

2aSC2: Intelligibility of British English for American younger and older adults with and without hearing loss

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Background

In audiology clinics, patients with hearing loss often report that they have difficulty understanding British-accented speech, despite having previously watched and understood British television shows without trouble.

A few studies have investigated the intelligibility of various English dialects within a single country (e.g. Clopper and Bradlow, 2008, in the USA; Iverson *et al.*, 2014, in the UK), but to our knowledge, no study has quantified the intelligibility of a non-U.S. variety of English for American listeners.

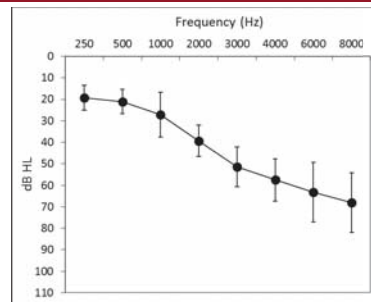
Previous research has shown that older hearing-impaired listeners have great difficulty understanding foreign-accented speech. Interestingly, they are not disproportionately negatively affected by a foreign accent compared to younger adults, in contrast with the disproportionate effects routinely observed for other types of distortion (Ferguson *et al.*, 2010). Compared to foreign accents, dialectal accents should be easier to understand, as they appear closer to the home dialect on a perceptual scale (Clarke and Garrett, 2004).

Hypotheses

- Both young adults with normal hearing (YNH listeners) and older adults with hearing impairment (OHI listeners) will perform worse on British-accented speech than on American sentences.
- Consistent with previous findings for foreign-accented speech, the effect of the British accent will be similar for YNH and OHI listeners.

Listeners

- 14 YNH listeners** (3 males, 11 females) were recruited from the University of Utah Department of Psychology participant pool; normal hearing was confirmed by hearing screenings performed at 25 dB HL for 250-8000 Hz.
- 14 OHI listeners** (9 males, 5 females) were recruited from the Utah Senior Ears database; all had mild-to-moderately severe sloping sensorineural hearing loss and word recognition scores $\geq 80\%$. The average test-ear audiogram for this group is shown to the right.
- 15 older adults with normal hearing (ONH listeners)** will be recruited from the Utah Senior Ears database; all will have thresholds ≤ 25 dB HL for 250-2000 Hz and ≤ 30 dB HL for 4000 Hz.



Stimuli

Four lists of 17 sentences were selected from recordings of the Basic English Lexicon (BEL) sentences (Calandruccio and Smiljanic, 2012). Both the American (AM) and British (BR) versions were spoken by female speakers (from the USA and the UK, respectively). Each sentence contained 4 keywords, yielding 68 keywords per test list.

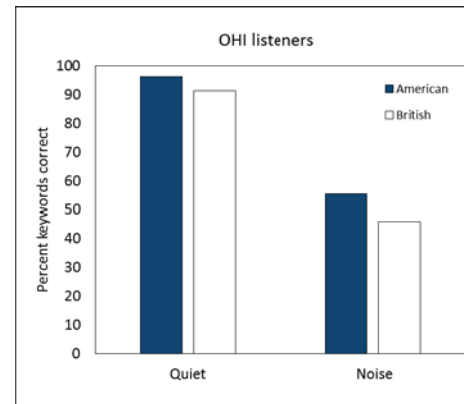
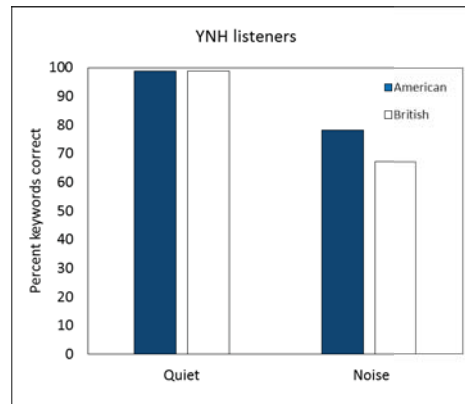
Stimuli were scaled to the same RMS amplitude and re-sampled at 24,414 Hz. Sentences were presented at 70 dB SPL for all listeners. In the noise conditions, sentences were mixed with 12-talker babble at an SNR of -9 dB for the YNH listeners and 0 dB for the OHI listeners.

Procedures

Listeners were presented monaurally via insert earphones with 1 list of AM in quiet, 1 list of BR in quiet, 1 list of AM in noise, and 1 list of BR in noise. While the order of the four talker/condition combinations was fixed for all listeners, the assignment of list to condition was pseudo-randomized. After each sentence, the listeners either typed their response on a keyboard or repeated what they heard to the experimenter, who typed the response.

Before the two quiet conditions and the two noise conditions, listeners were given 10 familiarization sentences (5 AM, 5 BR).

Results



References

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Analyses

Keyword percent correct scores for each listener and each list were computed and converted to rationalized arcsine units (RAU, Studebaker, 1985). RAU scores were analyzed using linear mixed-effects models (carried out in Stata) to test the effects of and interactions between three factors: talker dialect (American, British), listener group (YNH, OHI), and listening condition (Quiet, Noise). Listener was included as a random factor in all models.

Results & Discussion

- All three fixed effects were significant. Intelligibility was higher
 - For the AM talker than for the BR talker ($\beta = 8.88, z = 3.89, p < 0.001$)
 - For the YNH listeners than for the OHI listeners ($\beta = 18.67, z = 3.91, p < 0.001$)
 - In quiet than in 12-talker babble ($\beta = 48.28, z = 21.15, p < 0.001$)
- The 3-way interaction was not significant ($z = 1.04, p = 0.3$), nor were the 2-way interactions between talker dialect and listener group ($z = 1.31, p = 0.2$) or between talker dialect and listening condition ($z = 1.7, p = 0.09$).
 - The effect of talker dialect was similar for YNH and OHI listeners.
 - The effect of the noise was similar for the AM and BR talkers.
- The 2-way interaction between listening condition and listener group was significant ($z = -2.11, p = .035$):
 - The effect of noise was larger for OHI ($\beta = 52.52, z = 14.21, p < 0.001$) than for YNH ($\beta = 43.99, z = 13.87, p < 0.001$).
 - The listener group effect was larger in noise ($\beta = 22.92, z = 3.19, p < 0.01$) than in quiet ($\beta = 14.40, z = 4.69, p < 0.001$).

Acknowledgments

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