The Color of Musical Sounds in Non-Synesthetes
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Background
There are systematic associations between classical orchestral music (Bach, Mozart, and Brahms) and color dimensions (saturation, lightness, & R/G, B/Y). These results demonstrate that non-synesthetic participants show consistent color associations with musical sounds, both at the level of individual instrument timbres and for intervals and triads. Many important aspects of cross-modal associations with music remain to be investigated, however: e.g.,
- Do musical sounds have consistent associations with other aspects of visual images, such as shape, blur, and/or temporal dynamics?
- How does harmonic context change the emotional content of chords and the colors we associate with them?

RESEARCH QUESTION: Do participants show consistent color associations for low-level attributes of music such as intervals, chords, and instrumental timbres?

Methods & Stimuli

Tasks
Participants heard sounds (described below) in a random order and were asked to choose which of two color pairs “went better” with the sound. They later rated each sound and color pair on 5 emotional dimensions in a line-rating task: happy vs. sad, angry vs. calm, active vs. passive, strong vs. weak, harmonious vs. disharmonious.

Sound Stimuli
Intervals: Piano tone at middle C with all other possible notes in the chromatic scale. Triads: Piano tone at middle C with all possible combinations of two other notes in the key of C major, plus all possible two-note intervals in the same range.

Color Stimuli
A pilot study identified the 36 color pairs that correlated most highly with the emotional and colorimetric dimensions among the pairs consisting of red, green, blue, yellow, and gray at all four “cuts” (lightness-saturation levels) from the 37 Berkeley Color Project (BCP) colors.

EXAMPLE COLOR PAIRS FOR SFRC TASK

\[ C_{\text{Harmonious}} = \sum_{i=1}^{4} r_i \] (Happy) \[ C_{\text{Disharmonious}} = \sum_{i=1}^{4} r_i \] (Angry) \[ C_{\text{Active}} = \sum_{i=1}^{4} r_i \] (Passive) \[ C_{\text{Strong}} = \sum_{i=1}^{4} r_i \] (Weak) \[ C_{\text{Harmony}} = \sum_{i=1}^{4} r_i \] (Harmonious) \[ C_{\text{Disharmonious}} = \sum_{i=1}^{4} r_i \] (Disharmonious)

Correlation of Interval Harmony and CSA

Emotional Dimension

Color Stimuli

Does emotional content predict color-timbre associations?

Conclusions & Future Directions

These results demonstrate that non-synesthetic participants show consistent color associations with musical sounds, both at the level of individual instrument timbres and for intervals and triads. Many important aspects of cross-modal associations with music remain to be investigated, however: e.g.,
- Do musical sounds have consistent associations with other aspects of visual images, such as shape, blur, and/or temporal dynamics?
- How does harmonic context change the emotional content of chords and the colors we associate with them?
- Are multiple low-level features (e.g., the timbres of triads) additive in their color and emotional associations, or are there significant interactions?

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