



Exploring aesthetic experiences of females: Affect-related traits predict complexity and arousal responses to music and affective pictures



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ABSTRACT

Empirical studies testing Berlyne's (1971) psychobiological model have led to conflicting results, and individual differences have been proposed as a possible explanation. We explored whether top-down influences related to personality may play a role and studied how affect-related personality traits are related to complexity and arousal responses. Two hundred and six females rated either affective environmental scenes, environmental scenes converted into cartoons, or representational paintings (Study 1). Another group of 77 females rated excerpts of piano music (Study 2). We assessed trait emotional intelligence (EI), stress reactivity (SR), empathy (Study 1), emotional self-efficacy (Study 2) as well as engagement with art and music. Linear mixed-effects modelling revealed that affect-related traits emerged as significant predictors in all visual complexity and arousal models, except for the complexity model of environmental scenes. SR predicted arousal induced by environmental scenes, but not by cartoons and paintings, for which an interaction between trait EI and empathy was found. Musical sophistication predicted musical complexity, and the complexity and arousal models comprised interactions between trait EI, SR and emotional self-efficacy. Affect-related traits should be integrated into arousal-based theories of aesthetic experiences, and their impact on perceived complexity and felt arousal varies across stimulus categories.

1. Introduction

Aesthetic experiences are multifaceted phenomena, and current models acknowledge the determining role of the artwork, the characteristics of the perceiver and the socio-cultural context in shaping such experiences. More specifically, several models of art experience have included factors related to the individual, such as personality, prior mood states, as well as expertise (Pelowski, Markey, Luring, & Leder, 2016). Nevertheless, studying differences within and between individuals still remains a relatively open field of study. Here, our main aim is to identify the role of affect-related traits and expertise in ratings of arousal and complexity, two frequently studied variables of aesthetic experiences, in a group of healthy female university students. We study individual differences in the aesthetic appreciation of music and three sets of affective visual stimuli, thus following the recent trend of a comparative approach across sensory domains (e.g., Marin, 2015).

The notion that studying individual differences in aesthetic experiences may help evaluate the robustness of theories and models has recently gained growing interest among researchers, especially in the context of Berlyne's (1971) psychobiological model. Berlyne describes

an inverted U-shaped relationship between so-called collative variables (i.e., familiarity, complexity, novelty, ambiguity etc.) and measures of hedonic tone (i.e., beauty, liking, attractiveness etc.), which is mediated through arousal induced by a stimulus. In this model, stimuli of moderate complexity should be preferred. Some empirical evidence has been adduced in support of this claim, especially regarding the role of arousal in aesthetic experiences (e.g., Marin & Leder, 2013); however, discrepancies regarding the relationship between complexity and measures of hedonic tone have been reported (Chmiel & Schubert, 2017; Marin & Leder, 2013). This relationship may also depend on the underlying dimension of complexity (Nadal, Munar, Marty, & Cela-Conde, 2010) or on the specific measure of hedonic tone (Marin, Lampatz, Wandl, & Leder, 2016). Moreover, musical expertise has been suggested to dissolve (Orr & Ohlsson, 2005) or shift (Hare, 1974; Vitz, 1966) the inverted-U relationship between musical complexity and liking. More recently, Güçlütürk, Jacobs, and Van Lier (2016) showed that individual differences regarding preferences for visual complexity should be considered in the context of Berlyne's psychobiological model, suggesting that across-participant analysis methods may be inadequate to gain a deep understanding of how complexity and liking

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are related. In a similar vein, Street, Forsythe, Reilly, Taylor, and Helmy (2016) reported individual differences in preference for visual complexity evoked by fractals using mixed-effects modelling. We followed this approach by concentrating on two core parameters of Berlyne's influential theory, namely subjective complexity and arousal, and by studying responses to stimuli with affective contents.

In the present study, the issue under scrutiny is how affective (arousal) and cognitive (complexity) processing of visual and musical stimuli can be predicted by individual differences in empathy, emotional intelligence and stress reactivity. These three traits have previously been related to individual differences in affect processing in healthy individuals; therefore, we were interested in examining these traits together in a common framework with regard to aesthetic experiences. More generally, this comprehensive approach of studying more than one personality trait is in line with studies showing how genetic variation of the oxytocin receptor is associated with both empathy and stress reactivity (Rodrigues, Saslow, Garcia, John, & Keltner, 2009), or studies indicating a negative association between trait emotional intelligence and measures of acute and chronic stress level (Mikolajczak, Roy, Luminet, Fillée, & de Timary, 2007; Singh & Sharma, 2012). Correlations between trait EI, empathy and self-efficacy were also reported in an educational context (Kokkinos & Kipritsi, 2012).

Already Mayer, Dipaolo, and Salovey (1990) investigated the role of empathy in the perception of emotional faces, color swatches and abstract designs, showing that participants' ability to perceive emotional contents in visual stimuli was related to the degree of self-reported empathy. The study of empathy recently also gained some attention in the field of visual neuroaesthetics (Freedberg & Gallese, 2007; Schott, 2015), but not much work has been done regarding visual aesthetic experiences (but see Gerger, Pelowski, & Leder, 2017). Empathy has been more frequently studied regarding music-induced emotions. Sub-components of empathy have been associated with the experience of and preference for sadness in music (e.g., Eerola, Vuoskoski, & Kautiainen, 2016; Garrido & Schubert, 2011). The ability "to feel with someone" generally seems to play a role in processing musical emotions, probably due to an underlying action-perception mechanism (Wöllner, 2012). Taken together, these studies motivated us to further investigate the role of trait empathy, especially in the context of visual aesthetic experiences.

The investigation of trait emotional intelligence (EI), a broader construct than empathy, and its relation to aesthetic experiences may be a worthwhile and timely continuation because both constructs overlap only moderately in healthy individuals (Gökçen, Petrides, Hudry, Frederickson, & Smillie, 2014). Trait EI is a personality trait (Petrides, 2010), related to the Big Five personality traits, with similar genes driving the development of individual differences (Vernon, Villani, Schermer, & Petrides, 2008). A strong overlap between trait EI and the General Factors of Personality has also been reported (Van der Linden, Tsaousis, & Petrides, 2012). Trait EI concerns people's perceptions of their emotional world (i.e., not their actual abilities and skills) and comprises 15 different facets forming factors such as well-being, self-control, emotionality and sociability. The literature on trait EI in the field of empirical aesthetics is scarce, but trait EI has been shown to be positively related to flow experiences in music performance (Marin & Bhattacharya, 2013) and to the amount of musical training (Petrides, Niven, & Mouskounti, 2006). Regarding the aesthetic experience induced by pictures and music varying in emotional content, it is plausible to surmise that arousal responses may change as a function of trait EI.

Another trait associated with individual differences in processing of affective stimuli is stress reactivity. Stress reactivity refers to the "capacity or tendency to respond to a stressor" (Schlotz, 2013, p. 1891) and can be understood as a physiological and psychological response to a perturbation to homeostasis, precipitating the development of cardiovascular diseases and psychosis. Stress reactivity is assumed to be

related to high intrusiveness, low self-efficacy, high arousability of the central nervous system and high negative affectivity (Schulz, Jansen, & Schlotz, 2005). In the musical domain, stress-reactivity has been suggested to underlie gender effects observed in psychophysiological arousal responses to music (Nater, Abbruzzese, Krebs, & Ehlert, 2006), with females being more stress reactive than males and showing enhanced psychophysiological arousal responses to unpleasant music. Individual stress reactivity has also been found to be a mediator between habitual music listening-behaviour and indicators of psychological and physiological functioning (Thoma, Scholz, Ehlert, & Nater, 2012). More recently, Gingras, Marin, Puig-Waldmüller, and Fitch (2015) reported that pupil dilation, a measure of emotional arousal, in response to music did not vary as a function of stress reactivity.

Individual differences in art interest and art expertise have been reported to be an important factor in modelling aesthetic experiences (e.g., Istók et al., 2009; Palmer & Griscom, 2013; Silvia, 2013). For instance, Gartus and Leder (2014) studied modern art and reported a positive relationship between interest in modern art and liking among university students, which was not present for general art interest. In a follow-up project, Gartus, Klemer, and Leder (2015) showed that graffiti interest also affected beauty and interest ratings of graffiti art and eye movements. Silvia (2013) demonstrated that people with higher levels of visual art expertise regarded abstract art as more interesting and less confusing. Studying preference for harmony in the visual and musical domains, Palmer and Griscom (2013) found that higher levels of training in the respective art forms were associated with lower preference for harmony, and further, that preference for harmony was generally unrelated to the Big Five personality traits and sensation seeking. van Paasschen, Bacci, and Melcher (2015) showed that art experts and novices reported similar levels of valence and arousal in response to representational and abstract artworks. The results regarding musical training and emotional processing are inconclusive (Bigand, Vieillard, Madurell, Marozeau, & Dacquet, 2005; Mikutta, Maissen, Altorfer, Strik, & König, 2014; Park et al., 2014). Recent research has gone a step further and studied expertise in relation to personality with the motivation to unravel the characteristics of aesthetic people. Musical sophistication, which refers to different aspects of how people engage with music including musical training (Müllensiefen, Gingras, Stewart, & Musil, 2014), was recently reported to be related to the Big 5 personality traits and openness to aesthetics (Greenberg, Müllensiefen, Lamb, & Rentfrow, 2015). Similarly, personality and aesthetic fluency were studied by Fayn, Maccann, Tiliopoulos, and Silvia (2015), who showed that openness to experience and aesthetic fluency were moderately related.

In order not to run into issues of sample size and power, we restricted our sample to female university students, who are frequently studied in the field of empirical aesthetics. Because previous research has shown that traits such as stress reactivity (Nater et al., 2006) and empathy (Kreutz, Schubert, & Mitchell, 2008) can explain gender differences regarding affective responses to music, we decided to explore these variables in more depth among female university students. Moreover, gender differences regarding emotional picture processing are well documented in the literature (Filkowski, Olsen, Duda, Wanger, & Sabatinelli, 2016), with females showing stronger emotional reactions to negative valence and males showing stronger reactions to positive valence (Stevens & Hamann, 2012).

In summary, our research design is characterized by several current trends, namely by considering more than one personality trait (Mikolajczak et al., 2007; Rodrigues et al., 2009), by studying personality traits in relation to interest and sophistication (Greenberg et al., 2015; Palmer & Griscom, 2013), as well as by studying more than one aesthetic domain (Marin, 2015; Marin & Leder, 2013; Palmer & Griscom, 2013; Silvia, Fayn, Nusbaum, & Beaty, 2015). This approach allows us to obtain a more complete picture about the role of individual differences among female university students in the context of Berlyne's psychobiological model, which clearly is a timely issue.

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