CORTEX 47 (2011) 1099–1106

available at www.sciencedirect.com

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journal homepage: www.elsevier.com/locate/cortex

Special section on music in the brain: Research report

The role of mood and personality in the perception of emotions represented by music

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ARTICLE INFO

Article history:
Received 16 September 2009
Reviewed 6 January 2010
Revised 3 February 2010
Accepted 5 November 2010
Published online 30 April 2011

Keywords:
Emotion
Music
Personality
Mood
Preference

ABSTRACT

Neuroimaging studies investigating the processing of emotions have traditionally considered variance between subjects as statistical noise. However, according to behavioural studies, individual differences in emotional processing appear to be an inherent part of the process itself. Temporary mood states as well as stable personality traits have been shown to influence the processing of emotions, causing trait- and mood-congruent biases. The primary aim of this study was to explore how listeners' personality and mood are reflected in their evaluations of discrete emotions represented by music. A related aim was to investigate the role of personality in music preferences. An experiment was carried out where 67 participants evaluated 50 music excerpts in terms of perceived emotions (anger, fear, happiness, sadness, and tenderness) and preference. Current mood was associated with mood-congruent biases in the evaluation of emotions represented by music, but extraversion moderated the degree of mood-congruence. Personality traits were strongly connected with preference ratings, and the correlations reflected the trait-congruent patterns obtained in prior studies investigating self-referential emotional processing. Implications for future behavioural and neuroimaging studies on music and emotions are raised.

1. Introduction

Neuroimaging studies investigating the processing of emotions have traditionally relied on group-averaged brain activations, and considered variance between subjects as statistical noise (for a review, see Plomin and Kosslyn, 2001). However, according to behavioural studies, individual differences in emotional processing appear to be an inherent part of the process itself (for a review, see Rusting, 1998), and these differences may be essential in unravelling the neural circuits involved in the processing of emotions (Hamann and Canli, 2004). Behavioural studies have associated both temporary mood states as well as stable personality traits with individual differences in emotional processing, but it is still not clearly understood what the mechanisms behind these individual differences are (Rusting, 1998).

Extraverts have been shown to be particularly susceptible to positive affect, and neurotics to negative affect. Matthews et al. (1990) found that extraverts tend to experience more pleasant moods, whereas high neuroticism scorers tend to experience more unpleasant moods. Similarly, Rusting and Larsen (1997), and Larsen and Ketelaar (1991) reported that extraversion

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doi:10.1016/j.cortex.2011.04.011

correlated with positive mood after positive mood manipulation (but not with negative mood after negative mood manipulation), while neuroticism correlated with negative mood after negative mood manipulation (but not with positive mood after positive mood manipulation). These findings are in line with personality theory, according to which one of the definitions of extraversion is the tendency to experience positive emotions, while neuroticism is defined as the tendency to experience negative emotions such as depression, anger, and anxiety (see e.g., John and Srivastava, 1999).

Extraversion and neuroticism have also been connected with individual differences in brain function: Neuroticism has been associated with heightened brain activity (at rest and in response to negative stimuli) in brain regions associated with negative affect, whereas extraversion has been associated with brain activity (at rest and in response to positive stimuli) in brain regions that are important for reward and approach behaviour (for a review, see DeYoung and Gray, 2009). More specifically, Canli et al. (2002) discovered that extraversion correlated with amygdala activation to happy faces. However, when they used group-averaged data, they only found significant amygdala activation to fearful faces – a finding consistent with previous research.

Both personality and mood have been associated with affect-congruent biases in emotional judgments, but their role might depend on the type of emotional processing in question (for a review, see Rusting, 1998). A study by Martin et al. (1983) demonstrated that high neuroticism scorers recalled more negative information about themselves (but not about others), and this effect was not related to depressed mood. More recently, Zelenski and Larsen (2002) found that extraversion and neuroticism biased participant's self-referential judgments in trait-congruent directions, and these personality effects were also not mediated by mood states. The key aspect of self-reference is that the self acts as a setting against which incoming data are interpreted (see e.g., Rogers et al., 1977). Extraversion predicted increased likelihood judgments for positive future events, while neuroticism predicted increased likelihood judgments for negative events.

Mood states have been reported to cause affect-congruent biases especially in tasks involving more cognitive judgments. Bouhuys et al. (1995) discovered that induced depressed mood influenced the perception of facial emotional expressions in healthy participants. When feeling more depressed, the participants perceived more sadness/rejection in ambiguous faces, and less happiness/invitation in clear faces. Similarly, Isen and Shalker (1982) found that induced negative mood led to lower pleasantness ratings for pleasant, ambiguous, and unpleasant slides, while induced positive mood led to higher pleasantness ratings.

According to Rusting (1998), positive emotional traits such as extraversion may alter the processing of emotional cues in the presence of a negative mood state. Because extraversion represents the tendency to avoid negative stimuli (and to focus on positive stimuli) when experiencing negative mood states, it should also moderate the extent to which mood-congruency effects emerge. In contrast, individuals scoring high in neuroticism should be especially susceptible to negative mood-congruent thoughts. Richards et al. (1992) reported that the effect of induced state anxiety on performance on the emotional Stroop task was modulated by the participants' trait anxiety. Participants with high trait anxiety had an attentional bias towards stimuli which were congruent with their (induced) mood, while participants scoring low in trait anxiety had a tendency in the opposite direction. Similarly, a study by Rusting (1999) demonstrated that positive mood-congruence was stronger for participants scoring high in positive affectivity, while neuroticism and negative affectivity moderated the mood-congruence effect for negative emotions. However, the moderating effect of personality was only observed when mood was manipulated.

The last decade has seen the emergence of functional neuroimaging studies investigating the neural substrates of emotions using musical stimuli (for a review, see Koelsch et al., 2010). One issue that has held back advances in identifying the neural circuits involved in the processing of different emotions is the difficulty of eliciting strong and differentiated emotional responses in a laboratory environment (Barrett and Wager, 2006). However, music as a stimulus holds a lot of potential for future research: Music is capable of expressing and inducing fairly intense emotions – both positive and negative (see e.g., Zentner et al., 2008) – and music also enables the investigation of both affective and aesthetic appraisals simultaneously (for a review, see Brattico and Jacobsen, 2009; Nieminen et al., 2011, this issue).

In order to elucidate the neural basis of emotional processing, future neuroimaging studies on music and emotions should move beyond group-averaged brain activations, and include individual difference measures (e.g., personality) in the analyses. However, before this can be attempted, behavioural investigations on the role of individual differences in the perception of musical emotions as well as in music preferences (with regard to the emotion expressed) should provide evidence regarding the traits and states that might be involved. Personality traits have previously been associated with emotions induced by music (Kreutz et al., 2008) as well as with preferences for different musical genres (Rawlings and Ciancarelli, 1997; Rentfrow and Gosling, 2003), but their role in the perception of musical emotions has remained unclear. In addition, the affective aspects of music preferences – the role of emotions expressed by music – have also received little attention in previous studies (for a review, see Rentfrow and McDonald, 2010). Since preference is subjective by definition, it could be speculated that preference for music expressing different emotions (e.g., sadness or happiness) might reflect the pattern of trait-congruent biases found in self-referential emotional processing (e.g., Martin et al., 1983; Zelenski and Larsen, 2002).

Thus, the primary aim of this study was to investigate how listeners' personality traits and current mood are associated with their evaluations of discrete emotions represented by music. Based on the previous literature, it was hypothesized that both personality and mood would contribute to the perception of emotions in trait- and mood-congruent manners, and that mood and personality would also interact in producing affect-congruent biases. The possible interaction of mood and personality has received little attention in studies investigating trait- and mood-congruence (for a review, see Rusting, 1998), although some evidence of such interactions exists (see e.g., Rusting, 1999).

A related aim was to investigate the role on personality and mood in music preferences (with regard to the emotion expressed by the music), as preference ratings for music excerpts might provide a novel way of investigating self-referential emotional processing. Music preferences and their relation to individual differences are also of significance for neuroimaging studies on music and emotions, since aesthetic and subjective appreciation are some of the most common experiences associated with music listening (see e.g., Brattico and Jacobsen, 2009; see also Nieminen et al., 2011, this issue). It was hypothesized that music preferences and personality traits would exhibit a pattern of affect-congruent biases similar to the ones reported in studies investigating self-referential emotional processing (e.g., Martin et al., 1983; Zelenski and Larsen, 2002).

2. Methods

2.1. Participants

67 Finnish university students aged 18–42 years (mean 25.2, standard deviation 3.93, 66% females) took part in the experiment. Although a portion of the participants had received musical training or had music as a hobby, they were not selected according to any musical skills or musical background. The participants received movie tickets in return for their participation.

2.2. Measures

Before the actual listening experiment, the participants' personality traits were assessed using "The Big Five Inventory" (BFI; John and Srivastava, 1999). The BFI has 44 items that measure five broad personality domains labeled Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to experience. The items were rated on a 5-point Likert scale (1 = disagree strongly, 5 = agree strongly). In addition, their current mood prior to taking the test was evaluated using the Profile of Mood States-Adolescents questionnaire (Terry et al., 1999; see Terry et al., 2003 for validation for adult populations), which measures 6 factors of mood (Vigour, Confusion, Anger, Fatigue, Depression, and Tension). Although it is possible that the experiment itself might have had a slight effect on the participants' mood, it is unlikely that this effect was systematically caused by the music excerpts, since the excerpts were short (15 sec; a total duration of <13 min), and the emotions represented by them varied considerably in valence and arousal. Furthermore, any possible boredom or fatigue effects would have been reduced to random noise due to the randomization of individual excerpt orders. After the experiment, a short questionnaire was given out to gather information about the participants' film genre preferences, musical training, and any possible hearing problems.

2.3. Stimuli

The stimulus material consisted of 50 film music excerpts representing anger, fear, happiness, sadness and tenderness (for the list of excerpts, see appendix in Eerola and Vuoskoski, 2011; excerpts 001–050). Film music was used because it is composed for the purpose of mediating powerful emotional cues, and it could serve as an ecologically valid and diverse stimulus material. Each excerpt was 15 sec long, and there were both highly and moderately typical examples of each discrete emotion ([5 high + 5 moderate examples] × 5 emotions). The excerpts were selected on the basis of a pilot experiment from a set of 360 film music excerpts collected by a panel of musicologists (for details, see Eerola and Vuoskoski, 2011).

2.4. Procedure

The participants were instructed to rate the emotions that the music was expressing in their opinion (i.e., perceived emotions), and the difference between perceived and felt emotions was explained to them. The emotion ratings were collected using 5 discrete emotion scales (anger, fear, happiness, sadness and tenderness), ranging from 1 to 9 (1 = not at all angry, 9 = very angry, etc.). These five emotions have been documented to be commonly expressed and induced by music, and are easily recognized by listeners (see e.g., Juslin and Laukka, 2004). The participants were instructed to use as many scales as they found appropriate for each excerpt. The participants also rated how much they liked each excerpt (1 = I do not like at all, 9 = I like very much).

2.5. Apparatus

The listening experiments were conducted individually for each participant in a soundproof room. Participants listened to the excerpts through studio quality headphones (AKG K141 Studio), and rated the excerpts using a computer interface that enabled them to move from one excerpt to the next at their own pace. The stimuli were presented in a different random order for each participant.

3. Results

3.1. Correlations between personality traits, mood states, and emotion ratings

Overall, the emotion ratings were highly consistent (Cronbach alphas for all emotion scales were above .99). Such high alphas are not uncommon when measuring perceived emotions in music (see e.g., Eerola and Vuoskoski, 2011), and even studies investigating musically induced emotions (which are known to be more subjective) have reported alphas close to 1 (see e.g., Zentner et al., 2008). To eliminate the effect of possible individual differences in scale use, the raw emotion ratings were standardized within subjects using individual z-score transforms (with the exception of liking ratings). The z-scores were calculated using all emotion ratings of each participant. Table 1 shows the correlations between personality traits and the mean emotion ratings of each participant. The mean emotion ratings were calculated using ratings given for all 50 excerpts (i.e., the mean sadness rating of a participant was calculated from that participant's sadness ratings for all 50 excerpts). This enabled the investigation of overall biases in scale use, as has been done in previous studies (see e.g., Isen

Table 1 – Correlations between personality traits and mean emotion ratings.

	Anger	Fear	Happiness	Sadness	Tenderness
Extraversion	.20	−.06	.12	−.27*	.03
Agreeableness	.21	−.01	−.02	−.22	.06
Conscientiousness	.02	−.15	−.11	.09	.12
Neuroticism	−.08	.03	−.21	.25*	−.01
Openness	.24	−.14	−.12	−.14	.15

*$p < .05$.

and Shalker, 1982; Bouhuys et al., 1995). Levene's test was used to assess the equality of variances in the mean emotion ratings, and it confirmed the homogeneity of the variances in all 5 emotion scales ($p = .677$). Only two statistically significant correlations emerged; neuroticism correlated positively with sadness ratings ($r = .25$, $p < .05$), while extraversion and sadness ratings had a negative correlation ($r = -.27$, $p < .05$). These results are in line to a certain extent with the hypothesis concerning trait-congruency, according to which extraversion is related to the perception of positive emotional cues, and neuroticism to the perception of negative emotional cues (see e.g., Rusting, 1998). As we used mean sadness ratings (calculated from the sadness ratings for all 50 excerpts) in the analysis, it also takes into consideration the sadness ratings given for tender and fearful (etc.) excerpts. Thus, the negative correlation between extraversion and sadness ratings reflects a general scale-use bias towards positive emotions, as positive and negative affect (and happiness and sadness) can be seen as the opposite extremes of a bipolar continuum (see e.g., Russell, 1980). However, the correlations between personality traits and happiness ratings were not statistically significant (extraversion, $r = .12$, $p =$ n.s.; neuroticism, $r = -.21$, $p =$ n.s.), although the trend was towards trait-congruency.

The correlations between mood states and mean emotion ratings are shown in Table 2. The overall magnitude of the correlations between mood states and emotion ratings was higher than in the case of personality traits and emotion ratings, and there were several statistically significant correlations. For example, vigour correlated positively with happiness ratings ($r = .32$, $p < .01$), anger correlated negatively with happiness ratings ($r = -.38$, $p < .01$), and depression and sadness ratings had a positive correlation ($r = .40$, $p < .001$). These mood-congruent correlations are consistent with results obtained in studies utilizing mood manipulation (e.g., Bouhuys et al., 1995; Isen and Shalker, 1982), and imply a strong connection between mood and emotional evaluations.

According to personality theory as well as the results of previous studies (e.g., Rusting and Larsen, 1997; Larsen and Ketelaar, 1991; Matthews et al. 1990), certain personality traits are thought to predispose to certain mood states. Since both personality traits and current mood seem to be related to the emotional evaluation of music excerpts, the correlations between extraversion, neuroticism, and current mood (shown in Table 3) should also be investigated. As expected, there were several statistically significant correlations in trait-congruent directions. For example, neuroticism correlated positively with depression ($r = .31$, $p < .05$), tension ($r = .37$, $p < .01$), and confusion ($r = .39$, $p < .001$), while extraversion had a negative correlation with tension ($r = -.37$, $p < .01$). In addition, extraversion and neuroticism also had a strong, negative correlation ($r = -.58$, $p < .001$).

According to Rusting (1998), emotional processing is most likely influenced by both mood and personality, since personality traits represent underlying propensities towards mood states (but do not necessarily always produce them). However, it is still unclear how mood and personality traits interact in the process. Therefore, we decided to proceed by examining partial correlations between personality and emotion ratings while controlling for mood, as well as partial correlations between current mood and emotion ratings while controlling for personality. When current mood was controlled for, the previously significant correlations between personality traits (extraversion and neuroticism) and sadness ratings became statistically non-significant (sadness and neuroticism: $r = .14$, $p =$ n.s.; sadness and extraversion: $r = -.19$, $p =$ n.s.). However, when personality traits were controlled for, most of the correlations between mood and emotion ratings remained statistically significant (see Table 4). Although these results imply that the role of mood in emotional evaluations might be greater than the role of personality, a more detailed analysis of the independent and

Table 2 – Correlations between mood states and mean emotion ratings.

	Anger	Fear	Happiness	Sadness	Tenderness
Vigour	−.09	.14	.32**	−.23	−.11
Confusion	−.07	−.03	−.20	.21	.08
Anger	.03	−.11	−.38**	.33**	.11
Fatigue	.24*	−.12	−.32**	.14	.04
Depression	−.11	−.10	−.28*	.40***	.04
Tension	−.09	−.13	−.09	.26*	.00

*$p < .05$, **$p < .01$, ***$p < .001$.

Table 3 – Correlations between mood states and the personality traits extraversion and neuroticism.

	Neuroticism	Extraversion
Vigour	−.26*	.13
Confusion	.39***	−.22
Anger	.28*	−.21
Fatigue	.20	−.04
Depression	.31*	−.22
Tension	.37**	−.37**
Neuroticism		−.58***

*$p < .05$, **$p < .01$, ***$p < .001$.

Table 4 – Partial correlations between current mood and mean emotion ratings, when personality traits are controlled for.

	Anger	Fear	Happiness	Sadness	Tenderness
Vigour	−.11	.13	.24	−.15	−.08
Confusion	−.05	−.06	−.13	.14	.10
Anger	.05	−.09	−.33**	.27*	.08
Fatigue	.25*	−.10	−.26*	.09	.01
Depression	−.10	−.12	−.20	.35**	.04
Tension	.01	−.19	−.07	.17	.04

*$p < .05$, **$p < .01$.

interaction effects of the two variables is necessary and presented next.

3.2. Moderated multiple regression (MMR) analysis

MMR is an analysis method that allows investigating whether the effect of an independent variable on the dependent variable is moderated by a moderator variable. In other words, it allows testing for interactions between variables by entering two predictor variables and the product of those variables (i.e., interaction) into a linear regression equation (Aiken and West, 1991). The results of the correlation analyses as well as the results of previous studies contributed to the formulation of several regression models, which were tested using MMR. Three of the regression models were statistically significant: Extraversion and depression had a significant interaction effect in explaining the inter-subject variance in the participants' mean sadness ratings, and extraversion and vigour as well as extraversion and fatigue had a significant interaction effect in explaining happiness ratings (regression summary in Table 5).

As can be seen from Table 5, extraversion in itself was not a significant predictor in any of the regression models. Only the different mood states and the interaction between extraversion and mood were significant predictors of the inter-subject variance in the participants' emotion ratings, which further suggest that extraversion moderated the degree of mood-congruence, and not vice-versa. The moderating effects of extraversion on the relationships between mood and emotion ratings are visualized in Fig. 1. For example, the upper panel in Fig. 1 shows how the correlation between vigour and happiness ratings increases when extraversion increases (participants have been divided in three groups according to extraversion scores). The middle panel displays a similar trend for fatigue and happiness ratings (the degree on mood-congruence increases when extraversion increases), and the lowest panel demonstrates the relationship between depression and sadness ratings. Based on the results of the moderated regression analysis, we can infer that the degree of mood-congruence in the emotion ratings is at least to some extent moderated by personality traits.

3.3. Personality, mood, and music preferences

Finally, we examined whether personality traits and mood states correlate with preference ratings for excerpts expressing each discrete emotion. Since aesthetic and subjective appreciation are some of the most common experiences associated with music listening (see e.g., Brattico and Jacobsen, 2009; Nieminen et al., 2011, this issue), the affective aspects of music preferences may offer a novel way of investigating self-referential emotional processing. For each participant, we calculated a mean preference rating for the 10 excerpts expressing each of the 5 discrete emotions. These mean preference ratings were then correlated with the personality- and mood variables. As expected, current mood and preference ratings did not appear to be strongly connected, as there were only two statistically significant correlations: tension correlated negatively with liking for happy-sounding music ($r = -.29$, $p < .05$) and with liking for tender-sounding music ($r = -.26$, $p < .05$). In Table 6, the correlations between personality traits and mean liking ratings for excerpts representing each discrete emotion are displayed. Liking for happy-sounding music correlated strongly with agreeableness ($r = .47$, $p < .001$) and extraversion ($r = .32$, $p < .01$), while openness to experience correlated positively with liking for fearful-sounding ($r = .26$, $p < .05$) and sad-sounding music ($r = .32$, $p < .01$). Agreeableness also had a negative correlation with liking for angry-sounding ($r = -.29$, $p < .05$) and fearful-sounding music ($r = -.36$, $p < .01$). The correlations between liking and personality seem to be mostly trait-congruent, although the correlations between openness to experience and liking for fearful- and sad-sounding music could result from openness towards different kinds of music.

Compared to neuroticism and extraversion, there is less evidence regarding the biological substrates of agreeableness, openness to experience, and conscientiousness, and their role in emotional processing (for reviews, see DeYoung and Gray, 2009; Rusting, 1998). However, agreeableness has been defined as a prosocial orientation towards others (altruism,

Table 5 – MMR summary (DV = dependent variable, IV = independent variable, M = moderator variable, I = interaction of IV and M).

DV	IV: Depression M: Extraversion R^{2adj} (β)	IV: Fatigue M: Extraversion R^{2adj} (β)	IV: Vigour M: Extraversion R^{2adj} (β)
Sadness ratings	.21*** ($IV_{.29}$*, $M_{-.18}$, $I_{-.21}$*)		
Happiness ratings		.19*** ($IV_{-.43}$***, $M_{.17}$, $I_{-.32}$**)	.12** ($IV_{.32}$**, $M_{.13}$, $I_{.23}$*)

β = Standardized beta coefficients. Asterisks denote the significance level of F as well as the significance of the explanatory variables (*$p < .05$, **$p < .01$, *** $p < .001$).

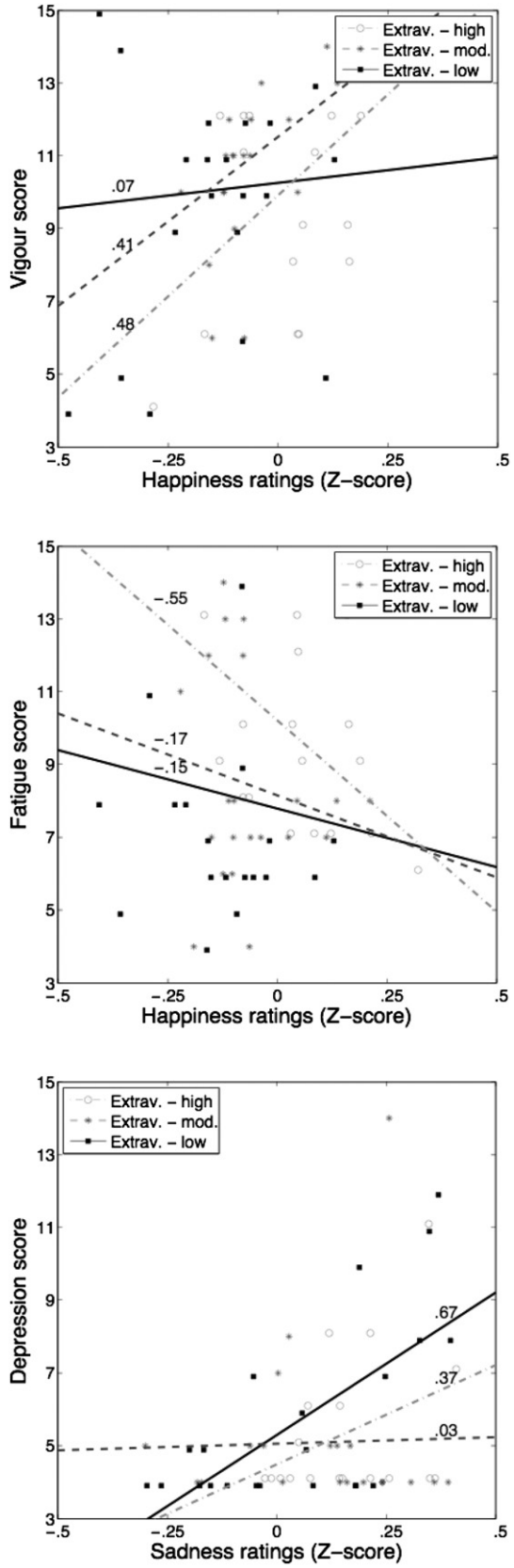

Fig. 1 – The correlations between mood states (vigour, fatigue, and depression) and emotion ratings vary depending on the level of extraversion (highest third, middle third, and lowest third).

tender-mindedness, trust, and modesty; see e.g., John and Srivastava, 1999), which is in line with the positive correlations between agreeableness and liking for happy- and tender-sounding music, as well as the negative correlations between agreeableness and liking for angry- and fearful-sounding music. Trait-congruent trends were also visible for neuroticism (e.g., neuroticism and liking for happy-sounding music; $r = -.23$, $p =$ n.s.), but these correlations failed to reach statistical significance.

4. Discussion

The results of the present study suggest that both mood and personality are involved in the perception of emotions represented by music, but their relationship appears to be rather complex. Although personality traits predispose to certain mood states (e.g., Matthews et al., 1990; Rusting, 1998), they also seem to moderate the degree of mood-congruence in the emotion ratings. In the present study, extraversion moderated the relationship between depression and sadness ratings, as well as the relationships between vigour and happiness ratings, and fatigue and happiness ratings. These results are partly in line with the findings of Rusting (1999), who discovered that neuroticism and negative affectivity moderated negative mood-congruence, and positive affectivity moderated positive mood-congruence. However, in contrast with the results of the present study, the interaction of personality and mood was only present when mood had been manipulated.

It should be noted that the moderated regression models only accounted for a relatively small part of the inter-subject variance in the participants' mean emotion ratings ($R^{2adj} = .12–.21$), and this raises further questions about other variables that might influence individual differences in emotion perception. Interestingly, Tomarken et al. (1990) found that affect ratings for films were better predicted by baseline frontal asymmetry (measured using electroencephalography) than by current mood – even when mood was accounted for. This finding could provide an interesting direction for further work, and highlights the potential advances that could be made by utilizing neuroimaging methods in the investigation of individual differences in emotional processing. Regarding the variance that can be attributed to the musical content of the excerpts, it should be noted that the mean emotion ratings given to each excerpt can be explained to a large degree (45–75%) by the acoustical and musical features of the stimuli (according to an analysis based on the data used in the present study; see Eerola et al., 2009; for a similar account, see also Schubert, 2004).

Personality traits were strongly associated with preference ratings for music excerpts expressing different emotions. As hypothesized, the correlations mostly reflected the trait-congruent patterns obtained in previous studies investigating self-referential emotional processing (e.g., Martin et al., 1983; Zelenski and Larsen, 2002), although the results regarding neuroticism did not reach statistical significance. Agreeableness was strongly associated with liking for happy- and tender-sounding music, and with disliking for angry- and fearful-sounding music, which is in line with the definition of agreeableness as a prosocial trait. Future studies on emotional

Table 6 – Correlations between personality traits and mean preference ratings for excerpts representing each discrete emotion.

	Preference (liking) for excerpts representing the emotion in question				
	Anger	Fear	Happiness	Sadness	Tenderness
Extraversion	−.06	−.16	.32**	.08	.17
Agreeableness	−.29*	−.36**	.47***	.05	.25*
Conscientiousness	−.13	−.03	.02	.13	.21
Neuroticism	.09	.13	−.23	.07	−.14
Openness	.16	.26*	−.04	.32**	.06

*$p < .05$, **$p < .01$, ***$p < .001$.

processing should also investigate other traits than just extraversion and neuroticism, as they may also contribute to response biases. The findings of the present study offer intriguing possibilities for future research, since music appears to enable the investigation of both cognitive and self-referential emotional processing simultaneously. In the present experiment both types of ratings (emotion ratings and preference ratings) were collected simultaneously, but they still exhibit clearly different trait- and mood-congruent patterns. This may also present new challenges for neuroimaging studies on music and emotions, since these two types of processing might have differing neural circuits.

Although the results should be considered only suggestive due to the small sample size and the non-causal experimental paradigm, they raise interesting questions that are amenable to direct empirical experiments. For example, mood manipulation could be used to decompose the interrelations between mood and personality, and to clarify the different roles of personality in cognitive and self-referential evaluations. Moreover, the properties of the stimuli that evoke mood- and personality-related differences could also be explored in more detail. For example, ambiguous stimuli may add to judgement biases related to personality or mood (e.g., Bouhuys et al., 1995).

The results of the present study have implications not only for the field of music and emotions, but also for emotion research in general, as they demonstrate that personality traits may moderate the degree of mood-congruence in cognitive emotional processing even when mood is not manipulated (c.f., Rusting, 1999). Musical stimuli provide a realistic and effective way of exploring the interaction of mood and personality in emotional processing, and they also allow exploring the more self-referential aspects of emotions simultaneously. In summary, this study demonstrated that personality and mood do play an important role in the processing of musical emotions, and that music preferences and personality traits exhibit strong, trait-congruent connections. Perhaps these findings will provide motivation for future neuroimaging studies on music and emotions to move beyond group-averaged brain activations, and hopefully shed more light on the complex phenomenon of individual differences in emotional processing.

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