

Just the way you are: The potential of the word *just* as a speaker discriminant

Oral paper or Poster - Eligible for the 'Best Student Paper Award'

Background

A particularly important issue in forensic voice comparison (FVC) is the lack of direct correspondence in the content of different recordings. That is, recordings are unlikely to share many of the same words. Therefore, a frequently used word (or other feature) in naturally occurring speech is of value because it permits direct comparison. To examine the forensic value of any linguistic feature, it is necessary to understand how variable it is between and within speakers, and the factors that affect it in different discourse positions or prosodic contexts. In the present study, the short discourse-pragmatic marker (DPM) *just* is analysed in this way for suitability as a diagnostic feature in FVC.

In previous research, filled pauses (*uh, um*), also defined as DPMs, have been analysed as FVC features with promising results (Tschäpe et al., 2005). In Hughes et al. (2016)'s study, the best speaker comparison models were based on all three formants. For the present study, formants and durations from the vowel portions of *just*, STRUT and filled pauses were analysed for 100 male Southern Standard British English speakers (DyViS corpus, Nolan et al., 2009). The polyfunctional word *just* was selected because of its high frequency in spontaneous speech. *Just* is the 27th most frequent word in the British National Corpus (2014) at 0.75 per 100 words (Love et al., 2015). Research also shows that *just* is increasing in frequency over time, as demonstrated for younger speakers in Toronto (Tagliamonte, 2016) and Tyneside (Woolford, 2021). It is also of interest to FVC whether speakers use *just* in different ways, and therefore the various different functions of *just* (as discussed by Woolford, 2021) are also analyzed to aid speaker comparison.

Results

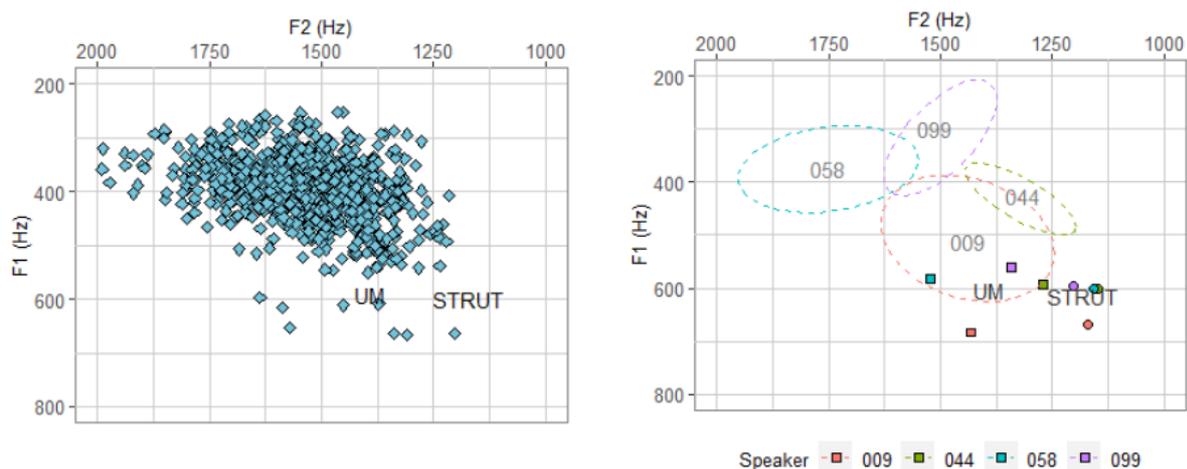


Figure 1. F1-F2 plot of *just* vowel midpoints alongside means for STRUT and the vowel of *um* (left). F1-F2 of *just* for 4 speakers compared with ellipses showing standard deviation and mean F1-F2 values for STRUT and the vowel in *um* (right).

1,276 tokens of *just* were extracted for analysis, transcribed to show function, segment elision and to allow for formant readings to be taken from the vowel. As expected, *just* was highly frequent, occurring overall 0.88 times per 100 words. In total, 1,019 *just* vowels were found

suitable for formant analysis. Midpoint formant measures for STRUT and the vowel of *um/uh* were also extracted as points of comparison for likelihood ratio-based testing across 76 speakers. Vowel midpoints for all tokens are displayed in Figure 1 along with the mean readings for STRUT and *um* vowels. Generally, the vowel in *just* is considerably raised and/or fronted compared to STRUT or *um*. Figure 1 also displays four speakers who had mean F1 and F2 values at the upper and lower extremes.

In likelihood ratio-based testing, various tests were run comparing acoustic measures of *just*. *Just* was also compared with STRUT and *um* in its discriminatory capacity. Figure 2 shows the validity measures for these tests, where lower log LR cost (C_{llr}) and equal error rates (EER) correspond to a better-performing system. The left panel shows that F1-F3 of *just* outperforms the formants of STRUT. It has a lower C_{llr} than *um* but a very slightly higher EER. The right panel of Figure 2 displays the effect of adding discourse functions of *just* to speaker comparison models. *Just* F1-F3 without any function information performs best, whereas adding restrictive or discourse *just* information reduces model validity. It is possible that speaker comparison models which do not include tokens of discourse *just* perform better – and therefore discourse *just* is a slightly less good feature than say adverb or restrictive *just*. Overall, *just* shows some promise for FVC application, performing better than *um* or STRUT. Adding information about *just* functions, however, may only aid the task of FVC a little. This is positive, as FVC analysts can treat all tokens of *just* similarly, regardless of the word's function – making *just* a broad idiosyncratic feature of the voice.

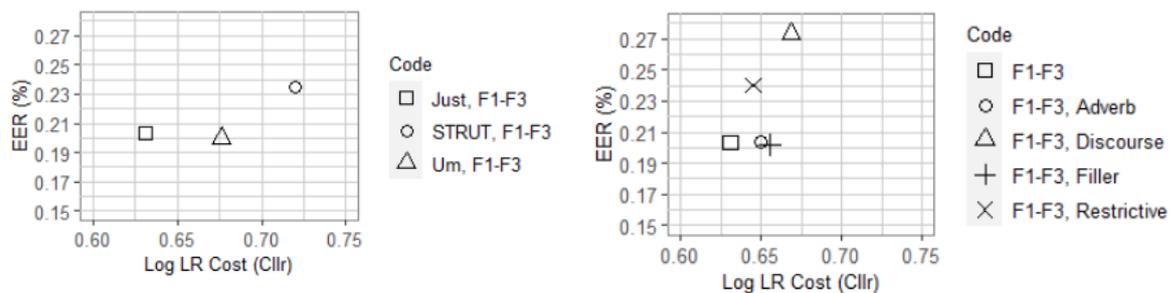


Figure 2. Plot of log LR cost (C_{llr}) and equal error rate (EER%) for *just*, STRUT and *um* F1-F3 vowel midpoints (left) and for *just* F1-F3 across various functions.

References

- The British National Corpus, version 3 (2007). Distributed by Bodleian Libraries, University of Oxford, on behalf of the BNC Consortium. URL: <http://www.natcorp.ox.ac.uk/>
- Love, R., Dembry, C., Hardie, A., Brezina, V. and McEnery, T. (2017). The Spoken BNC2014: designing and building a spoken corpus of everyday conversations. *International Journal of Corpus Linguistics*, 22(3): 319-344. DOI: 10.1075/ijcl.22.3.02lov
- Hughes, V., Wood, S. & Foulkes, P. (2016). Strength of forensic voice comparison evidence from the acoustics of filled pauses. *International Journal of Speech, Language & the Law*. 23.
- Nolan, F., McDougall, K., De Jong, G. & Hudson, T. (2009). The DyViS database: style-controlled recordings of 100 homogeneous speakers for forensic phonetic research. *International Journal of Speech Language and the Law* 16(1): 31-57.
- Tagliamonte, S. (2016). *Teen talk: The language of adolescents*: Cambridge University Press.
- Tschäpe, N., Trouvain, J., Bauer, D., & Jessen, M. (2005). Idiosyncratic patterns of filled pauses. Paper presented at the 14th Annual Conference of the International Association for Forensic Phonetics and Acoustics (IAFPA), Marrakesh, Morocco.
- Woolford, K. (2021). Just in Tyneside English. *World Englishes*. doi:10.1111/weng.12542