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Psychopathy traits and the processing of emotion words: Results of a lexical decision task

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Research has indicated that individuals possessing psychopathic traits exhibit a deficit in the processing of emotional stimuli. Lexical decision task studies found that psychopathic individuals do not demonstrate affective facilitation in processing emotional words relative to nonpsychopathic individuals. However, these investigations have not examined processing of discrete affective categories and their relation to the callous/unemotional (F1) and impulse control/antisocial (F2) factors of psychopathy. Sixty undergraduate men completed a self-report measure of psychopathy traits and a lexical decision task assessing response latencies to anger, sadness, fear, and happiness words. Results reflected an association between F2 and a heightened experience of anger, whereas F1 was associated with a diminished experience of sadness. Findings are discussed in terms of the relation to existing research using alternative methods of processing affect.

Cleckley identified lack of remorse and general poverty of affect as core features of the psychopathic personality. Although general correlates of antisocial and deviant behaviour typify common criminals, he included other members of society, such as doctors, lawyers, and businessmen unidentified by the legal system in the same rubric. Nevertheless, most studies in this area have focused on forensic populations while individuals in the general population possessing psychopathic traits have been studied to a lesser degree. Edens, Marcus, Lilienfeld, and Poythress (2006) demonstrated that psychopathic traits may be best conceptualised on a continuum and that the dimensional nature of psychopathy justifies research in non-forensic samples. Hare's conceptualisation of psychopathy identifies two factors, emotional detachment and antisocial behaviour (Hare, 2003). Pursuantly,

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assessment of psychopathy in clinical, forensic, and published research has most commonly employed this two-factor structure of psychopathy. Additionally, this two-factor structure has been replicated in several self-report measures of psychopathy (see Lilienfeld & Fowler, 2006). These scales proved particularly useful in research of psychopathic personality traits in college and community populations where resources and access to criminal history are limited.

Congruent with Cleckley's theory and existing research that extends to general populations, Blair, Colledge, Murray, and Mitchell (2001) proposed that emotional processing is pivotal early during development and that deficits in processing can disrupt normal socialisation. They found that children with psychopathic tendencies have deficits in the perception of expressions of emotion in others (e.g., extreme versions of sad and fearful faces) and are significantly more likely to interpret these expressions incorrectly than children who do not endorse such traits. Similarly, Kimonis, Frick, Fazekas, and Loney (2006) found a negative association between psychopathy traits and the processing of emotional stimuli. To investigate response latencies to positive and negative emotion words compared with non-emotion words in a group of delinquent adolescents, Loney, Frick, Clements, Ellis, and Kerlin (2003) used a lexical-decision-task (LDT) and found that callous-unemotional traits (Factor 1 psychopathy; F1) were related to slower response times to negative emotion words, whereas poor impulse control (Factor 2 psychopathy; F2) was associated with more rapid response times to negative emotion words. These results suggest a differential relationship between psychopathy trait factors and the processing of emotion.

Patterns of aberrant emotional processing have also been identified in adult psychopaths. Williamson, Harpur, and Hare (1991) used the LDT to examine deficient cognitive processing and event-related potential (ERP) differentiation between affect and neutral words. Lexical-decisions of nonpsychopaths were significantly faster, and relevant ERP components were significantly larger, for affect words than for neutral words. In contrast, psychopaths failed to evince faster response latencies or larger amplitude ERPs to affect words. Blair et al. (2005) studied the effect of affect priming on emotional processing in psychopaths. They found that psychopaths rated negative cues as more neutral and positive cues as equal or more positive, than did control participants.

Evidence indicates factor-specific patterns of emotional experience. Fowles and Dindo (2006) found that F1 is negatively correlated with distress, fear responses, and stress reactions, whereas F2 is associated with greater anger, distress, fear, and stress. Kroner, Forth, and Mills (2005) reported that anger and hostility are moderately and positively correlated with psychopathy total scores, but are more strongly related to F2 than to

F1. However, Hicks and Patrick (2006), showed that F1 and F2 exhibit mutually suppressing effects in the prediction of three facets of negative emotionality.

Trait-congruency theory posits that affective traits are linked to enhanced activation of congruent emotion networks (Rusting, 1998) and provides a useful framework to assess emotion processing in individuals who possess psychopathic traits. These trait-related cognitive biases purportedly increase the likelihood that a particular emotion (e.g., anxiety/fear) is experienced. Based on theoretical work in this area (Bower & Forgas, 1999), a purported "network activation" is involved in behavioural and physiological responses, as well as in verbal and semantic structures related to that emotion.

Evidence suggests that the LDT is one of the best available measures of network activation (Marsh & Landau, 1995). This word–nonword discrimination task purports to measure network activation via response latency evidenced by participants to particular stimulus words, with faster RTs indicating greater network activation (e.g., Schacter, 1987). In contrast, slower reaction times to emotion words suggest less activation.[1] As such, individuals prone to anger would respond faster to anger words and persons with deficits in the experience of fear or sadness would respond slower to corresponding words. Studies involving LDTs have allowed researchers to examine emotional processing in psychopathic individuals, as the task can measure implicit (and uncontrollable) thought processes (Blair et al., 2005).

Although several investigations have used the LDT to demonstrate deficits in the processing of emotional words, few, if any, have used this method to assess the factor-specific patterns of emotional experience proposed by some theorists (e.g., Fowles & Dindo, 2006). Rather than examining how psychopathy relates to the processing of discrete affective words (i.e., anger words vs. sad words), studies have typically examined the differences in processing of neutral and general emotion words (e.g., positive vs. negative emotion), without disaggregating the findings for specific emotion categories. The purpose of the present study was to examine whether the factors of psychopathy are differentially related to affective states consistent with recent research indicating the presence of differential patterns (Hicks & Patrick, 2006). We used the LDT paradigm to extend extant literature by examining (1) independent and (2) interconnected node activation associated with discrete, rather than only general, types of affect. To accomplish this, we first compared discrete affect words to neutral words and next compared discrete affect words to the other affective words based

[1] Notably, slower responses to threat words have been attributed to an "activity-disrupting" defence mechanism purported to indicate greater attention allocation to threat (Algom, Lev, & Chajut, 2004). These seemingly discrepant findings require further examination of attention allocation to affect words and attendant response latencies.

on theory that emotion represents activation of an interconnected network of nodes.

We examined processing of fear, anger, sadness, and happiness words. We expected that total psychopathy scores would be related to faster response times to anger words and slower responses to sad and fear words relative to other words. No relation to happiness words was expected. We also hypothesised that F1 traits (callous, unemotional) would predict slower response latencies for fear and sadness but not to anger or happiness words. Conversely, we hypothesised F2 traits (poor impulse control, antisocial behaviour) would predict faster response latencies to anger and fear words and no relation to sad and happiness words. Finally, a set of exploratory analyses were planned to determine whether when entering indices of self-reported affect (i.e., empathy, trait anxiety, and negative affect), the relationship between psychopathy indices and emotion processing would be negated.

METHOD

Participants

Participants were 60 male undergraduate psychology students. Women were excluded based on previous research in college samples indicating lower levels of psychopathy traits (e.g., Levenson, Kiehl, & Fitzpatrick, 1995). Participants reported a mean age of 19.2 ($SD = 2.8$) years and, mean level of education of 14.2 ($SD = 2.8$) years. The racial composition of the sample consisted of 50 Caucasians, 4 African Americans, 3 Asian Americans, 2 Hispanic Americans and 1 "Other".

Materials

All participants completed a demographic form that assessed age, gender, education level, ethnicity, marital status, and family income and a series of questionnaires designed largely to provide validation for the LSRP.

Levenson Self-Report Psychopathy Scale (LSRP; Levenson et al., 1995). The LSRP is a 26-item Likert-type scale comprising two subscales that assess two domains of the psychopathic personality. The F1 scale (Cronbach $\alpha = .82$) reflects a callous, manipulative, and selfish use of others. The F2 scale (Cronbach $\alpha = .63$) assesses impulsivity and poor behavioural control. Respondents rate each item on a scale from "1" (*disagree strongly*) to "4" (*agree strongly*). In the current sample, Cronbach's alphas were $\alpha = .80$ ($M = 32.2$, $SD = \pm 6.8$), $\alpha = .58$ ($M = 18.6$, $SD = \pm 3.6$), and $\alpha = .74$ ($M = 52.4$, $SD = \pm 7.9$) for F1, F2, and total scale, respectively.

Positive and Negative Affective Schedule (PANAS; Watson, Clarke, & Tellegen, 1988). This consists of 20 mood descriptors comprising a 10-item Positive Affect (PA; Cronbach $\alpha = .71$; $M = 24.8$, $SD = 7.6$) and a 10-item Negative Affect (NA; Cronbach $\alpha = .89$; $M = 14.5$, $SD = 3.9$) scale.

Interpersonal Reactivity Index (IRI; Davis, 1980). The Empathic Concern scale (EC; Cronbach $\alpha = .80$; $M = 25.4$, $SD = 3.9$) measures feelings of sympathy, compassion, and concern for others, whereas the Perspective Taking scale (PT; Cronbach $\alpha = .78$; $M = 23.3$, $SD = 4.2$) measures the ability to take another person's point of view.

Barratt Impulsiveness Scale (BIS-11; Patton, Stanford, & Barratt, 1995). This is composed of 30 statements pertaining to behavioural and cognitive tendencies of impulsivity. In the present sample, Cronbach's α was .80 ($M = 67.7$, $SD = 9.7$).

Spielberger Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). This consists of 20 items assessing enduring symptoms of anxiety. In the present sample Cronbach's α was .89 ($M = 40.1$, $SD = 8.7$).

Narcissistic Personality Inventory (NPI; Raskin & Terry, 1988). This contains 40 pairs of self-relevant statements (e.g., "I am an extraordinary person") and participants were asked to select the statement that best reflected them. In the present sample, Cronbach's α was .78 ($M = 17.03$, $SD = 6.18$). The Entitlement (Cronbach $\alpha = .42$; $M = 1.9$, $SD = 1.3$) and Exploitativeness (Cronbach $\alpha = .49$; $M = 2.0$, $SD = 1.4$) subscales reflect extreme psychological maladjustment.

Lexical Decision Task. Participants are seated facing a computer monitor and a keyboard with two keys labelled either "word" or "nonword". Participants are told to identify, as quickly as possible, whether or not each character string is an actual English word and they are instructed to respond "word" or "nonword" by pressing an appropriate key following presentation of each character string. Prior to the task, participants are administered 10 announced practice trials (five words and five nonwords), in which all word stimuli are of neutral emotional connotation. Experimental trials consisted of 120 word and 120 nonword trials. The onset of each trial is marked by a horizontally and vertically centred plus sign (+), which serves as a fixation point. After 500 ms latency, the fixation point is replaced by a character string. The stimulus item disappears after the participant responds or a latency of 3000 ms, whichever occurs first, and is followed by an inter-trial interval of 200 ms. Word stimuli are presented in a randomised fashion controlled by computer software.

Each word was rated on a 5-point scale by 25 psychology graduate students who were unaware of the study's hypotheses and the 15 words in each emotion category that received the highest ratings were selected for use in the present study (see Appendix). Each neutral word was matched to each emotion word in terms of word frequency. Neutral and emotion words were matched on syllabic length to reduce any effect of word length on response latency. Because the use of unpronounceable, orthographically irregular nonwords (e.g., BNEO) can eliminate a robust word-frequency effect, pronounceable nonwords were created by changing a single letter in each of the 120 words. Stimulus words were presented only once during the LDT.

Procedure

Participants provided informed consent and were informed that the purpose of the experiment was to assess their speed of word recognition. They were given instructions to the LDT and the experiment began when participants expressed an understanding of the task. Upon completion of the LDT, participants completed a demographic form and series of questionnaires. After all questionnaires were completed, participants were debriefed.

RESULTS

Lexical decision response latency

Trials reflecting incorrect responses were deleted. Additionally, any response latency 2.5 standard deviations above or below each individual's mean response latency was removed (i.e., reaction time outliers).

The aim of the present study was to examine change in processing speed of discrete affect words relative to (1) neutral words and (2) other affect words. To make this comparison, we first computed emotion facilitation scores by subtracting the mean RT for the 15 emotion words in each discrete affect from the mean response latency to neutral words. We next examined change in processing speed of discrete affect words relative to other affect words by subtracting the mean RT for the 15 emotion words in each discrete affect from the composite of the remaining 45 emotion words (i.e., three affects). More negative RT values indicate less facilitation and, as such, decreased activation of that emotion "network". Conversely, more positive RT values would suggest increased activation of that emotion "network".

Preliminary analyses

The F1 and F2 scales were not significantly correlated in the present sample ($r = .02$, $p > .05$). Pearson product–moment correlations between the LSRP and the self-report trait measures were computed to assess the convergent and discriminant validity of the psychopathy trait measure. Correlations between the LSRP and other trait measures can be seen in Table 1.

Overall, the LSRP demonstrated good convergent and discriminant validity in the present sample. Response times to words were Angry $M = 659.41$; Happy $M = 672.29$; Sad $M = 719.86$; Fear $M = 638.82$; Neutral $M = 704.44$; and nonwords $M = 711.99$.[2]

Psychopathy traits and emotion processing

Discrete affect vs. neutral words. We first examined the extent to which total psychopathy scores predicted affect compared to neutral words. Regression analyses indicated that total psychopathy scores did not predict response latencies to fear words, sadness words, or happiness words. When response latencies to anger words were entered as the outcome variable, total psychopathy scores were a marginal but nonsignificant predictor of faster response times $F(1, 58) = 3.61$; $\beta = .24$; $p = .06$; $R^2 = .06$; $R^2_{adj} = .04$. While this trend is not statistically significant, it suggests that scrutiny of the relationship between psychopathy and anger network activation is warranted.

TABLE 1
Correlations for psychopathy factors and self-report affect

Variable	*F1*	*F2*	*TP*
Positive Affect	−.08	−.14	−.14
Negative Affect	.15	.30*	.27*
Perspective Taking	−.17	−.12	−.21
Empathy	−.40**	−.13	−.41***
Trait Anxiety	.13	.44***	.32**
Impulsivity	.02	.54***	.28**
Narcissism	.40**	−.19	.26*
Entitlement	.46***	−.06	.38**
Exploitativeness	.53***	−.17	.38**

Note: F1 = Factor 1 Psychopathy; F2 = Factor 2 Psychopathy; TP = Total Psychopathy; *$p < .05$; **$p \leq .01$; ***$p \leq .001$.

[2] Dependent *t*-test indicated that each discrete affect significantly differed from neutral words, and from other words of affects.

Next, we constructed a series of regression equations to determine how each of the LSRP subscales predicted response latencies to affect words compared to neutral words.[3] Similar to the total scale, the subscales were unrelated to response latencies to fear and happiness words. The full model containing F1 and F2 as predictors of the response latencies to anger words demonstrated a trend toward significance, $F(2, 57) = 2.59$; $p = .08$; $R^2 = .08$; $R^2_{adj} = .05$. Individual betas indicated that F1 was not significantly related to anger words, $\beta = .13$, $p > .10$, whereas F2 significantly predicted faster response times to anger words, $\beta = .25$, $p = .05$. When response latencies to sadness words were entered as the outcome variable, the full model containing F1 and F2 was again marginally significant, $F(2, 57) = 2.61$; $p = .08$; $R^2 = .08$; $R^2_{adj} = .05$. Individual betas indicated that higher levels of F1 traits were related to slower responses times to sadness words, whereas F2 was statistically unrelated to response latencies ($\beta = -.27$, $p < .05$ and $\beta = .10$, $p > .10$, respectively).

Discrete affect vs. composite affect. We next repeated these regression equations using the affective composite difference scores as the outcome variable. The pattern of results was nearly identical to the previous set of regression equations. The F1, F2, and total scale psychopathy scores were all nonsignificant when entered as predictors of fear and happiness words (all $ps > .10$). When total psychopathy was entered as the predictor of anger words in comparison to all other affective words the model significant, $F(1, 58) = 3.79$; $\beta = .25$; $p = .05$; $R^2 = .06$; $R^2_{adj} = .05$. Total psychopathy scores significantly predicted slower response latencies to sadness words in comparison to all other affects $F(1, 58) = 5.02$; $\beta = -.28$; $p < .05$; $R^2 = .08$; $R^2_{adj} = .06$. When F1 and F2 were entered as predictors of anger words, neither proved to be significant ($ps > .10$). However, when F1 and F2 were entered as predictors of sadness words, the full model was significant, $F(2, 57) = 3.44$; $p < .05$; $R^2 = .11$; $R^2_{adj} = .08$ and the beta for F1 predicted slower response times $\beta = -.33, p = .01$ and F2 was nonsignificant. Beta coefficients for psychopathy scores and affect facilitation scores are presented in Table 2.

Exploratory analyses

A set of hierarchical regression equations were computed to determine whether the present results represent emotion processing specific to psychopathy traits or, rather, are better explained by generalised emotional maladjustment. Self-report indices of trait anxiety, negative affect, and empathy were entered into the first step of the regression equation to

[3] For all regression equations containing F1 and F2 as the predictors, Hotelling's *t*-tests were performed to determine whether βs differed significantly. No *t*s were significant.

TABLE 2
Betas for psychopathy factors and LDT affect indices

Variable	*Fear*	*Anger*	*Sadness*[a]	*Happiness*
Discrete Affect–Neutral Words				
F1	.14	.13	−.27*	−.02
F2	.08	.25*	.11	−.04
TP	.16	.24†	−.19	−.04
Discrete Affect–Composite Affect				
F1	.18	.18	−.33**	−.01
F2	−.03	.19	.02	−.17
TP	.15	.25*	−.28*	−.09

Note: F1 = Factor 1 Psychopathy; F2 = Factor 2 Psychopathy; TP = Total Psychopathy; [a]Negative coefficients indicate slower response latencies; †$p = .06$; *$p < .05$; **$p = .01$.

determine whether controlling for these variables would nullify the relationship between psychopathy scores and affect processing. Due to the small sample size, loss of degrees of freedom by adding predictor variables into the model, and consequent loss of statistical power, we report uncorrected significance values.

We first computed the regression equation using the affect versus neutral word difference scores. When controlling for lack of empathy, F1 still significantly predicted outcome to sadness words, $\Delta F(1, 57) = 4.51$; $\beta = -.38$; $p = .01$; $\Delta R^2 = .12$. A similar pattern of results was found using total psychopathy as the predictor controlling for empathy, trait anxiety, and negative affect, $\Delta F(1, 54) = 1.88$; $\beta = -.28$; $p = .06$; $\Delta R^2 = .06$. Upon entering total psychopathy score and F2 as separate predictor of response latencies to anger words while controlling for trait anxiety and negative affect, results were nonsignificant.

We repeated these analyses using the affective composite difference scores as the outcome variable. When controlling for lack of empathy, F1 still significantly predicted response to sadness words, $\Delta F(1, 57) = 4.08$; $\beta = -.39$; $p < .05$; $\Delta R^2 = .13$. A similar pattern of results was found using total psychopathy as the predictor controlling for empathy, trait anxiety, and negative affect, $\Delta F(1, 54) = 2.02$; $\beta = -.33$; $p < .05$; $\Delta R^2 = .08$. Upon entering total psychopathy score and F2 as separate predictor of response latencies to anger words while controlling for trait anxiety and negative affect, results were nonsignificant.

DISCUSSION

The primary goal of this study was to examine whether psychopathy traits are related to different patterns of emotion processing as measured by the

LDT paradigm. We conducted a series of regression analyses to determine how the psychopathy indices related to the processing of emotional stimuli. We approached the analyses in two ways. We first compared discrete affects to neutral words and then compared discrete affect words to other (composite) affects. This allowed us to test the emotion stimuli under theory that affects are (1) independent networks and (2) an interconnected network of nodes displaying differing levels of activation.

Our hypotheses were partially supported. When testing affects as independent networks, we found that total scale scores confirmed our hypotheses for the anger processing but were nonsignificant for fear and sadness processing. F1 predicted less sadness whereas F2 predicted more anger. Similar to total psychopathy, neither factor was significantly related to fear processing. When examining affect as an interrelated network, our hypotheses regarding F1 and total psychopathy were supported. However, for anger words the total scale score only approached significance while the F2 scale was nonsignificant. Again, none of the psychopathy scales were related to the processing of fear words. Effect sizes for regression equations were small to moderate in size. The adjusted R^2s indicated that the amount of shrinkage ranged from 1% to 3%.

Exploratory analyses indicated that the relation between psychopathy scores and processing of sadness words could not be better accounted for by other self-report measures of affect. Conversely, controlling for these indices of affect negated the relationship between psychopathy and anger. On the one hand, it is possible that such diminished association is due to loss of power corresponding to fewer degrees of freedom due to inclusion of additional predictor variables. On the other hand, it may indicate that while the relation between F2 and anger is the result of general emotional maladjustment, the relation between F1 and sadness may reflect more severe psychopathology.

Collectively, the results indicate that F1 (as assessed by the LSRP) is related to lesser experience of sad affect, whereas F2 and total psychopathy may be associated with a greater experience of anger. These findings are consistent with research suggesting that psychopaths (Serin, 1991) and, in particular, secondary psychopaths (Morrison & Gilbert, 2001) experience more anger than individuals not possessing these traits. Additionally, our findings extend research demonstrating that psychopathy traits are related to impaired processing of sad facial and vocal affect (e.g., Dolan & Fullam, 2006). However, the results of the present study do not support research suggesting that psychopathy is related to attenuated experiences of fear (Hicks & Patrick, 2006).

One possible explanation for this finding is methodological. For example, words chosen to represent fear may not purely represent the experience of fear and could activate other affective nodes based on individual differences in cognitive biases. For example, when an individual who possesses high trait fearfulness sees a word such as "murder", it may be associated more strongly with the activation of fear nodes. In contrast, an individual who possesses high trait anger may have cognitive biases that also associate this word with anger nodes. Similarly, fear may be less "pure" than other affects and, as such, may commonly overlap with them. Although we attempted to control for any lack of "affect purity" by comparing response latency for individual affects with all other affect response latencies, fear may share more covariance with one or multiple affects.

Several limitations of the present investigation merit mention. First, the sample was relatively homogeneous, as all participants were single university students and most were Caucasian. Inclusion of women and non-university participants in future research would increase the external validity of the findings. Second, the LSRP factors were not interrelated in our sample, which is uncommon for this measure. This finding could indicate a qualitative difference between the present sample and the derivation sample of the instrument. Another potential explanation is that the LSRP factors may not be ideal indicators of the "typical" psychopathy factor structure. Lilienfeld and Fowler (2006) suggested that LSRP F1 is "more highly related to measures of secondary psychopathy and antisocial behaviours than to measures of the core affective and interpersonal features of psychopathy" (p. 118). Third, although psychopathy indices explained a significant proportion of variance in emotion processing, the effect sizes were medium, at best. Further, statistical comparisons of the regression coefficients of the F1 and F2 scale for anger and sadness words were not significant. This could indicate that although general psychopathy displays disparate relations to facets of negative emotion, these hyper/hypo emotion biases may not be due to differential relations with F1 and F2. Consequently, the present results must be interpreted cautiously and require replication in different samples with multiple measures of psychopathy traits.

Nevertheless, the present study contributes to the literature in several ways. First, it supports research and theory suggesting that the core emotional deficits can be assessed in a nonforensic population. Second, the current findings represent a novel avenue of research into the relation between psychopathic traits and processing of emotion. Previous studies assessing the relationship between psychopathy and lexical decision making have not examined discrete affects of positive and negative emotion; but rather, the differences in the processing of neutral versus general emotion words. To our knowledge, this is the first study that examines the relation to the processing of discrete affects. Third, our findings indicate that the LSRP successfully taps both the emotional deficiencies and biases associated with psychopathic personality. However, more research with diverse populations is needed to examine the affective processing in individuals who possess high levels of psychopathic traits.

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Appendix

Stimulus words

Fear	Anger	Happiness	Sadness
afraid	anger	ecstasy	misery
cancer	irritated	elated	despair
danger	furious	euphoric	despondent
death	upset	happiness	downhearted
die	hostile	joyous	glum
disease	outrage	merry	heartbroken
doom	pissed-off	cheered	miserable
dying	outraged	delight	sad
fear	fed-up	joy	sorrow
horror	rage	enjoyment	sadness
lethal	hostility	excited	lonely
suffocate	mad	gaiety	grief-stricken
terror	angry	ecstatic	hopelessness
tormented	fury	overjoyed	melancholy
tremble	vengeful	joyful	depression