Perception of Glaswegian rhoticity suffers in challenging listening conditions

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Non-ideal listening conditions come in many forms. One challenge to speech perception may exist when words are acoustically similar, and another may be when the listener is uncertain about the identity or the accent of the talker.

Both of these challenging conditions can be examined using Glaswegian as a case study. Previous research has found that Glaswegian can be hard to understand for unfamiliar listeners (Smith et al. 2014; Adank et al. 2009) but this paper focuses on the difficulty that may arise for native Glaswegian listeners when asked to identify which word from a pair, e.g. *hut/hurt*, the speaker produced. Working class (WC) /r/ has weakened over time (Lawson et al. 2017), meaning WC Glaswegians often produce these words so that they are acoustically (Lennon et al. 2015) and perceptually (Lennon et al. 2016) almost identical. Middle class (MC) speakers, in contrast, produce e.g. *hurt* with a very strong /r/ (Lawson et al. 2011; Lennon et al. 2015) so their *hut/hurt* distinction is not hard to perceive. To explore perceptual consequences of uncertainty about speaker accent, this experiment manipulated whether words like *hut* & *hurt* were heard in single-talker or mixed-talker blocks.

Glaswegians heard single words from 12 pairs presented in 3 blocks: Single MC, Single WC, and Mixed (MC&WC randomised together). Their task was to use the mouse to click the word they heard, out of two options per trial – e.g. *hut/hurt*, *bud/bird*. 'MouseTracker' (Freeman & Ambady 2010) recorded cursor trajectories as participants moved towards their chosen word, at the top of the screen (Fig.1).
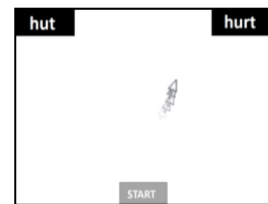

Fig.1

Trajectories were analysed using a suite of measures (RT; Area-Under-the-Curve (*ibid*); Discrete-Cosine-Transformation (Watson & Harrington 1999)), finding significant processing costs when distinguishing WC *hut/hurt*. This cost increased for the Mixed block – when two accents and talkers were randomised the message was harder to decode. Interestingly, even the 'easier' MC pairs were more difficult in the Mixed block. These results are discussed in terms of general principles which underlie exemplar theories and Bayesian inference, concerning how listeners resolve uncertainty about both the linguistic unit and the speaker.

Adank, P, Evans, B, Stuart-Smith, J, & Scott, S (2009) Comprehension of familiar and unfamiliar native accents under adverse listening conditions. *Journal of Experimental Psychology*, 35, 520–529.

Freeman, J, & Ambady, N (2010) MouseTracker: Software for studying real-time mental processing using a computer mouse-tracking method. *Behavior Research Methods*, 42(1), 226-241.

Lawson, E, Scobbie, J, & Stuart-Smith, J (2011) The social stratification of tongue shape for postvocalic /r/ in Scottish English. *Journal of Sociolinguistics*, 15(2), 256-268.

Lawson, E, Stuart-Smith, J, & Scobbie, J (2017) The role of gesture delay in coda /r/ weakening: an articulatory, auditory and acoustic study. *Journal of the Acoustical Society of America*.

Lennon, R, Smith, R & Stuart-Smith, J (2015) An acoustic investigation of postvocalic /r/ variants in two sociolects of Glaswegian. *ICPhS 18*, Glasgow, Scotland.

Lennon, R, Smith, R & Stuart-Smith, J (2016) Ambiguous rhoticity in Glasgow: Short term exposure promotes perceptual adaptation. *LabPhon15*, Ithaca, USA.

Smith, R, Holmes-Elliott, S, Pettinato, M, & Knight, R (2014) Cross-accent intelligibility of speech in noise: Long-term familiarity and short-term familiarization. *QJEP*, 67(3), 590-608.

Watson, C, & Harrington, J (1999) Acoustic evidence for dynamic formant trajectories in Australian English vowels. *The Journal of the Acoustical Society of America*, 106(1), 458-468.