

(Smith continued)

music). Max helps manage this complexity. At the outset, we want to explore our materials empirically, and the rapid prototyping possible with Max facilitates this process. Much later, we may want to repeat the experiment (or concert), possibly with modifications, although the original equipment has disappeared long ago. Ircam's commitment to the portability and durability of the Musical Workstation makes this possibility likely.

Grouping of Harmonics in Natural vs. Synthetic Musical Instrument Tones

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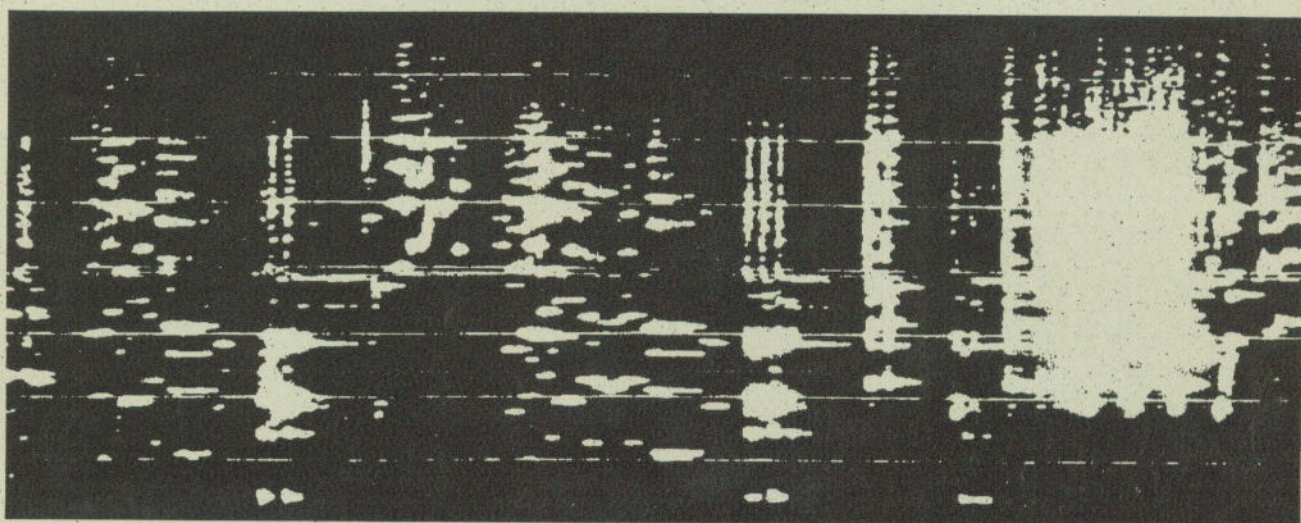
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The perception of pitch depends on the grouping of the incoming frequency values into distinct sounds. Frequencies in simple harmonic relationships to one another and having a common fundamental group together to form the experience of a single object having a pitch. However, the auditory system is tolerant of slight departures from harmonicity: this has been likened a "harmonic sieve" in which slight mistunings are allowed for membership to the pitch object, but larger mistunings are not. The width of the "holes" in this sieve has been extensively studied (Moore, Glasberg & Peters, 1985; Darwin & Ciocca, 1992; Darwin, Ciocca and Sandell, 1994). Until now the phenomenon has been studied using only simple synthetic steady-state sounds. The present study used natural, spectrotemporally variant oboe and cello tones that were altered with a Phase Vocoder to have mistuned 4th harmonics to see if the same grouping effects could be observed. The general effect found in the earlier studies, that mistunings of up to 3% are tolerated, was replicated here. Additionally, we observed if taking the dynamic patterns out of the instrument tones (by synthesizing steady state versions of them based on their average spectra) affected grouping. Dynamic patterns are assumed to help group sounds together and thus might lead to greater tolerance for mistunings. The oboe showed no difference between steady state and natural conditions; the cello showed a difference, but very slight and opposite to the direction expected. The findings suggest that harmonicity outweighs temporal patterns in the grouping of harmonics.

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Adapted from R. Cogan's spectrum taken from Stravinsky's
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