Towards Three-Dimensional Model of Affective Experience of Music

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ABSTRACT

Background

Although there is debate among some scholars does the music elicit true emotions in the listeners (Kivy, 1990; Konečni, 2008), findings from studies using subjective, behavioral, physiological, and neurological measures indicate that listeners respond affectively to music (e.g., Gagnon & Peretz 2003; Mitterschiffthaler et al. 2007). Dimensional models of emotion suggest that affective experience can be explained by a set of underlying dimensions that are bipolar and consist principally of valence (pleasantness–unpleasantness) and arousal (high and low activation) (e.g., Russell 1980, 2003; Watson & Tellegen, 1985, 1999). This line of research started with the work of Osgood in 1950s on affective meaning of concepts which resulted in three stable and culturally invariable dimensions of affective meaning: evaluation (pleasant-unpleasant), potency (strong-weak) and activity (active-passive) (Osgood, Succi & Tannenbaum, 1957; Osgood, May & Miron, 1975). Following dimensional stream in emotion theory, abundant number of studies has been conducted using variety of stimuli materials in order to discover underlying structure of affective experience.

In an earlier study on music stimuli (Nordenstreng, 1969) listeners rated music pieces on a number of different emotion attributes. Four factors were extracted and labeled as softness, colourfulness, relaxation and magnitude. In an extended study that followed Wedin (1972) proposed that emotions to music can be accounted for by three bipolar factors: tension/energy (vehement, violent, furious), gaiety-gloom (playful, exuberant, glad) and solemnity-triviality (solemn, sublime, grand). Recent studies focused more on specific aspects of emotional responses to sounds, such as music-specific affects (e.g., Zentner, Grandjean, & Scherer, 2008), thrills (e.g., Guhn, Hamm, & Zentner, 2007), or strong experiences elicited by music (Gabrielsson, 2001, 2006)

However, despite rapidly expanding research in the field there is a lack of broader consensus on the structure of music induced affective reactions. As a consequence, inconsistent findings directed great number of researchers to rely on two-dimensional model of emotion, in accordance with widespread recognition of valence and arousal as basic dimensions of affective experience. Indeed, in recent years, two-dimensional model of emotion has gained support among researchers and has been applied widely with considerable success. Nevertheless, number of studies suggest that the two-dimensional model is not able to account for all the variance in sound elicited affective experiences and that two dimensions may not be enough (e.g., Bigand, Vieillard, Madurell, Marozeau, & Dacquet, 2005; Ilie & Thompson, 2006).

Aims

The goal of this study is further elaboration of the underlying structure of affective experiences of music. Specifically, the aim of the first study was to collect empirically a set of attributes that represents subjective, affective experience of music. The aim of the second study was to establish the underlying structure of affective experience of music through factor analytic study. Finally an attempt was made to propose a parsimonious instrument that measures affective experiences of music and that can be used for different kinds of music stimuli in further studies.

Method

In the first study we tried to obtain common attributes people use in describing their affective experience of various music stimuli. 84 participants (undergraduate psychology students) were asked to produce attributes that can describe their subjective experience of presented 64 musical excerpts, selected to cover a wide spectrum of music genres, themes and instruments. In addition, attributes selected through literature review were added to the list.

In the second study, a total of 102 participants (divided into nine smaller groups) assessed 72 musical excerpts (approx. five seconds long) on the instrument that consisted of 43 bipolar 7-point scales (from -3 to 3), with attributes of opposite meaning on both ends. Stimuli were generated by extracting suitable fragments from the original musical pieces selected to cover a wide spectrum of music genres, features, themes and instruments. In order to avoid possible confounding effects of rating what stimulus appear to express, or what would be expected to express, the respondents were clearly instructed to rate their own subjective experience of the presented stimuli.

Results

All affective attributes, produced by respondents and selected through the literature review, were collected in one database. Summary list consisted of 1190 attributes. On the basis of the frequency in production and possibility to have adequate opposite 86 attributes were selected for the final form of the instrument that will be used in the following factor analytic study.

In the second study, the original 3-D data matrix (subjects × scales × stimuli) was transformed into 2-D data matrix, using the stringing out method as proposed by Osgood and his associates (Osgood et al., 1975). To examine the latent structure of affective experience of music stimuli principal components analysis with varimax rotation was performed. Catell's scree test indicated that a three-factorial structure was appropriate solution for this data. The three factors were interpreted as: *Affective valence* (pleasant - unpleasant, beautiful - ugly, attractive - unattractive), *Arousal* (arousing -

relaxing, exciting - unexciting, impressive - unimpressive), and *Cognitive evaluation* (expected - unexpected, usual - unusual, clear - unclear, familiar - unfamiliar). These three factors accounted for 60% of the total variance. The first principal component, i.e. the *affective valence* accounted for 37.5% of the variance, while the *arousal and cognitive evaluation* accounted for 16.2% and 6, 2% of the variance, respectively. Kaiser-Meyer-Olkin measure of sampling adequacy was .968. Congruence analysis indicated robustness of three obtained dimensions across different music stimuli and participants.

Conclusions

The main aim of this research was to establish latent structure of affective experience of music stimuli. The results showed that affective experience of music is constituted of three underlying factors, interpreted as: affective valence, arousal and cognitive evaluation. The first extracted dimension, affective valence, explains the largest part of the variance followed by arousal. This is consistent with the previous findings of the structure of affective experiences.

However, the results of this study demonstrate that substantial part of subjective experience represents a third dimension - cognitive *evaluation* (disorganized - organized expected - unexpected, usual - unusual, clear - unclear, regular - irregular, meaningless - meaningful, familiar - unfamiliar etc.). This finding is compatible with the findings of our previous studies dealing with the structure of subjective experience of stimuli from different sensory modalities (Janković, in press). Similar factor, sometimes named cognitive evaluation and sometimes regularity, was obtained in the study of subjective experiences of sounds (Janković & Trkulja, 2010), paintings (Marković & Radonjić, 2008), abstract visual patterns (Marković, Janković & Subotić, 2002), haptic stimuli (Žunić, 2002), olfactory stimuli (Marković & Vulin, 2008), gustatory stimuli (Milosavljević, Janković & Marković, 2010) and verbal materials (Janković, 2000).

In our opinion, the outcome of this research could be comprehended as an addition to major findings in the domain of affective experiences of music. The aim of this study was not to evaluate other low-dimensional models, but to provide further elaboration of the underlying structure of affective experiences of music through a comprehensive approach that includes an empirical criterion for selection of music elicited subjective experiences and a wide spectrum of music stimuli. It is confirmed that dimensions of valence and arousal may be considered as basis of affective experiences of music, and the results illuminated the third dimension, cognitive evaluation, that is proved to be important in the structure of subjective experience of stimuli from different sensory modalities including music stimuli and sounds in general.

Keywords

Affective experience of music, three-dimensional model, valence, arousal, cognitive evaluation.

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