

How music can brighten our world: emotions induced by music affect brightness perception.

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ABSTRACT

Background

For most of us, music can be a strong emotional stimulus, and there is evidence that certain basic emotions expressed by music are universally recognized (Fritz et al. 2009). Previous research has shown that emotional components, valence and/or arousal, of musical primes can influence emotional processing of visual stimuli including human faces (Logeswaran & Bhattacharya, 2009) and complex pictures (Marin, Gingras & Bhattacharya, 2011).

In the present study we investigated whether musical primes can also influence low level processing of visual target stimuli. This low-level processing is classically conceptualised as bottom-up perceptual processing immune from influences of top-down processing (e.g. Marr, 1982), however the perceived physical world is not just a mere passive registration of external reality, but an active process of representation based on internal expectations and affective states (Bruner, 1957).

Aims

It has recently been shown that perceptual judgements could be biased towards brighter if the judgement was followed by positive, rather than negative, word evaluations (Meier et al, 2007) This suggests that brightness perception could be susceptible to influences of top-down processes. In three separate experiments, we investigated whether musically induced emotions can systematically influence brightness perception. We predicted that perceived brightness would be biased towards brighter following musical primes conveying positive emotions as compared to primes conveying negative emotions.

Method

In all three experiments, four different types of short musical primes were used that were pre-rated as either high or low along the dimensions of arousal and valence (Vieillard et al, 2008), and categorized as either happy, sad, scary, or peaceful. In addition, the participants of Experiment 1 also themselves evaluated the musical excerpts in terms of valence and arousal. On each trial of Exp. 1 and 2, a grey square was presented before a musical prime was played, and after the evaluation of the prime participants were asked to judge whether a second square was brighter or darker than the first. Participants were told that the changes in brightness between the grey squares presented before and after the prime were small but detectable, while in actuality a square with identical brightness was presented twice. Experiment 2 was similar to Experiment 1 but without any active affective evaluations of the musical primes, and allowed us to investigate the automaticity in musical

affective evaluations. Experiment 3 was designed to control for potential memory effects related to the memorization of the brightness of the first square while listening to the musical prime. Here, only one grey square was presented on each trial after each musical prime but without any affective evaluations, and participants rated its absolute brightness on a grey scale that was learned in a training session before the start of the experiment.

Results

Experiment 1 showed that perceptual judgements were significantly biased towards a brighter direction following positively, as compared to negatively, valenced music. Experiment 2 showed that such biases are automatic, i.e. do not require conscious evaluation of the musical prime in terms of valence and arousal. A similar, but only marginally significant, effect was observed in Experiment 1 for high arousal as compared to low arousal musical primes. Experiment 3 showed that such biases were not caused by memory effects and absolute judgment of brightness was mostly modulated by happy (positively valenced and high arousal) musical primes.

Conclusions

Our results can be explained by metaphor representation viewpoint (i.e. positive : negative = bright : dark; Lakoff & Johnson, 2008; Meier et al, 2007) and the music's ability to communicate basic emotions on the positive and negative ends of the valence dimension.

Taken together, these results suggest that general affective disposition of musical stimuli can systematically induce perceptual bias across modality, and can influence relatively low-level visual processes.

Keywords

Emotion, Cross-modal, Metaphor.

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