Residual rhoticity in East Lancashire English: Variation in Blackburn and Burnley

Claire Nance, Maya Dewhurst, Lois Fairclough, Pamela Forster, Sam Kirkham, Justin Lo, Jessica McMonagle, Takayuki Nagamine, Seren Parkman, Haleema Rabani, Danielle Turton and Di Wang
Lancaster University

Rhoticity in Northern English has received increased attention in recent years (Dann et al., 2022; Ryan et al., 2022; Turton & Lennon, 2023). In particular, Turton & Lennon (2023) present acoustic analysis of rhoticity in contemporary Blackburn, demonstrating that this historical aspect of East Lancashire English is declining across generations among the ethnically white population. Here, we extend their analysis to consider production of rhoticity across East Lancashire including Blackburn and Burnley, as well as using ultrasound tongue imaging to investigate articulation of rhoticity. We answer the following questions: 1) How is audible rhoticity distributed across East Lancashire according to location, gender, age, ethnicity? 2) How do audibly rhotic and non-rhotic realisations differ acoustically? 3) How do rhotic speakers differentiate rhotic and non-rhotic minimal pairs in articulation?

Acoustic and ultrasound tongue imaging data were collected in Blackburn Market or Burnley Market as part of public engagement events using a Telemed MicrUS ultrasound machine frame rate ~92Hz, a Beyerdynamic headset microphone, and Articulate Assistant Advanced software (Wrench, 2023). Here, we present data from 16 (9f, 7m; 14 white, 2 South Asian heritage) long-term residents of Blackburn, and 15 (8f, 7m; 12 white, 3 South Asian heritage) long-term residents of Burnley aged 27-45. Participants read two repetitions of a word list containing 13 items, 9 of which contained optional coda rhoticity. We present analysis of approximately 750 tokens in total.

We first conducted an auditory analysis classifying optionally rhotic tokens as audibly rhotic or non-rhotic. Formants were then estimated in Fasttrack (Barreda, 2021). We present analysis of the difference between F3 and F2 (F3–F2), which correlates with rhoticity in East Lancashire (Heselwood, 2009; Turton & Lennon, 2023). We fitted GAMMs at 11 time points across the vowel(+rhoticity) interval. Model comparison was used to compare audibly rhotic and non-rhotic tokens to test for significant differences in formant trajectory and shape (Sóskuthy, 2017). Additionally, we extracted the time point at which trajectories significantly diverge (Malmi et al., 2022). Our articulatory analysis focusses on minimal pairs within speakers (paw~pour and caw~core). We compare tongue shapes for speakers who have an audible contrast for rhoticity, and those who don't. We compare splines fitted at 80% duration of the vowel(+rhotcity) interval. To facilitate cross-speaker comparison, we conducted a Principal Component Analysis of the spline coordinates (Bennett et al., 2018; Nance & Kirkham, 2022), and report values of PC1.

Logistic regression modelling indicates that audible rhoticity is present to a greater extent in Blackburn speakers, who are male, older, and either white or speakers of a rhotic variety of Indian English. Our acoustic analysis shows that rhotic and non-rhotic realisations differ in trajectory height in all vowel contexts, and some vowel contexts also differ in trajectory shape. Principal Component Analysis indicates that there are significant differences in tongue shape for speakers who are audibly rhotic, compared to those who are not.

We discuss these results in the context of change in English dialects over time. Our allows contemporary comparison across East Lancashire and confirm that Blackburn really is the stronghold of remaining coda rhoticity in Northern England. Additionally, we reflect on our data collection process combining research and public engagement in a market setting.

References

Barreda, S. (2021). Fast Track: Fast (nearly) automatic formant-tracking using Praat. *Linguistics Vanguard*, *7*(1).

Bennett, R., Ní Chiosáin, M., Padgett, J., & McGuire, G. (2018). An ultrasound study of Connemara Irish palatalization and velarization. *Journal of the International Phonetic Association*, 1–44.

Dann, H., Ryan, S. D., & Drummond, R. (2022). Social meaning in archival interaction: A mixed-methods analysis of variation in rhoticity and past tense `be' in Oldham. *English Language and Linguistics*, *26*(4), 861–887.

Heselwood, B. (2009). Rhoticity without F3: Lowpass filtering, F1-F2 relations and the perception of rhoticity in NORTH-FORCE, START and NURSE words. *Leeds Working Papers in Linguistics and Phonetics*, *14*, 49–64.

Malmi, A., Lippus, P., & Meister, E. (2022). Spectral and temporal properties of Estonian palatalization. *Journal of the International Phonetic Association*, 1–26.

Nance, C., & Kirkham, S. (2022). Phonetic typology and articulatory constraints: The realisation of secondary articulations in Scottish Gaelic rhotics. *Language*, *98*(3), 419–460. Ryan, S. D., Dann, H., & Drummond, R. (2022). 'Really this girl ought to be going to something better': Rhoticity and social meaning in oral history data. *Language in Society*, First view.

Sóskuthy, M. (2017). *Generalised additive mixed models for dynamic analysis in linguistics: A practical introduction*. https://arxiv.org/abs/1703.05339.

Turton, D., & Lennon, R. (2023). An acoustic analysis of rhoticity in Lancashire, England. *Journal of Phonetics*, *101*, 101–280.

Wrench, A. (2023). *Articulate Assistant Advanced (Version 221.2)*. Articulate Instruments.