

Abstract

Cellular phones and other devices that process and modify voices have become an integral part of today's society. The question investigated in this experiment was, "To what degree and in what ways do the analog-to-digital conversion, compression, and decompression of audio signals in cellular phones significantly alter the magnitudes of the fundamental frequency and harmonics of these audio signals?" The hypothesis was that the distributions of the harmonics would be different.

Recordings collected for a previous experiment were input into one cellular phone linked to an identical cellular phone, the output from which was recorded with a laptop. The recording was cut into individual sounds and each sound was analyzed by a Fast Fourier Transform, which determines the magnitudes of the components of a complex sound. After the data were normalized in the same way as the previously collected data, a χ^2 goodness of fit test was used to compare the distributions of each previously analyzed sample with the corresponding new sample. In almost all cases, the distributions were shown to be significantly different, and the intervals of octave, nineteenth, and twenty-second contributed the greatest error; therefore, the data supported the hypothesis that the distribution was significantly altered.

Applications of this research include improving recording and processing devices so that harmonics, which give a sound its characteristic sound, are not drastically altered.