

The impact of phonotactic position and social class on coda /r/ tongue gesture timing in spontaneous speech

¹Eleanor Lawson, ¹James M. Scobbie, ²Jane Stuart-Smith

¹Queen Margaret University, Edinburgh, ²University of Glasgow

elawson@qmu.ac.uk, jscobbie@qmu.ac.uk, jane.stuart-smith@glasgow.ac.uk

Background

Previous ultrasound tongue imaging research based on word-list recordings of Scottish speech shows that coda /r/ strength is affected by the timing of the anterior lingual gesture; delayed tongue gestures causing /r/ to sound weak, or absent. Three factors have been found to significantly affect lingual gesture timing: (1) speaker social class, (2) /r/ tongue shape (3) checked status of preceding vowel (Lawson et al., 2015, Lawson et al., 2013). To date, there has been no systematic study of the effect of linguistic factors such as phonological context and stress on coda /r/ gesture timing, although prepausal position has been found to significantly delay gesture timing in /l/ (Sproat and Fujimura, 1993, Recasens and Farnetani, 1994). We present a study of coda /r/ gesture timing using an audio-UTI conversational corpus to quantify the effects of linguistic and social /r/ on gesture timing.

Method

Eight male and female Glaswegian speakers aged 12-13 (half middle-class, half working-class) were recorded carrying out a spot-the-difference task. Recordings lasted around 15 minutes and were made with DP2200 video-based ultrasound machines (deinterlaced frame rate of c60fps), Articulate Assistant Advanced software and probe-stabilizing headsets. Technical constraints required sampling of speech in 10s chunks (with 5s saving time). Mean 23 analysable coda /r/-word tokens were obtained per speaker. A normalised temporal measure was taken between the maximum of each anterior lingual gesture for /r/ and voicing offset/onset of a following consonant. Mixed effects modelling was undertaken with fixed factors: phonological context (VrC, Vr#C, Vr##C, Vr###); syllable stress (stressed/unstressed); preceding vowel (checked/unchecked); speaker sex (M/F); speaker social class (WC/MC).

Results

Statistical analysis confirmed expected patterns of timing variation; gesture delay was significantly affected by social class and phonological context. WC speakers' anterior /r/ gestures were more delayed than those of MC speakers. In the Vr### - utterance-final - context WC speakers produced significantly longer delays than other phonological contexts.

References

- Lawson, E. Scobbie, J. M. and Stuart-Smith, J. (2015). "The role of anterior lingual gesture delay in coda /r/ lenition: an ultrasound study. In Proceedings of the 18th ICPhS, Glasgow (0332).
- Lawson, E. Scobbie, J. M. and Stuart-Smith, J. (2013). "Bunched /r/ promotes vowel merger to schwa: An ultrasound tongue imaging study of Scottish sociophonetic variation," *Journal of Phonetics* 3–4, 198-210.
- Recasens, D. and Farnetani, E. (1994). "Spatiotemporal properties of different allophones of /l/: phonological implications," *Phonologica 1992: Proceedings of the 7th International Phonology Meeting*, 195-204.
- Sproat, R. and Fujimura, O. (1993). "Allophonic variation in English /l/ and its implications for phonetic implementation," *Journal of Phonetics*, 292-311.