., Styler, W., Tobin, S., Bekker, I., & Wissing, D. (2022). Producing and perceiving socially structured coarticulation: Coarticulatory nasalization in Afrikaans. Laboratory Phonology: Journal of the Association for Laboratory Phonology, 13(1): 13, pp. 1–43.

Fowler, C., & Smith, M. (1986). Speech perception as "vector analysis": An approach to the problems of segmentation and invariance. In J. Perkell & D. Klatt (Eds.) Invariance and Variability in Speech Processes. Erlbaum: Hillsdale, NJ, pp. 123–139.

Mielke, J, Carignan, C. , Thomas (2017). The articulatory dynamics of pre-velar and pre-nasal /æ/-raising in English: An ultrasound study. The Journal of the Acoustical Society of America 142, 332 (2017); doi: 10.1121/1.4991348.