Cross-dialectal variation in /s/-retraction in English

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The retraction of /s/ in the cluster /str/, e.g. *string,* so that /s/ sounds more like [ʃ], has been observed in several dialects of English (e.g. London, Philadelphia, New Zealand), though not all (e.g. RP, Australian English); Stevens and Harrington (2016). Baker et al (2011) provide acoustic evidence for the phonetic precursor to this sound change in the lower spectral Centre of Gravity (Cog) for /s/ in /str/ in both non-/s/-retracting and /s/-retracting speakers of American English, resulting from coarticulatory influence of the rhotic. They also find gradient acoustic lowering of Cog in /sp sk st/ clusters, and /spr skr/ clusters (see also Stevens and Harrington 2016 for Australian English). There have been no cross-dialectal acoustic studies of /s/-retraction in English, so the nature and extent of acoustic retraction of /s/ in /sC(r)/ clusters with respect to singleton /s ʃ/ by dialect is still unclear.

This paper presents the results of a large-scale acoustic study of /s/-retraction in English dialects. In order to consider consistency in patterning in /s/-retracting dialects, we analysed two such dialects, from Columbus, Ohio (Buckeye), and Raleigh, North Carolina. We contrasted these with a non-/s/-retracting' dialect, Glasgow vernacular (Sounds of the City), though one where /s/ is auditorily retracted. We extracted all instances of stressed initial singleton /s/ ʃ/, and /s/ in /sp st sk spr skr str/ from pre-segmented spontaneous speech from 185 male and female speakers from the three corpora. Spectral measures of Centre of gravity, Spread, Peak and Front slope, were calculated over the central 50% of the fricative, after downsampling and high/low pass filtering. The impact of erroneous tokens/measures being included from the use of automated procedures was mitigated through substantial post-hoc data reduction, and removal of likely outliers by around 25% (final N = 71,951).

Centre of gravity was analysed using linear mixed effects modelling in R, with fixed factors of (sibilant) Duration, Gender, Dialect, and Onset (/s/ ʃ sp st sk spr skr str/), all two-way interactions, and random intercepts of Word and Speaker. The best model showed two significant interactions. Significant Gender and Onset shows that, unlike Australian English (Stevens and Harrington 2016), in these three dialects, female speakers have higher Cogs than male speakers, except for /st/ and /str/ clusters, where they show lower frequency /s/ than males. Significant Dialect and Onset shows that the two /s/-retracting dialects share a pattern of Cog frequencies by onset, and Glasgow shows another. Specifically, Cogs in the /s/-retracting dialects fall into four onset groups, from highest to lowest frequency : /s/, /sC/, /sCr/, and /ʃ/, whereas Glasgow shows three groups: /s sp sk st spr skr/, /str/ and /ʃ/. Our study is the first to confirm the acoustic retraction of /s/ in /str/ for such a large sample of speakers, and also for a dialect whose singleton and cluster /s/ is already retracted.

References

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