

Social Feedback Influences Musically Induced Emotions

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Numerous studies have shown that music is a powerful means to induce emotions. The present study investigates whether these emotional effects can be manipulated by social feedback. In an Internet-based study, 3315 participants were randomly assigned to two groups and they listened to different music excerpts. After each excerpt, participants rated emotions according to arousal and valence dimensions. Additionally, those in group 2 received feedback allegedly based on the emotional ratings of preceding participants. Results show that feedback significantly influenced participants' ratings of group 2 in the manipulated direction compared to the group without feedback.

Key words: emotion; Internet; social feedback; music; online

Introduction

Different studies show that music affects the so-called "subjective feeling" component of emotion.¹ This study investigated whether social influences can manipulate this component while music is being listened to. In an Internet study by Salganik *et al.*,² participants were asked to choose songs to download. In the experimental condition, feedback regarding the frequency of peer downloads was varied. As a result, popular songs (as indicated by feedback) were downloaded more often than less popular songs, suggesting that music listeners tend to orientate their aesthetic choices on the behavior of others.

Analogously, the present study investigated whether the emotional effects of music can also be manipulated by social feedback concerning the emotional ratings of others, as might happen in real life: One's best friend presents a

newly bought CD, saying it is very sad or happy music. To answer whether this might influence one's own emotion during listening to this music, the following study was conducted.

Music and Emotion

Here, *emotion* is used according to the *component process model* presented by Scherer.³ According to this model, an episode of emotion consists of coordinated changes in three major reaction components: physiological arousal, motor expression, and subjective feelings. A cognitive appraisal process often evokes this emotional episode. Subjective feelings can be described on dimensional scales. Two feeling dimensions, arousal (from low to high) and valence (from negative to positive), were derived by Russell⁹ when applying factor analyses and multidimensional scalings of different emotional terms. With the use of these dimensions, all terms examined by Russell⁹ could be projected into a circular structure model with two orthogonal axes, the *emotion space*. The structure was subsequently confirmed in many other studies (e.g.,

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that of Nagel *et al.*⁴) and also applied in our study.

According to Juslin and Västfjäll,¹ music affects emotion through different mechanisms: brain stem reflexes, evaluative conditioning, visual imagery, episodic memory, musical expectancy, emotional contagion, and cognitive appraisal. Cognitive appraisal might be socially affected: The appraisal theory of emotion states that emotions emerge from a cognitive evaluation of the emotion-eliciting factors regarding the dimensions of novelty, urgency, coping potential, norm compatibility, and goal congruence. We think that this evaluation process can be influenced by social feedback because norms are socially determined, and being socially accepted is one very important human goal.⁵

Social Conformity

The influence of social feedback can be regarded as social conformity. Two forms of conformity are described in the literature⁵: *Informational influence* describes conforming to the views of others because of having insufficient information about the object to evaluate. The other form is called *normative influence*, occurring when people follow group norms. One of the most prominent studies on conformity was conducted by Asch in 1951.⁵ He showed in his experimental study that subjects are affected by normative social feedback when asked to judge the length of simple lines, leading them to give wrong answers.

In addition to the already mentioned experiment of Salganik *et al.*,² only few studies examined the effect of social feedback related to music.^{6,7} Radocy¹³ in 1975 investigated the matching of simple tones for pitch or loudness. Subjects were found to comply with the researcher's confederates when incorrect social feedback was given. Furman and Duke⁸ investigated preferences of musically untrained listeners and found that ratings of unfamiliar orchestral music, but not of familiar pop music, were affected by social feedback.

Aims

The research question is "Can emotional experiences be manipulated by social feedback while listening to music?" In our paradigm social feedback is defined as providing information about the rating of musical pieces by preceding participants.

Method

Subjects

Three thousand three hundred fifteen (3315) participants (mean age: 31.3 years, range: 10–93 years, 1371 females and 1944 males) were recruited by linking the study to several German Web sites.

Stimuli

All participants listened to five music excerpts (30 s each) randomly chosen from a total of 23 in a random order. The pieces were selected to represent all four emotional characters described by the two-dimensional emotion model by Russell,⁹ thus presumably inducing negative or positive valence with low or high arousal.

Procedure

The study was conducted online because of the many advantages of Web experiments,¹⁰ which have been shown to be valid in measuring the emotions induced by music.¹¹ As a cover story, the study was embedded in a 10-min German online music-personality test.

Every site visitor was randomly redirected to one of two versions of the test. The first version served as a control condition (group 1). Participants in the second version (group 2) were presented with manipulated social feedback during music listening. Before music listening, subjects received instructions about the tasks, were required to pass a comprehension test, and took part in a test trial. After each music excerpt,

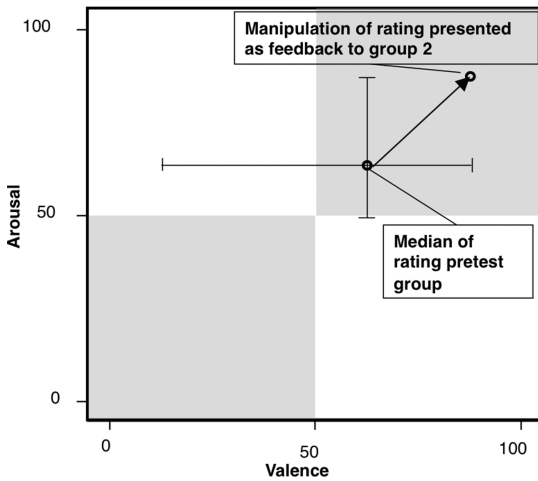


Figure 1. One example of feedback manipulation. The rating of the piece (“Olsen Olsen” by the group Sigur Ros) was moved to the pretest group’s upper quartile of rating, away from the center of the emotion space.

participants rated emotions induced by music using the arousal and valence dimensions. To do so they moved two sliders with their mouse from positive to negative. Negative valence was defined as “unpleasant” and positive valence as “pleasant.” Negative arousal was defined as “calming” and positive arousal as “arousing.”

Social Feedback

The manipulated feedback was presented to group 2 by the position of the two emotion rating sliders. Subjects were blinded about the true origin of the social feedback. Instead, they were informed that this was how the persons that already had participated in the study had rated the effect of this excerpt. The manipulation was based on ratings of a pretest group ($n = 11$). As values for the feedback the upper and lower quartiles of the ratings of the pretest were presented (for an example see Fig. 1).

Results

For comparison, pieces were grouped according to the manipulation applied to the

feedback: pieces where the feedback values were higher than the median values of the control group henceforth will be called “manipulated upward”; pieces where the feedback values were lower than the corresponding median value of the control group will be called “manipulated downward.” Results show that participants of group 2 (with social feedback) rate their own emotions significantly differently compared to group 1 (without feedback) (Fig. 2). Significant differences were revealed between the two groups for both dimensions and both conditions (pieces manipulated upward or downward) in the manipulated direction.

Conclusions

In this Internet-based set-up, the manipulated social feedback influenced participants’ ratings of emotions. Subjects rated pieces with feedback that was higher or lower than the median of the unbiased control group according to the corresponding direction of the manipulation. To our knowledge, for the first time a social factor influencing emotional effects of music could be confirmed: participants in this study were conforming to the preceding subjects’ ratings. The social feedback seemed to change the emotion induced by the music. This result underscores the importance of the cognitive appraisal component of emotion by showing that feeling an emotion like that of the majority of their peers seems to be an attractive goal to humans.

However, here only the subjective feeling component of emotion was measured. It remains an open question whether the physiological emotion component³ is affected by the feedback. In order to clarify this issue, the study will be replicated in a lab setting applying physiological measurements of the autonomous nervous system. The influence of social feedback on physiological measures has recently been demonstrated in a study by Berns *et al.*¹² In a functional magnetic resonance imaging

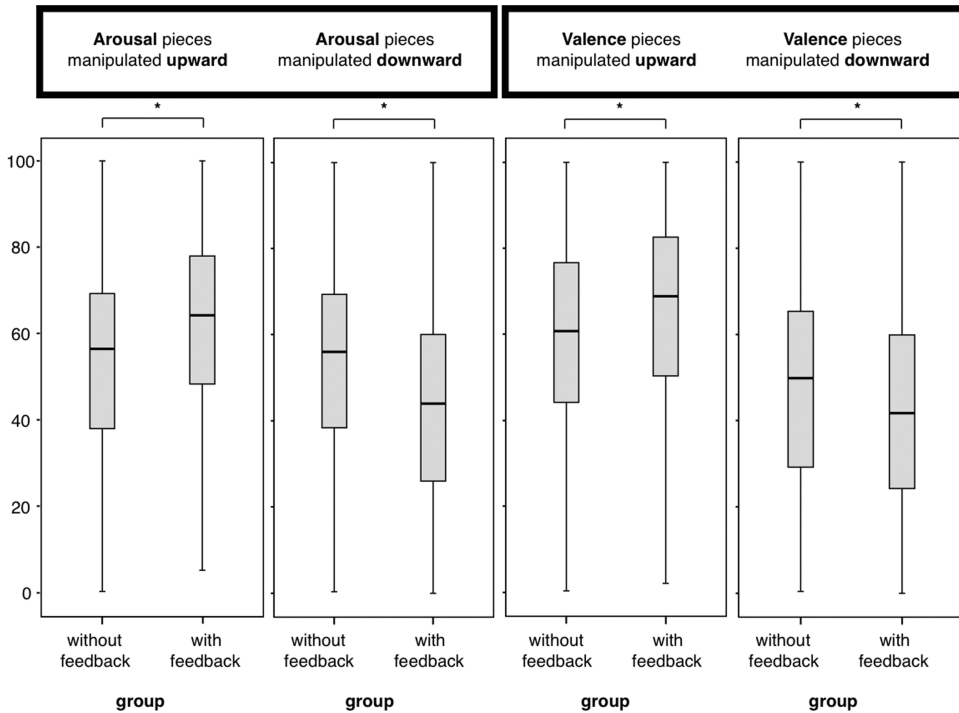


Figure 2. Box plots of ratings. Ratings of pieces manipulated upward or downward by the feedback values, separated by groups and dimensions. *Mann-Whitney U tests (Bonferroni correction $P \leq 0.05/4$) $P \leq 0.0125$.

experiment they investigated neurobiologic correlates of social conformity during a mental rotation task similar to Asch's experiments. Their results indicate that social information leads to a different visual perception of the task, accompanied by an increased activation of an occipital-parietal network, and lacking involvement of frontal executive decision-making areas.

It might also be questionable, how this Web experiment simulated normative influence because the social feedback was rather indirect and participants did not know who exactly participated before them. In everyday life social feedback might occur in a different way, for example, one's peers describing which new album is most "emotional." However, feedback mechanisms as used in our study are often applied on the Internet: When selecting music at Amazon.com or iTunes, for example, one is usually presented with preceding visitors' ratings of the music that one might intend to purchase.

This clearly represents an informational social influence, in which customers' behavior is affected by the ratings of others.

Conflicts of Interest

The authors declare no conflicts of interest.

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