

On the impact of noise on vowel formant measures

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Acoustic analyses of speech recordings, and subsequent vowel formant measures taken from them, may be compromised by various factors. Recorded in different settings, using various equipment and digitisation procedures, vowel formant values may be affected by technical artefacts (De Decker and Nycz 2010; Hansen and Pharao 2006/submitted; Plichta 2004) or lead to unreliable measures which then require a time-consuming manual correction or even an exclusion from the dataset, thus introducing random variability into the sample or reducing the sample size.

In this paper, we concentrate on the implications of noise components on the F1/F2-measurements of /i a u/ vowels in Scottish English. Our analyses drew upon spontaneous speech corpora of Glaswegian vernacular recorded in the 1970s and 2000s. Most of these recordings were made using lavalier microphones. However, their placement was not controlled for, nor were sources of background noise or acoustic properties of the respective places where recordings took place. As well as the inherent variability in the recording settings, all these factors may lead to a ground hum, buzz, hiss or extraneous acoustic events on the recording (Jason 2010). With an increase of noise components, formants can appear very faint or have larger bandwidths and therefore be less clearly defined (cf. Plichta 2004). Two acoustic manifestations of noise are examined here: (1) the signal-to-noise ratio and (2) the spectral composition of the noise components. We confirm and extend previous findings by showing that (1) classical LPC-algorithms used for formant measurements are very sensitive to even slight changes in both noise parameters; (2) especially F1 is affected; and (3) the amount of deviation in F1 differs depending on the vowel category (cf. Hansen and Pharao 2006/submitted). We further make suggestions for the best practice when working with recordings of variable sound quality.