

Pitch breaks as a voice disguise

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This paper examines the nature of pitch breaks and its effectiveness as voice disguise. A speech recognition test was carried out with one speaker and seven listeners (who were all close and active acquaintances of the speaker). The voice disguise used by the speaker in this study comprised a form of phonation described as pitch breaks. A speech sample of duration of 3.15 seconds incorporating pitch breaks formed the stimulus for the test. To examine the nature of pitch breaks, an acoustic analysis of the source and filter characteristics was carried out. It is concluded that four out of seven speakers had absolutely no clue of who the speaker was despite their close association with the speaker.

Keywords: Pitch breaks, voice disguise, speech recognition, acoustic analysis

INTRODUCTION

Ear witness testimony has become increasingly important in courtrooms and as a consequence speaker identification has gained immense significance. One of the challenges faced by the forensic phoneticians is the identification of speech marked by voice disguise. Voice disguise, undoubtedly, has a considerable detrimental effect on speaker identification. Kunzel (2000:149-179) notes that “falsetto, pertinent creaky voice, whispering, faking a foreign accent and pinching one’s nose are the most common types of voice disguise” and further reports that “over the last two decades, between 15 and 25 percent of the annual cases dealt with at the BKA (The German Federal Police Office) speaker identification section, exhibited at least one kind of disguise.” On the other hand, there are few references to the use of pitch breaks as a form of voice disguise in the current research.

METHODOLOGY

To test the effectiveness of pitch breaks as a form of voice disguise, a speaker identification task was carried out with one speaker and seven listeners. All the listeners were close and active acquaintances of the speaker. The voice disguise used by the speaker in this study comprised a form of phonation described as pitch breaks. Riper (1990:250-251) defines pitch breaks as “sudden shifts of pitch as characteristic of the period of voice change...pitch changes towards the higher and lower notes as well.... and they generally are an octave in extent.” Pitch breaks are often quoted in the pathological cases and voice changes related to pubertal age but there are hardly any references to it as a form of voice disguise. A speech sample “Come to the coffee shop at six in the evening” of duration of 3.15 seconds incorporating pitch breaks formed the stimulus for the test. The speaker made sure that there was an absence of any pronounced foreign or regional accent or idiosyncratic speech features. The utterance was played to the listeners and they were asked to identify the speaker. To examine the nature of pitch breaks, an acoustic analysis of the source and filter characteristics of the speech sample was carried out. In addition to that, the source and filter characteristics of the same speech sample uttered in normal voice by the same speaker was also analysed and a comparative analysis of the pitch and formant values obtained from both the speech samples was carried out.

CONCLUSION

An acoustic analysis of the source characteristics reveals that the pitch range of the speech sample with pitch breaks was about two and a half octaves while the pitch range of the normal voice was just about an octave and a half. The minimum pitch, maximum pitch and the mean pitch identified in the speech sample with pitch breaks were 70Hz, 432Hz and 269Hz respectively. On the other hand, the minimum pitch, maximum pitch and the mean pitch identified in the normal speech were 166Hz, 428Hz, and 241Hz respectively. Likewise, the F1 and F2 values for all the twelve vowels in both the speech samples (with pitch breaks and normal speech) were calculated and a comparative analysis was carried out. It is intriguing to note that none of the F1 and F2 values matched although both the utterances were made by the same speaker. It may also be noted that, on an average, both the F1 and F2 values of the vowels with pitch breaks was comparatively lower than the values of the normal speech. It is concluded that four out of seven speakers had absolutely no clue of who the speaker was despite their close association with the speaker.

REFERENCES

- Kunzel, H.(2000).“Effects of voice disguise on speaking fundamental frequency. ”Forensic linguistics 7.
- Riper, V. (1990) “Speech correction: an introduction to speech pathology and audiology”. Prentice Hall, Eaglewood Cliff.