

STREAM SEGREGATION AND FORMANT AREAS

Christoph Reuter

University of Cologne, Germany

Background

For simultaneous playing of timbres characterized by their formants, the following principles could be observed:

- 1.) blending: timbres with equivalent main formant areas blend homogeneously.
- 2.) partial masking: timbres with non-matching formant areas are perceived separately.

These two principles are corroborated by the instructions in many orchestration treatises.

Aims

The conclusion could be drawn that the position of formant areas would lead to similar results in the case of successive tones such as in stream segregation experiments: If that was the case, then a melody with alternating timbres would either be split in perception into two different melodies (if the formant areas were distinct) or would be heard as one sole melody (if the formant areas were equivalent).

Method

In order to test this hypothesis, melodies were played, switching from one tone to the next between the timbres of two instruments. Additionally, alternation of timbres was also employed using timbres whose formant areas had been purposely displaced using formant shifting software.

In an auditory experiment, 30 subjects were asked to judge whether the sound examples consisted of one sole, continuous melody or if they were hearing two separate melodies perceived as two latent, distinct parts.

Results

In almost all cases featuring equivalent formant areas most of the subjects perceived one sole melody. Differing formant areas predominantly led to the perception of two different streams. Comparable results can be found in the literature on stream segregation.

Conclusions

- 1.) Alternating timbres with equivalent main formant areas tend to produce one sole, continuous melody in perception.
- 2.) Alternating timbres with non-matching formant areas tend to produce two distinct melodies in perception.