

Investigating the articulatory bases of a sound change in progress: an ultrasound study of derhoticisation in Scottish English

Despite the availability of instrumental articulatory methods for investigating speech production, the role of articulatory strategies in the initiation and transmission of sound change – and their relationship to perceived variation – is still not well understood (though see e.g. Wright and Kerswill (1989)). This poster presents results from a new study which considers the articulatory bases for an ongoing sound change in Scottish English.

In present-day English spoken in the Scottish Central Belt (SCB), a range of postvocalic /r/ variants can be heard. We focus on two variants at opposite ends of an auditory continuum; approximants with a strong rhotic quality, traditionally transcribed as retroflex and variants with a weak rhotic quality, where an audible /r/ articulation is almost absent. These qualitatively opposing variants have been of interest for over four decades, as they are used predominantly by members of higher and lower socioeconomic groups respectively, see. Romaine (1978), Speitel and Johnson (1983), Stuart-Smith (2003), (2007). Romaine (1978) noted that the increased sociophonetic complexity of /r/ variation in Eastern SCB speech indicated a sound change in progress: the weakened variant could be a step towards full nonrhoticity.

We report here the findings of an Ultrasound Tongue Imaging (UTI) study, which allowed an examination of the articulations underlying these different types of postvocalic /r/, and which resulted in some surprising insights. A socially-stratified corpus of UTI recordings from 15 young speakers from eastern SCB was collected in 2007-8. Examination of weakened /r/ shows that a tongue-tip raising gesture is still present, but temporally offset, so that the gesture maximum occurred after voicing had ceased, Lawson et al (2008). An explanation for this phenomenon will be suggested. Examination of the strong /r/ revealed a *bunched*, rather than a retroflex tongue configuration. The presence of tongue bunching also potentially explains the neutralisation of *girl*, *fur*, and *fern* vowels to the same schwa-like vowel.

A further interesting finding emerged: apparent social stratification is also found at the articulatory level in CVr words, e.g. *beer*, *poor*, *far*, *bore*, *par*, *purr*. Bunched tongue configurations were most common in the speech of those from higher socioeconomic classes and tip-raised variants were more common among lower socio-economic classes, particularly males. These results contrast with those from recent studies of American English bunched and retroflex /r/, which show nonobvious intra and inter-speaker patterns of variation, due to the fact that articulatory configurations are auditorily indistinguishable, e.g. Twist et al (2007).

Social stratification in articulation of /r/ suggests a need to investigate listeners' ability to perceive and/or retrieve underlying tongue gestures from the auditory signal cf Ohala (1996); Fowler et al (2003). We conclude with a report on a pilot study which used UTI to compare tongue configurations and gesture timings during a mimicking task. We recruited a 32 year-old male speaker (who had lived in both east and west SCB) and self-identified as using different /r/ variants depending on interlocutor. Using material from the Eastern SCB corpus, we asked the participant to mimic auditorily-presented stimuli (e.g. *verb*, *for*, *sure*, *bear*) for which we also had UTI recordings. The results showed that the speaker did not reproduce the tongue configurations of the original speaker, but he did adjust his gestural timings towards those of the stimulus. The pilot study also showed that misinterpretation of weakly rhotic variants can occur when a word is not presented in conversational context even if a covert tip-raising gesture is present in the stimulus.

References

- Fowler, C. A., Brown J. M., Sabadini L., Weihing J. (2003). "Rapid access to speech gestures in perception: Evidence from choice and simple response time tasks." In *Journal of Memory & Language*. (49) Pp396-413.
- Lawson, E. Stuart-Smith, J., and Scobbie, J. (2008) . "Articulatory Insights into Language Variation and Change: Preliminary Findings from an Ultrasound Study of Derhotization in Scottish English." *University of Pennsylvania Working Papers in Linguistics*. 14/2: 1524-1549.
- Ohala, John, J. (1996). "Speech perception is hearing sounds not tongues." In the *Journal of the Acoustical Society of America* (99) (1996). pp1718-1725.
- Romaine, S. (1978). "Postvocalic /r/ in Scottish English: Sound change in progress?" In Trudgill, P. (Ed). *Sociolinguistic Patterns in British English*. London: Edward Arnold. Pp144-157.
- Speitel, H. & Johnston, P. (1983). ESRC End of Grant Report "A Sociolinguistic Investigation of Edinburgh Speech."
- Stuart-Smith, J. (2003), 'The phonology of Modern Urban Scots'. In Corbett, J. J., McClure, D. and Stuart-Smith, J. (eds.) *The Edinburgh Companion to Scots*. Edinburgh: Edinburgh University Press. pp.110-137.
- Stuart-Smith, J. (2007). 'A sociophonetic investigation of postvocalic /r/ in Glaswegian adolescents'. In the Proceedings of the XVIth International Congress of Phonetic Sciences, Saarbrücken. p1307
- Twist A., Baker A., Mielke J., and Archangeli D. (2007) "Are 'covert' /r/ allophones really indistinguishable?," In *Selected Papers from NWAV 35, University of Pennsylvania working Papers in Linguistics* 13/2: 207-216
- Wright, S. and Kerswill, P. (1989) "Electropalatography in the study of connected speech processes." *Clinical Linguistics and Phonetics*.3: 49-57