Implications of interarticulatory coordination for patterns of sound change

In our previous work, data on patterns of articulatory overlap led to a plausible account of the greater susceptibility of clusters such as /kn/ to sound-change (e.g. compared to /kl/). We consistently found less overlap between the consonantal gestures in /kn/ for German, a language that unlike English has retained both clusters. This was interpreted as a strategy to avoid destroying salient properties of the plosive burst through premature lowering of the velum. Thus we assumed that the low-overlap cluster /kn/ is dispreferred because it is less suitable for fulfilling the competing constraints of parallel transmission (efficient for speaker) and good recoverability (efficient for hearer). An interesting challenge to the generality of this account has emerged from more recent analysis of plosive+r clusters. Such clusters appear to be much more common than plosive+nasal clusters. Nevertheless EMA data for German and French (all 9 speakers studied having a dorsal /r/) showed clearly less overlap for onsets with plosive+r than plosive+l.

Our first reaction to this finding was that it could provide a neat explanation for the fact that while plosive+r clusters are very common it is nonetheless the case that /r/ is frequently involved in metathesis (e.g. Germ. "Ross" vs. English rhotic dialects "horse"), thus in a sense involving instability in the position relative to the vowel. Moreover, as recently pointed out by Webb & Bradley (2009), it is possible to identify cases of metathesis involving dorsal /r/ that may not be amenable to an account based on the effect of long-range lowering of F3 put forward by Blevins & Garrett (2004). The low-overlap pattern for plosive+r clusters would lead to straightforward scenario if , in turn, this resulted in the rhotic C2 showing a particularly large degree of overlap with the following vowel (which would actually be a prediction of the c-center pattern of organization of onset clusters proposed by Browman & Goldstein). This would result then in a situation in which listeners might very easily misinterpret the position of the rhotic in the syllable given some variability in gestural timing by the speaker.

Unfortunately, the articulatory data gave little evidence for such a pattern: Rather than the right-edge of the cluster-onset moving to the right over the vowel compared to a control singleton onset, there was a strong shift of the left edge of the cluster away from the vowel.

To resolve this puzzle, stimuli are now being prepared using articulatory synthesis to investigate the perceptual implications of systematically varying the amount of overlap, both of the onset consonants with each other as well as the onset as a whole with the vowel. This would aim to pinpoint what aspects of plosive+/r/ clusters make them successful as onsets (i.e. presumably easily recoverable by the listener), even if this comes at the price of low overlap (inefficient for the speaker) and occasional misperceptions of temporal location by the listener.

Blevins, J. & Garrett, A. 2004. "The Evolution of Metathesis". Phonetically Based Phonology, ed. by B. Hayes, R. Kirchner & D. Steriade, 117-156. Cambridge: Cambridge University Press.

Webb, E. R. & Bradley, T.G. 2009. Rhotic Metathesis Asymmetries in Romance: Formalizing the Effects of Articulation and Perception on Sound Change. Romance Linguistics 2007: Selected Papers from the 37th Linguistic Symposium on Romance Languages (LSRL) ed. by Pascual J. Masullo, Erin O'Rourke, & Chia-Hui Huang, 321-337. Amsterdam: John Benjamins.