

## Listening to Circles, Playing Lights: A Study of Cross-Modal Perception in Music

**Authors :** Roni Granot, Erica Polini

**Abstract :** Music is often described in terms of non-auditory adjectives such as a rising melody, a bright sound, or a zigzagged contour. Such cross modal associations have been studied with simple isolated musical parameters, but only rarely in rich musical contexts. The current study probes cross sensory associations with polarity based dimensions by means of pairings of 10 adjectives: blunt-sharp, relaxed-tense, heavy-light, low (in space)-high, low (pitch)-high, big-small, hard-soft, active-passive, bright-dark, sad-happy. 30 participants (randomly assigned to one of two groups) were asked to rate one of 27 short saxophone improvisations on a 1 to 6 scale where 1 and six correspond to the opposite pole of each dimension. The 27 improvisations included three exemplars for each of three dimensions (size, brightness, sharpness), played by three different players. Here we focus on the question of whether ratings of scales corresponding with the musical dimension were consistently rated as such (e.g. music improvised to represent a white circle rated as bright in contrast with music improvised to represent a dark circle rated as dark). Overall the average scores by dimension showed an upward trend in the equivalent verbal scale, with a low rating for small, bright and sharp musical improvisations and higher scores for large, dark and blunt improvisations. Friedman tests indicate a statistically significant difference for brightness ( $\chi^2(2) = 19.704, p = .000$ ) and sharpness dimensions ( $\chi^2(2) = 15.750, p = .000$ ), but not for size ( $\chi^2(2) = 1.444, p = .486$ ). Post hoc analysis with Wilcoxon signed-rank tests within the brightness dimension, show significant differences among all possible pairings resulted in significant differences: the rankings of 'bright' and 'dark' ( $Z = -3.310, p = .001$ ), of 'bright' and 'medium' ( $Z = -2.438, p = .015$ ) and of 'dark' and 'medium' music ( $Z = -2.714, p = .007$ ); but only differences between the extreme contrasts within the sharpness dimension : 'sharp' and 'blunt' music ( $Z = -3.147, p = .002$ ) and between 'sharp' and 'medium' music rated on the sharpness scale ( $Z = -3.054, p = .002$ ), but not between 'medium' and 'blunt' music ( $Z = -.982, p = .326$ ). In summary our study suggests a privileged link between music and the perceptual and semantic domain of brightness. In contrast, size seems to be very difficult to convey in music, whereas sharpness seems to be mapped onto the two extremes (sharp vs. blunt) rather than continuously. This is nicely reflected in the musical literature in titles and texts which stress the association between music and concepts of light or darkness rather than sharpness or size.

**Keywords :** audiovisual, brightness, cross-modal perception, cross-sensory correspondences, size, visual angularity

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