

Articulatory insights into language variation and change: preliminary findings from an ultrasound study of derhoticization in Scottish English

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Scottish English is often cited as a rhotic dialect of English. However, in the 70s and 80s, researchers noticed that postvocalic /r/ was in attrition in Glasgow (Macafee, 1983) and Edinburgh (Romaine, 1978; Johnston and Speitel 1983). Recent research (Stuart-Smith, 2003) confirms that postvocalic /r/ as a canonical phonetically rhotic consonant is being lost in working-class Glaswegian speech. However, auditory and acoustic analysis revealed that the situation was more complicated than simple /r/ vs. zero variation. The derhoticized quality of /r/ seemed to vary socially; in particular male working class speakers often produced intermediate sounds that were difficult to identify. It is clear that although auditory and acoustic analysis are useful, they can only hint at what is going on in the vocal tract. A direct articulatory study is thus motivated.

Instrumental phonetic studies that examine the vocal tract during the production of sustained rhotic consonants and in laboratory-based studies of American English /r/ have identified a complex relationship between articulation and acoustics, including articulatory differences with minimal acoustic consequences, (starting with Delattre & Freeman, 1968). In other words, different gestural configurations can be used to generate a canonically rhotic consonant. A pilot study (Scobbie & Stuart-Smith, 2006) using Ultrasound Tongue Imaging (UTI) with a Scottish vernacular speaker revealed something rather different: the occurrence of a strong articulatory retroflex tongue motion, which generated little or no rhotic acoustic consequences because it was timed to occur after phonation had ceased, before pause. This tongue motion was found in a speaker who was weakly rhotic. Thus we may have a situation in which acoustic differences with a sociolinguistic function have, in some prosodic contexts, imperceptible articulatory differences in tongue position, though timing will vary. The situation of language variation and change in Scotland means that an articulatory/acoustic study is likely to give very different results to similar studies of rhotic speakers in the USA (Mielke, Twist, and Archangeli, 2006), and be particularly relevant to understanding social variation.

Ultrasound is non-invasive and portable and therefore has great potential as an instrumental method for studying aspects of socially stratified variation: articulatory data can be physically collected in every-day social settings. However the technique requires refinement for effective use in recording locations outside the laboratory (e.g. in school, at home), and the potential impact of using the equipment on speech is not known. Gick (2002) suggest methods for fieldwork, but we are not aware of any study which attempts to quantify the effects of the technique on vernacular speakers.

This paper reports on a new ESRC-funded project which uses ultrasound to investigate the change in progress mentioned above, namely derhoticisation of Scottish /r/. We present initial findings from the project data, which comprise a series of pilot laboratory-based recordings (acoustic and articulatory), and the first socially-stratified corpus of spontaneous and wordlist speech incorporating articulatory data, recorded from informants from West Lothian in the Central Belt of Scotland.

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