

The impact of melodic sound on perceptual dominance of musical notes engaged in binocular rivalry

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Musical notation involves abstract and symbolic representations familiar only to those with musical training. Using auditory musical melodies and visual scores, we investigated whether audiovisual congruence of structured auditory information and visual representations of that information can impact perceptual dynamics during binocular rivalry.

In Experiment 1, observers dichoptically viewed a score scrolling from right to left within a viewing window and a vertical grating drifting in the opposite direction. On “congruent” trials, participants heard the specific melody synchronized in time with the melody’s score; on “incongruent” trials, a melody different from the score was heard; on “no sound” trials, only visual stimuli were presented. In Experiment 2, a nonsense score and a flickering radial grating were dichoptically presented. After several alternations, the nonsense score morphed into a probe score unpredictably at the onset of either dominance or suppression phase of the default score. At the onset of the transition, observers started hearing the melody “congruent” with the introduced score, a melody “incongruent” with the introduced score, or “no sound” at all. A single dominance or suppression duration for the probe score was generated in each trial. Observers were divided into two groups (“readers” and “non-readers”) based on their ability to read music.

In Experiment 1 (extended tracking), scores predominated over the grating significantly more on “congruent” trials compared to “incongruent” or “no sound” trials, but only for participants who could read music. This enhanced predominance stemmed from longer dominance durations of scores on “congruent” trials. In Experiment 2 (discrete trial technique), dominance durations but not suppression durations of scores were impacted by auditory melodies, again with congruent > incongruent. For non-readers, melodies again had no influence at all on rivalry.

These results implicate experience-dependent, top-down influences of semantic information on the resolution of perceptual conflict created by binocular rivalry.