

# Exploring covariation as a marker of speaker specificity.

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'Work in progress' poster

Eligible for 'Best Student Poster Award'

A fundamental hypothesis of forensic speech science is that speakers show idiosyncratic realisations of speech sounds. While many studies have documented the scope and nature of speaker-specific variability across a range of individual features, it is likely that speaker individuality may more concretely reside in the ways in which features co-occur. In sociophonetic research, this is often referred to as 'style' (Podesva, 2008), with a given feature differing in its social meanings depending on the other features that comprise that style. Co-variation also shows systematicity in phonological systems; for example, a speaker's production of stop consonants tend to be highly related to one another, even when across a corpus of speech these features exhibit considerable variability (Chodroff & Wilson, 2018). This suggests that analysing co-variation of phonetic features may reveal deep structure in both phonology and speaker-specificity. Accordingly, this study extends previous work in order to assess whether structured co-variation of phonetic features is a useful tool for speaker identification.

The key aim of my research is to assess whether speakers exhibit structured covariation in spontaneous speech, and whether listeners are sensitive to this. In this study, I will sketch out some foundations for this work, by analysing variability across vowels and their co-variation. Data will be taken from WYRED corpus (Gold et al., 2018), which contains forensically relevant data recordings from 120 West Yorkshire English speakers. A selection of five vowels; FLEECE, schwa, GOAT, FACE, and GOOSE are analysed from spontaneous speech in stimulated police interview recording data. FLEECE and schwa are used as anchors due to their relative stability within the vowel system (Watt and Fabricus, 2002), while GOAT, FACE and GOOSE represent highly variable vowels that have been subject to variation and change. For instance, GOOSE fronting is a well know phenomena of British English, but the trajectory of change varies by dialect (Lawson et al., 2019). Importantly, these three vowels are highly variable, while also having regional and social associations in Yorkshire (Haddican et al., 2013).

The vowels will be analysed acoustically, extracting time-varying F1-F4 over the vowel's duration, which are then parametrised using GAMMs. As a first step, the vowels will be assessed in terms of their variability within and between speakers. Following this, I then examine the correlation between vowel variation across speakers, in order to test the hypothesis that socially meaningful vowel variation exhibits structured covariation.

In doing so, this work will examine how features vary within and between speakers, while also investigating how co-variation patterns manifest across speakers. Consequently, this research will aim to situate speaker individuality in terms of structured constellations of features and, in doing so, aims to unify models of speaker individuality across forensic phonetics and sociophonetics (Fairclough, forthcoming). The implications of this work include application to speaker identification tasks, such as how the presence of different combinations of features may influence analyst perceptions.

## References

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