

Investigating the acoustic correlates of deceptive speech

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Voice stress analysis based technologies, commonly known as Voice Stress Analysers (VSA), which are said to measure peoples' veracity based on the speech signal have come under a large amount of scientific scrutiny in recent years. Scientific reliability testing of these products has mainly resulted in negative evaluations (Damphousse et al. 2007, Hollien & Harnsberger 2006). While testing of these products is a necessary part of their evaluation, it is believed that a more fundamental step has been overlooked. Prior to examining the reliability of a test it should be ascertained whether the assumptions on which the test is based are valid (Eriksson & Lacerda 2007). In other words, whether a relationship exists between deception, truth and speech, and if so, what the nature of this relationship is. The following study describes an initial investigation into the acoustic and phonetic correlates of deceptive speech using auditory and acoustic analysis.

Due to the lack of extant data suitable for acoustic analysis, a laboratory-based experiment was designed which employed a mock-theft paradigm in conjunction with a 'security interview' to elicit truthful and deceptive speech as well as control data from a total of 12 male native British English speakers. Using Praat, the control, truthful and deceptive speech samples were analysed on a range of speech parameters including f_0 mean and variability, intensity, and vowel formant frequencies for F1, F2 and F3.

Preliminary analysis suggests that truth-tellers and liars cannot be differentiated based on the speech parameters measured in this study. Not only was there a lack of significant changes for the majority of parameters investigated but also, if change was present it failed to reveal consistencies within and between speakers. F_0 mean and F_0 SD values did not differ significantly across conditions. The findings regarding overall mean energy changes also did not offer grounds for a reliable distinction between control, truths and lies. The majority of F1, F2 and F3 differences between conditions were statistically non-significant. The remarkable amount of inter and intra-speaker variability underlines the fact that deceptive behaviour is individualised, very multifaceted and far from being clear cut. As well as providing a basis for future research programs, the present study should encourage researchers and practitioners to evaluate critically what is (im)possible using auditory and machine based analyses with respect to detecting deception from speech.

References

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