Retraction on Coronation [ʃ]treet:
An ultrasound-tongue-imaging study of *s*-retraction in Manchester English

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This study of Manchester English (McrE) uses ultrasound tongue imaging to investigate the articulation of *s*-retraction in /stɹ/ and /stj/ clusters. This constitutes the first such study of this phenomenon in British English (BrE), where it is comparatively under-studied and (to the best of our knowledge) work has been based exclusively on acoustic data (e.g. Bass 2009, Sollgan 2013). The use of ultrasound is required for a more complete picture of the behaviour of /s/ in these contexts, given that the same acoustic signal can be achieved through different articulatory means (see e.g. Mielke et al. 2017 on covert articulation of /ɹ/).

Retraction is relatively well-studied in American English (AmE; e.g. Durian 2007, Wilbanks 2017), where it has been argued that retraction is triggered non-locally by /ɹ/ (Shapiro 1995, Lawrence 2000). These studies have principally relied on acoustic—or even impressionistic—data, with the exception of ultrasound studies by Mielke et al. (2010) and Baker et al. (2011). However, our results suggest that, in McrE, /ɹ/ is not the direct cause of retraction, nor is it the only indirect source due to comparable behaviour in /stj/, a cluster notably absent in AmE. Although we find inter-speaker variation with respect to the gradience/categoricity of retraction, /stɹ/ and /stj/ appear to pattern together.

In this study, articulatory data were collected using midsagittal ultrasound tongue imaging alongside simultaneous, synchronised audio recordings. Three repetitions of each target word were elicited in the carrier sentence 'I know *x* is a word' and a different randomised order was used for each participant. The stimuli were all monosyllabic with target segments in word-initial position and were balanced for the following vowel (/iː uː ɒ a/), with the exception of /stj/, which only occurs before /uː/ and for which two target words were disyllabic (*student, stupid, stew*). Distractor items began with /s/, /ʃ/, /st/, /tʃ/, /tɹ/ and /t/, with the /s/- and /ʃ/-initial words being used to gauge the degree of retraction in target clusters (as in Fig. 1).

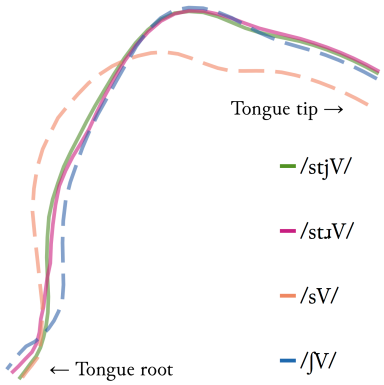

Fig. 1: Avg tongue contours for M01

Results from 3 subjects (2M 1F, aged 25-26) reveal inter-speaker variation: both male speakers show categorical retraction in /stɹ/ and /stj/ and gradient retraction in /st/. The female speaker shows only gradient retraction in /stɹ/ and /stj/, with no retraction at all in /st/; data collection is ongoing in order to investigate the possibility of an implicational hierarchy and the ramifications for the pathway of the development of this particular sound change.

The fact that /stɹ/ and /stj/ show comparable retraction for all speakers, whether gradient or categorical, shows that the explanation for *s*-retraction in AmE is not applicable to McrE. Rather than /ɹ/ being the direct trigger (see Baker et al. 2011), we instead suggest that both /ɹ/ and /j/ trigger affrication of the preceding /t/, which in turn causes retraction of /s/.

Future work will examine word-internal /stɹ/ and /stj/ clusters as well as the effects of word and morpheme boundaries and factors such as speech rate on *s*-retraction in McrE.