Speaker individualities in speech spectral envelopes

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Abstract

This paper is an attempt to identify that physical characteristics representing speaker individualities of vowel. We assume that the physical characteristics people use to identify speakers are significant physical characteristics representing speaker individualities. And frequency bands having speaker individualities in the spectral envelopes and significant part in these bands were investigated by psychoacoustical experiments. The stimuli used for the experiments have spectral envelopes and pitch frequencies modified by LMA analysis-synthesis system.

The experimental results lead to the following conclusions.

1. Speaker individualities exist in whole frequency band in the spectral envelopes, mainly in higher frequency band.

2. The peaks in the spectral envelopes were more significant than the dips for speaker identification.

3. Speaker individualities mainly exist in the frequency include and extend beyond the peak around 20 ERB rate (1740 Hz), and the voice quality can be controlled by replacing the frequency band of one speaker with that of other speakers.

4. Speaker individualities in spectral envelopes are more significant than that in pitch frequencies.

These results suggest that speaker individualities in the higher frequency band in the spectral envelopes can be used for speech synthesis. On the other hand, speaker normalization or adaptation techniques can be constructed, and these techniques can improve speaker-independent speech recognition performance.

Key Words: **spaker individuality, vowel, spectral envelope, voice quality control, speaker recognition, higher frequency band**