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Personality traits modulate skin conductance response to emotional pictures: An investigation with Cloninger's model of personality

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Abstract

Several studies found strong relationships between main personality dimensions and emotions, and more particularly between neuroticism and negative emotions, as well as between extraversion and positive ones. In these studies, personality was mainly assessed with respect to the big five model, and emotions were evaluated with subjective rating scales. To extend the exploration of the associations between personality and emotion, the aim of the present study was to investigate the relationships between Cloninger's dimensions of personality and emotional reactivity assessed by skin conductance response (SCR). In 55 normal subjects, SCR was recorded while they were presented pictures selected as positive, negative and neutral from the International Affective Picture System. The results showed no influence of personality on response magnitude, but subjects with higher harm avoidance scores showed longer half-recovery times for negative relative to neutral pictures. This result is consistent with the dispositional bias of harm avoidance to respond intensely to signals of aversive stimuli.

Keywords: Emotional reactivity ; personality ; skin conductance response ; cloninger

1. Introduction

Relationships between personality and emotions have been extensively studied. Several studies found robust associations between extraversion and positive emotions as well as between neuroticism and negative ones (Canli, Sivers, Withfield, Gotlib, & Gabrieli, 2002; Costa & McCrae, 1980; Gross, Sutton, & Ketelaar, 1998; Rusting & Larsen, 1997). Despite these general findings, the exact influence of personality on emotional responses (i.e., which aspect of the emotional response is involved in the personality-emotion relationships) is still unclear.

Most studies on this topic focused on subjective ratings as measures of emotion (Gomez, Cooper, & Gomez, 2000; Gross et al., 1998; Heponiemi, Keltikangas-Järvinen, Puttonen, & Ravaja, 2003), which is of course a crucial issue of emotion, but might be attached to some problems, especially the individual differences in willingness to conform to social desirability and in the understanding of rating criteria. Moreover, subjective ratings do not allow one to identify the source of individual differences in emotional reactivity, because subjective emotional responses are complex and can depend upon other parts of the emotional reaction, including peripheral, cognitive and behavioral aspects.

Psychophysiological methods could add interesting information for the study of personality-emotion relationships. Indeed, some studies including acoustic startle probes (Corr, 2002), event-related potentials (ERPs) (De Pascalis, Strippoli, Riccardi, & Vergari, 2004), and neuroimaging techniques (Canli et al., 2002) reported results that were generally consistent with those obtained with subjective ratings. For instance, Canli et al. (2002) reported a positive correlation between extraversion and activation of the amygdala following the presentation of happy, but not angry, fearful, sad or neutral faces, indicating that emotional responses to pleasant stimuli are modulated by extraversion. Thus, these studies support and extend previously observed relationships between personality traits and emotions by using objective measures.

Furthermore, autonomic reactions are an important component of the emotional response. More particularly, skin conductance response (SCR) is a classical and sensitive way to assess affective arousal and directly reflects sympathetic nervous system reactions (Dawson, Schell, & Filion, 2000). Interestingly, some studies have demonstrated that electrodermal activity (EDA) is related to behavioral inhibition and to individual differences in Behavioral Inhibition System (BIS) strength (Clements & Turpin, 1995; Fowles, 2000). In contrast, other studies failed to link EDA to the activity of the BIS (Keltikangas-Jarvinen, Kettunen, Ravaja, & Naatanen, 1999; Sosnowski, Nurzynska, & Polec, 1991). Thus, SCR recording could address the question of whether specific autonomic responses could be responsible, in part, for the personality influences on emotional reactions. Recently, Yoshino, Kimura, Yoshida, Takahashi, and Nomura (2005) showed that SCR were significantly larger in subjects with higher novelty seeking (NS) scores on the Cloninger's model (Cloninger, Svrakic, & Przybeck, 1993) as compared with subjects with low NS scores when positive or negative stimuli were subliminally displayed. In addition, subjects with higher harm avoidance (HA) scores showed larger SCR than subjects with

low HA scores for stimuli of all three valences. The authors concluded that dimensions of temperament could be associated with different patterns of unconscious emotional responses.

The main stream of research investigating the relationships between personality and emotions was mostly focused on the extraversion and neuroticism dimensions. However, more recently, some studies examined the associations between personality and emotions in reference to Gray's Behavioral Inhibition and Activation Systems (BIS/BAS) which were related, as expected from their theoretical foundations, to negative and positive affects, respectively (De Pascalis et al., 2004; Gomez et al., 2000; Heponiemi et al., 2003). For instance, Gomez et al. (2000) found that either positive or negative mood was induced within a go/nogo task involving rewards or punishments (winning and losing money), and results indicated that BIS (anxiety) and BAS (impulsivity) predicted sensitivity to negative or positive mood induction, respectively. On the other hand, Corr (2002) reported that anxious subjects (high-BIS) showed greater startle response potentiation within a negative emotional context than non-anxious subjects (low-BIS), indicating that BIS modulates sensitivity to aversive stimulations.

In the present study, like Yoshino et al. (2005), the relationships between emotions and personality were investigated in reference to Cloninger's biosocial model. This model suggested that personality could be divided into innate temperaments (novelty seeking, harm avoidance, reward dependence and persistence) and acquired characters (self-directedness, cooperativeness and self-transcendence) (Cloninger et al., 1993). Particularly, novelty seeking (NS) is the tendency to respond actively to novel stimuli leading to pursuit of rewards and escape from punishment and harm avoidance (HA) is the tendency to inhibit responses to signals of aversive stimuli that lead to avoidance of punishment and non-reward. Reward dependence (RD) is the tendency for a positive response to conditioned signals of reward that maintain behavior. Persistence (P) is perseverance despite frustration and fatigue. Self-directedness (SD) is the ability of an individual to control, regulate and adapt his or her behavior to fit the situation in accord with individually chosen goals and values. Cooperativeness (C) accounts for individual differences in identification with and acceptance of other people. Self-transcendence (ST) is associated with spirituality. Furthermore, NS refers to behavioral activation and HA to behavioral inhibition, since they were defined respectively as the tendencies to activate and inhibit behaviors (Cloninger, 1987); this (consistently with Cloninger's NS and HA definitions) suggests that these temperaments would be related to differences in the innate emotional reactivity: high-NS subjects are expected to be particularly sensitive to pleasant stimuli, whereas high-HA subjects are expected to be more reactive to unpleasant stimuli. NS is also associated to Zuckerman's impulsive sensation and sociability dimensions (both being defined as BAS-dependent and related to positive affects) and HA to Zuckerman's neuroticism-anxiety dimension (defined as BIS-dependent and negative affects-related) (Zuckerman & Cloninger, 1996; Zuckerman, Joireman, Kraft, & Kuhlman, 1999).

To extend the exploration of the associations between personality and emotions, the aim of the present study was to investigate the relationships between Cloninger's dimensions of personality and emotional reactivity assessed by SCR. In contrast to the study of Yoshino et al. (2005) where the stimuli were presented subliminally, we want to assess whether personality traits could be associated with different patterns of conscious emotional responses by displaying emotional stimuli for a longer duration (5 s). Based on previous studies, we hypothesized that NS and HA dimensions will be related respectively to higher sensitivity to positive and negative stimuli (expressed by larger SCR and/or longer half-recovery time).

2. Methods

2.1. Subjects

The study was conducted on 55 healthy volunteers (15 males) with a mean age of 22 years (range from 19 to 30 years, SD = 2.41). Most of them (40) were undergraduate students who were enrolled in psychological courses. The other participants consisted of students' relatives. They all underwent a clinical interview based on past history to exclude psychiatric and somatic diseases, and to be sure if they had normal or corrected to normal vision. The participants were naive to the aim of the experiment and to the pictures used in the study. The use of any drug (with the exception of contraceptive pills) was excluded for one week before the experiment. The ethical committee of the University of Liège Psychology Faculty approved the protocol, and the subjects gave their informed consent to participate in the study.

2.2. Psychological assessments

The participants completed the French version of the revised form of the Temperament and Character Inventory (TCFR, Cloninger, 1999). The TCFR is a 240-item self-questionnaire that assesses the seven dimensions of the Cloninger's model where each proposition must be rated on a 5-point Likert scale ranging from 1 (totally disagree) to 5 (totally agree). The translated version of the TCFR used in the study exhibits solid psychometric properties (Hansenne, Delhez, & Cloninger, 2005). After completion, one author (SM) checked if the subjects

answered all the items, and if they responded appropriately to the five validity items.

The subjects also completed the French version of the Positive and Negative Affect Schedule (PANAS) (Gaudreau, 2000; Watson, Clark, & Tellegen, 1988 for the French adaptation) to assess mood. The PANAS comprised 10 positive and 10 negative adjectives, for which subjects rated if they feel this way at the present moment on a 5-point Likert scale ranging from 1 (very slightly or not at all) to 5 (extremely). Finally, arousal was assessed by a 10 cm Visual Analog Scale ranging from "Sleepy" to "Awake".

2.3. Visual stimuli

Visual stimuli consisted of two sequences of 30 pictures selected from the International Affective Picture System (IAPS) (Lang, Bradley, & Cuthbert, 1999), wherein 10 pictures were shown for each of the three categories: neutral (e.g., domestic objects), positive (e.g., happy scenes, erotic couples) and negative (e.g., surgery pictures, mutilations).[1] The pictures from the first sequence were comparable to the pictures from the second sequence as regards to the arousal and pleasure ratings. The presentation of the sequences was counterbalanced, and half of the subjects were exposed to the first sequence, and the other half to the second one. The pictures were displayed on a 17-in. computer screen (rate of refreshment, 85 Hz) in a pseudo-randomized order so that two slides from the same category cannot follow each other. The subjects sat in front of the screen at a distance of 50 cm. Pictures were presented for 5 s and were separated by a black screen with a white cross at the center lasting 10 s. During this 10-s period, the subjects were asked to rate on 9-point Likert scales the emotional valence (1 = low pleasure to 9 = high pleasure) and the arousal of the previous picture (1 = low arousal to 9 = high arousal).

2.4. Procedure

Subjects first completed the TCI-R, and then the arousal and mood scales. They were comfortably seated and the electrodes were placed. After an accommodation period of 20 min, the pictures were presented to the subjects while the SCR were recorded. The recording session lasted about 9 min.

2.5. SCR recording and analysis

SCR were recorded in a sound-attenuated room with a 23 °C ambient temperature using a SC5 (Psylab) system (DC, constant voltage 0.5 V, conductance measure, sampling rate 40 Hz). Disposable Ag/AgCl electrodes were attached to the last phalange of the third and fourth fingers of the non-dominant hand and filled with a 0.05% NaCl electrode paste.

SCR were analysed individually for a 10-s period from the picture onset and responses were selected in accordance to the guidelines proposed by Dawson et al. (2000) as the first wave in a time window between 1 and 4 s for rise latency and whose peak amplitude reached 0.04 μS. Magnitude and half-recovery time were calculated for each response, and both values were logarithmically transformed (after adding 0.01 to the magnitude) to fit a normal distribution.

2.6. Statistical analysis

All the statistical analyses were performed with Statistica (6.0) for Windows. Gender differences regarding the TCI-R dimensions were examined with Student's *t*-tests, and Pearson's correlation between the TCI-R dimensions were carried out. Pearson's correlations between SCR parameters and both arousal and mood measures were also performed. Personality dimension's influence on positive and negative mood scores were examined with Student's *t*-tests. The differential effects of the three picture categories on both pleasure and arousal were assessed by Friedman analyses of variance, with Wilcoxon test used for paired comparisons. For SCR data, one-way repeated-measure ANOVAs (three picture categories) with magnitude and half-recovery time as dependent variables were performed. Furthermore, to investigate the interactions between SCR and personality data, subjects were assigned to groups on the basis of high and low scores for each personality dimension, with high- and low-subjects selected respectively over and below the median. For each personality dimension, two-way repeated-measure ANOVAs were performed with the factors of three picture (positive, neutral and positive) and two personality categories (high and low). Moreover, gender influence on emotional reactivity was investigated in separated two-way repeated-measure ANOVAs, with three picture categories as within-subject factor and gender as between-subject factor. All effects involving repeated measures were corrected by Greenhouse-Geisser epsilon for lack of sphericity, and least significant differences (LSD) tests were used as post hoc analysis.

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[1] Neutral pictures: 2440, 2580, 5593, 5950, 7004, 7010, 7080, 7140, 7205, 7560, 2480, 5500, 5920, 7000, 7009, 7031, 7090, 7175, 7234, 7620; pleasant pictures: 2050, 2170, 2303, 4607, 4611, 4651, 4660, 4670, 4690, 2160, 2209, 2550, 4610, 4640, 4659, 4666, 4680, for women: 4520, 4460, 4658, for men: 4220, 4180, 4290; unpleasant pictures: 3000, 3015, 3071, 3064, 3080, 3120, 3170, 3266, 9040, 9405, 3010, 3051, 3063, 3062, 3102, 3150, 3261, 3400, 9252, 9410.

3. Results

The distribution of subjects among the high- and low-NS and HA groups, as well as mean age, NS, HA, PA and NA scores are depicted in Table 1. Pearson's correlations between SCR recorded for the three picture categories and both arousal and mood ratings are shown in Table 2. Since no correlation reached significance, arousal and mood were not included within the following analysis.

A significant positive correlation was observed between magnitude and half-recovery time of SCR recorded during the presentation of negative, but not neutral or positive pictures. Student's Mests showed that positive mood scores were higher in high-*P* than low-*P* subjects ($t_{(48)} = 2.19$, $p < 0.05$), in high-SD than low-SD subjects ($t_{(49)} = 2.75$, $p < 0.01$), and in high-C than low-C subjects ($t_{(51)} = 2.13$, $p < 0.05$).

Student's Mests revealed that women scored significantly higher than men in HA ($t_{(53)} = 2.91$, $p < 0.01$), RD ($t_{(53)} = 2.12$, $p < 0.05$) and C ($t_{(53)} = 2.74$, $p < 0.01$) dimensions. Pearson's correlations between the TCI-R dimensions are presented in Table 3.

Friedman ANOVAs revealed a significant main effect of picture category for pleasure ($\chi^2_{(2)} = 85.56$, $p < 0.0001$) and arousal ($\chi^2_{(2)} = 94.26$, $p < 0.0001$). Paired comparisons showed significant differences between all picture categories (Fig. 1a and b).

Table 1 *Mean (SD) age, NS and HA scores, and PA and NA scores in high-score and low-score NS and HA groups*

	N	Age	NS	HA	PA	NA
NS group						
Low-NS	27	22.3 ± 2.55	95.4 ± 8.76[a]	102.7 ± 16.24	28.7 ±6.15	14.5 ± 3.64
High-NS	25	21.5 ± 1.90	120.2 ± 8.31	96.4 ± 17.33	27.8 ± 4.58	15.6 ± 4.40
HA group						
Low-HA	26	21.9 ± 2.21	111.2 ± 14.67[b]	83.9 ± 9.79[c]	28.6 ± 5.64	14.3 ± 2.96
High-HA	26	22.2 ± 2.63	102.9 ± 14.37	113.0 ± 10.00	28.4 ± 5.82	15.7 ± 4.82

[a] Significant difference between groups ($t_{(50)} = 10.45$, $p < 0.0001$).
[b] Significant difference between groups ($t_{(50)} = 2.06$, $p < 0.05$).
[c] Significant difference between groups ($t_{(50)} = 10.63$, $p < 0.0001$).

Table 2 *Pearson's correlations between arousal, positive (PA) and negative mood (NA), and magnitude and half-recovery times for the three picture categories*

	Arousal	PA	NA	(1)	(2)	(3)
Magnitude						
Neutral	0.04	0.001	-0.17	-0.09	**0.33**	-0.07
Positive	0.13	0.10	-0.15	-0.22	0.00	0.04
Negative	-0.01	0.15	-0.21	-0.21	0.00	**0.44**
Half-recovery time						
Neutral (1)	-0.02	-0.04	-0.23			
Positive (2)	0.11	-0.01	-0.04			
Negative (3)	-0.26	-0.13	0.07			

r^2 in bold are significant at $p > 0.05$ threshold.

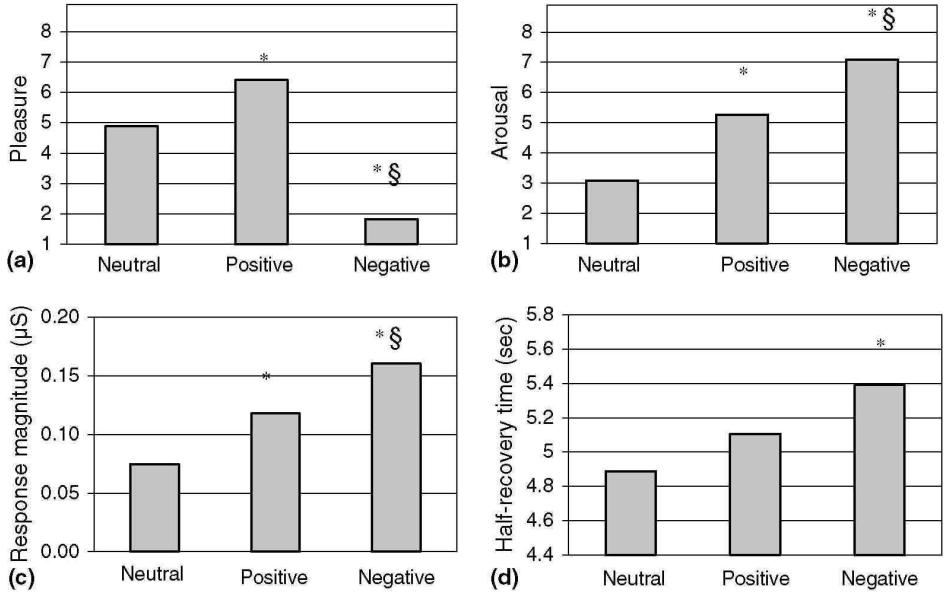
Table 3 *Pearson's correlation between the TCI-R dimensions*

	NS	HA	RD	P	SD	C
HA	**-0.37**					
RD	**0.32**	0.03				
P	**-0.37**	0.06	-0.14			
SD	-0.05	-0.13	0.12	**0.29**		
C	-0.16	**0.29**	**0.48**	0.23	0.25	
ST	0.09	-0.25	**0.33**	0.17	-0.06	0.25

r^2 in bold are significant at $p > 0.05$ threshold.

As regards SCR magnitude, repeated-measure ANOVA showed a significant effect of picture category ($F_{(2,108)}$ = 20.02, $p < 0.0001$), with LSD tests showing significant differences between all picture categories (neutral-positive: $t_{(54)} = 3.75$, $p < 0.001$; neutral-negative: $t_{(54)} = 5.82$, $p < 0.0001$; positive-negative: $t_{(54)} = 2.80$, $p < 0.01$; see Fig. 1c). With half-recovery time as dependent variable, analysis showed that the effect of picture category did not reach statistical significance ($F_{(2,90)} = 2.92$, $p = 0.06$) (see Fig. 1d), but the LSD test showed a difference between neutral and negative pictures ($t_{(45)} = 2.25$, $p = 0.03$).

Fig. 1. *Mean pleasure (a), arousal (b), magnitude (c) and half-recovery time (d) for neutral, positive and negative pictures. (*) A significant difference at p < 0.05 compared to neutral pictures and (§) a significant difference at p < 0.05 compared to positive pictures.*

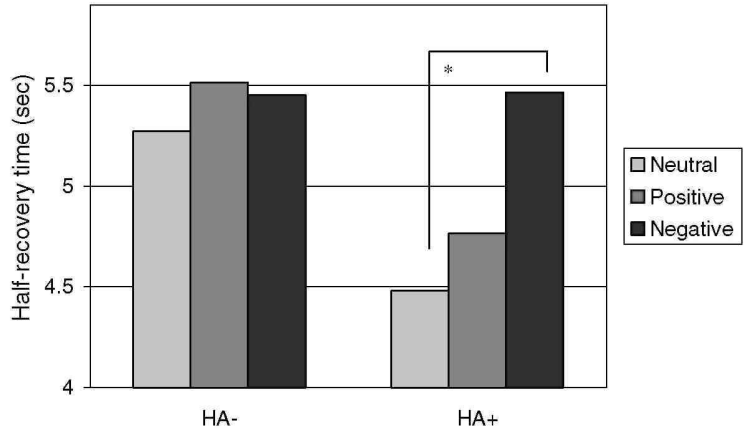


With SCR magnitude as dependent variable, the two-way repeated-measure ANOVA revealed that the high-NS group exhibit a tendency towards lower magnitudes than the low-NS group ($F_{(1,50)} = 3.62$, $p = 0.06$). Neither main nor interaction effect of other personality dimensions were observed.

With half-recovery time as dependent variable, the two-way repeated-measure ANOVA revealed a main effect of HA ($F_{(1,42)} = 5.93$, $p = 0.019$), with the high-HA group exhibiting faster recovery than the low-HA group, and a tendency for an interaction between picture category and HA ($F_{(2,84)} = 2.72$, $p = 0.07$). LSD post hoc analyses indicated that half-recovery time was prolonged for negative relative to neutral and positive pictures among the high-HA group (negative-neutral: $t_{(42)} = 12.75$, $p = 0.0009$; negative-positive: $t_{(42)} = 6.44$, $p = 0.015$) but not among the low-HA group (negative-neutral: $t_{(42)} = 0.37$, $p = 0.55$; negative-positive: $t_{(42)} = 0.04$, $p = 0.84$) (Fig. 2). Neither main nor interaction effect of other personality dimensions were found.

Regarding gender differences, the two-way repeated-measure ANOVA showed a marginal main effect of gender on SCR magnitude (larger magnitude among women, $F_{(1,53)} = 3.54$, $p = 0.07$), and a significant gender × picture category interaction ($F_{(2,106)} = 5.61$, $p < 0.01$). LSD post hoc analyses showed that SCR magnitude was larger within women than men for negative pictures ($t_{(53)} = 11.63$, $p < 0.005$) but not for neutral ($t_{(53)} = 0.46$, $p = 0.50$) or positive ones ($t_{(53)} = 0.19$, $p = 0.67$). With half-recovery time as dependent variable, the ANOVA revealed a significant sex × picture category interaction ($F_{(2,88)} = 7.01$, $p < 0.005$). LSD post hoc analyses showed that SCR half-recovery time was longer within women than men for negative pictures ($t_{(44)} = 13.26$, $p < 0.001$) but not for neutral ($t_{(44)} = 0.76$, $p = 0.39$) or positive ones ($t_{(44)} = 0.09$, $p = 0.76$). The interaction between sex and picture category remains significant whenever HA is controlled, with magnitude ($F_{(2,104)} = 6.41$, $p < 0.005$) and half-recovery time ($F_{(2,86)} = 5.06$, $p < 0.01$) as dependent variables.

Fig. 2. *Mean SCR half-recovery time for neutral, positive and negative pictures in high-HA and low-HA groups. (*) A significant difference at $p < 0.05$.*



4. Discussion

The main results of the study showed that HA dimension and gender modulate SCR to emotional stimulations, suggesting that those factors interact with the perception and the processing of emotions. The present results showed that high-HA subjects exhibited shorter half-recovery times than low-HA subjects for neutral and positive pictures. The precise meaning of half-recovery time is still under question. Some authors consider this parameter as a simple index of emotion dissipation, while others argue that it might be associated with the attentional process, in which short recovery times would reflect an open attentional stance to the environment (Boucsein, 1992; Raine, Venables, & Williams, 1996). Personality disorders, and more particularly antisocial personality disorder, have been extensively studied regarding SCR (Fowles, 2000), and results showed that antisocial subjects are characterized by longer half-recovery times (Boucsein. 1992). On the other hand, antisocial subjects have lower scores on the HA dimension (Cloninger. 2000). Boucsein (1992) proposed that antisocial subjects might reveal an "over-focused" attention associated with deficits in the septo-hippocampal system. From this view, one may argue that high-HA subjects could generally show the opposite pattern, with less focused attention on the target pictures, and paying more attention to the unattended environment than low-HA subjects, but when the targets have a negative emotional content, they could focus their attention on them. Such an "open-gate" state of attention might be seen as a component of a defensive attitude (i.e., increased vigilance to the environment) that would be consistent with the fact that high-HA subjects are described as anxious (Cloninger et al., 1993). Further, amplitude of the mismatch negativity (an ERP's component reflecting attention automatically allocated to a physical change in the unattended environment) is larger, and amplitude of P300 (an ERP's component reflecting selective attention and controlled processes) is lower in high-HA subjects (Hansenne, 1999; Hansenne et al., 2003), which supports the hypothesis that high-HA subjects show less focused attention than low-HA subjects. This hypothesis is of course speculative, since influence of personality on SCR time parameters has never been investigated among normal populations and must be confirmed in further studies.

The results showed also that high-HA subjects exhibited longer half-recovery times for negative relative to neutral pictures whereas low-HA subjects did not. Considering the two explanations described above, the increasing of half-recovery time for aversive stimuli specifically found among high-HA subjects indicates a specific difficulty for them to process negative emotions, either a specific difficulty to dispel negative emotions, or to shift attention towards the environment after a negative emotion (i.e., attention over-focused on negative stimuli). The prolonged half-recovery times found in high-HA subjects for negative stimuli suggests that these subjects are particularly sensitive to negative affects, which is consistent with the HA definition as a tendency to respond intensely to signals of aversive stimuli (Cloninger, 1987). This result is also consistent regarding the theoretical link between HA and Gray's BIS, in that BIS classically refers to specific sensitivity to aversive stimulations (Corr, 2004). Indeed, even if the revised version of the reinforcement sensitivity theory states that the fight-flight-freeze system (FFFS) mediates responses to aversive stimuli and considers BIS as responsible for anxiety responses (i.e., activated when conflicting goals have to be managed) (Gray & McNaughton, 2000), it seems that the general relation between BIS (or the anxiety personality dimension) and negative emotions remains relevant (Corr, 2004). Since HA modulates responses to negative but not positive pictures, the present results preferentially support Gray's original separate subsystem hypothesis (which states that BIS and BAS are independent) than Corr's joint subsystem hypothesis (Corr, 2002, 2004).

Conversely, no influence of personality on response magnitude appeared here. Thus, the present results suggest that only response duration (i.e., half-recovery time) differs as a function of personality dimensions. Some methodological aspects can be advanced to explain this negative result. Firstly, in contrast to the study of Yoshino et al. (2005) where the pictures were presented subliminally, the pictures were presented during 5 s in the present study. This could mean that temperaments probably act on the unconscious emotional processing rather than the conscious one. Secondly, it is possible that the negative pictures used in the present study were somehow too significant (i.e., highly significant contents and arousal ratings), so that possible personality differences cannot appear because of a ceiling effect. Hence it might be more appropriate to use less significant material (e.g., less arousing negative pictures or emotional words), since some studies have demonstrated that such stimuli are also able to elicit SCR (Silvert, Delplanque, Bouwalerh, Verpoort, & Sequeira, 2004). Thirdly, the choice to use only the TCI-R as a measure of personality may constitute a limitation, as other personality models have previously been linked to differential emotional reactivity differences. In consequence, further studies could incorporate other personality measures (e.g., Eysenck personality questionnaire and BIS/BAS scales).

Gender was found to influence autonomic responsiveness, with women showing larger SCR and longer half-recovery time than men in response to negative pictures, but not to neutral or to pleasant ones. This particular sensitivity of women to negative affects was previously found with SCR and other psychophysiological indices as well as with subjective ratings of emotions (Bradley, Codispoti, Sabatinelli, & Lang, 2001; Kring & Gordon, 1998). Interestingly, this gender influence was not dependent of HA scores, suggesting that BIS would not be involved in this particular sensitivity, as could have been expected regarding women's classically higher scores in HA and BIS-related scales (Hansenne et al., 2005; Jorm et al., 1999).

In conclusion, the present study supports the idea that personality traits (HA) can modulate the emotional reactivity generated by pictures with different affective valences. The results found here could be also considered as new arguments to Cloninger's model, since they support some of its prediction regarding differential emotional reactivity. Therefore, the study supports and extends the associations between personality and emotion, in that autonomic responses as reflected here by SCR are influenced by the dispositional bias of HA to respond intensely to signals of aversive stimuli. However, since the other dimensions of the Cloninger's model are not implicated in the personality-emotion interaction, this model is not necessarily more relevant than other personality measures to investigate the relationship between dispositional tendencies and emotional reactivity.

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