

Spectra and Timbre

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The first part of this paper will provide a critical re-examination of data reduction in sound analysis/synthesis systems. Grey's work used tones recorded on audio tape with audible tape hiss. Thus, test subjects could distinguish resynthesized tones by the presence or absence of noise alone. The forms of data reduction explored by Grey (and Charbonneau) omitted one important variant: slightly inharmonic but constant-frequency spectra. Grey showed that exactly harmonic, time-invariant spectra produced an "electronic"-sounding timbre. Slightly inharmonic spectra do not seem to evoke the same response. This has important implications for synthesis of "lively"-sounding timbres while keeping the computational load to a minimum.

The second part of this paper will discuss data reduction in musical phrases: what degree of data reduction is permissible for various kinds of articulation.

This paper will also show ways of dealing with one problem involved with the phase vocoder in analysis and synthesis. Recall that the phase vocoder is equivalent to a fixed band of band-pass filters. The center frequencies cannot move as the frequency of the input moves. This means that the filters established for a tone at a given pitch will not exactly map on the harmonics of a tone at a different pitch. I will present solutions to this problem and discuss their advantages.