Uniformity and crosslinguistic influence in Cantonese-English bilingual stops

While crosslinguistic influence is widespread in bilingual speech production, it remains unclear which aspects of representation are shared across languages. Most prior work examines phonetically-distinct yet phonologically-similar sounds, for which phonetic convergence suggests a cross-language connection (Chang, 2012). Convergence is harder to assess when sounds are already similar, as with English and Cantonese long-lag stops. To assess shared phonological representation, we extend the articulatory uniformity framework (Chodroff & Wilson, 2017) to cross-language homorganic pairs. Uniformity is the notion that phonological features are consistently implemented, constraining phonetic variation (Chodroff & Wilson, 2017). Here, we ask if Cantonese-English bilinguals exhibit uniform VOT for /ptk/ within and across languages.

Using a new Cantonese-English bilingual speech corpus (n=34), we identified prevocalic syllable-initial /ptk/ from force-aligned transcripts refined with AutoVOT (Keshet & Sonderegger, 2012). Preliminary results from ten talkers exhibit high within-English and within-Cantonese uniformity. After accounting for speech rate, residual VOT values are significantly correlated in English (all: $r > 0.75$, $p < 0.01$) and Cantonese (all: $r > 0.82$, $p < 0.01$). Cross-language homorganic pairs were not significantly correlated (all: $r < 0.57$, $p > 0.08$). A Bayesian linear mixed model indicates that VOT variation arose primarily from talker intercept differences—corroborating the correlation analysis—and the existence of preceding silence. Estimates were highly variable across talkers, which fits with the observation that only 2/10 talkers had the same ordinal relationship of /ptk/ VOT means across languages. Together, these preliminary results suggest that bilinguals do not share an underlying laryngeal feature across languages.

References

Chang, C. B. (2015). Determining cross-linguistic phonological similarity between segments: The primacy of abstract aspects of similarity. In E. Raimy & C. E. Cairns (Eds.), The Segment in Phonetics and Phonology (1st ed., pp. 199–217). John Wiley & Sons, Inc. https://doi.org/10.1002/9781118555491

Chodroff, E., & Wilson, C. (2017). Structure in talker-specific phonetic realization: Covariation of stop consonant VOT in American English. Journal of Phonetics, 61, 30–47. https://doi.org/10.1016/j.wocn.2017.01.001

Sonderegger, M., & Keshet, J. (2012). Automatic measurement of voice onset time using discriminative structured prediction. The Journal of the Acoustical Society of America, 132(6), 3965–3979. https://doi.org/10/f4j9rq