

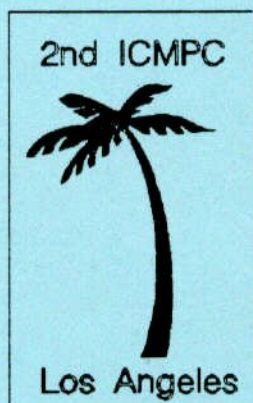
Session C14: Timbre and Pitch
Chair: Donald E. Hall

11:20

C14-4. Factors determining the 'blend' of concurrently-sounding timbres: The roles of spectral brightness, loudness, and inharmonicity. Gregory J. Sandell (Center for New Music and Audio Technologies, Berkeley, CA, USA)

Orchestration often involves selecting instruments for concurrent presentation, as in melodic doubling or chords. One evaluation of the aural outcome of such choices is along the continuum of "blend:" whether the instruments fuse into a single composite timbre, segregate into distinct timbral entities, or fall somewhere in between the two extremes. An earlier study (Sandell, 1989) investigated, through perceptual experimentation, the acoustical correlates of blend for 15 natural-sounding orchestral instruments presented in concurrently sounding pairs (e.g., flute-cello, trumpet-oboe, etc.). Analysis of the data showed that the ratings related to the overall amounts of spectral centroid height (brightness), amount of difference in the onset durations of the tones, the degree of similarity in temporal envelope changes in amplitude and spectrum, and amount of pitch deviation for a pair. Two follow-up studies are reported here. The first experiment explored the role of a new interval of presentation (minor third). In this condition the difference in attack time was less strongly related to the judgments, suggesting that the minor third interval more clearly explicated the presence of two notes. The role of centroid slightly shifted in emphasis from centroid height to centroid difference: tones that were closer in centroid blended better than those which were farther. Overall, however, both effects were slight and the results were not dramatically different from in unison condition. To confirm the importance of centroid as an independent factor determining blend, pairs of tones including instruments with artificially changed centroids were rated for blend. Judgments for several versions of the same instrument pair showed that blend decreased as the altered instrument increased in centroid, corroborating the earlier experiments. For example, the blend for French horn and oboe can be improved by darkening the oboe. Overall, the experiments suggest evidence that including instrument with darker spectra (or played in such a way to foster darker spectra) is a useful strategy for promoting *blend* in orchestration. Similar manipulations in harmonicity and amplitude were explored for their effect on blend, and these results will be discussed.

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