The Role of Instrumental Emotion Regulation in the Emotions-Creativity Link: How Worries Render Neurotic Individuals More Creative

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ABSTRACT
Based on the instrumental account of emotion regulation, the current research seeks to offer a novel perspective to the emotions-creativity debate by investigating the instrumental value of trait-consistent emotions in creativity. We hypothesize that emotions such as worry (vs. happy) are some trait-consistent experiences for neurotic individuals and experiencing these emotions can facilitate performance in a creativity task. In two studies, we found support for our hypothesis. First, individuals higher in neuroticism had a greater *preference for* recalling worrisome (vs. happy) events in anticipation of performing a creativity task (Study 1). Moreover, when *induced* to recall a worrisome (vs. happy) event, individuals higher in neuroticism had better performance in a creativity task (Study 2). These findings offer a new perspective to the controversy concerning the emotions-creativity relationship and further demonstrate the role of instrumental emotion regulation in the domain of creative performance.

C&C '13, Jun 17-20 2013, Sydney, NSW, Australia
ACM 978-1-4503-2150-1/13/06.

Author Keywords
Instrumental emotion regulation; creativity; neuroticism; emotions

ACM Classification Keywords
J.4. Social and Behavioral Sciences: Psychology.

General Terms
Performance; experimentation; theory.

INTRODUCTION
Although the relationship between emotions and creativity has been extensively theorized and researched [4, 9], it is still unclear what the most beneficial emotional state for individual creativity is [2, 23]. Much research comparing positive and neutral moods has found evidence that positive moods facilitate cognitive complexity and creative problem solving across a broad range of settings [6]. Nonetheless, there is also evidence that negative moods (vs. positive or neutral moods) foster creative performance [1, 5, 6].

Results from a recent meta-analysis of 63 empirical studies [8] support a *contextual perspective* to the emotions-creativity relationship [14]. Overall, there is consistent support for the facilitating effect of positive emotions on creativity. However, the evidence for the creative benefits of negative emotions is mixed. We submit that the results

for negative emotions are mixed because negative emotions only benefit individuals with certain personality dispositions.

Based on the instrumental account of emotion regulation [19, 21], the current research seeks to offer a new perspective to the emotions-creativity debate by investigating how emotion regulation helps some individuals attain their performance goal in a creativity task. A basic tenet of the instrumental emotion regulation account is that experiences with trait-consistent emotions foster attainment of performance goals [18, 20]. For example, for the trait of neuroticism, individuals higher on this trait have a greater preference for worry- (vs. happy-) enhancing activities before engaging in an effortful task [18]. Emotions such as anxiety and worry are some trait-consistent emotions for neurotic individuals and experiencing these emotions can facilitate attainment of desired outcomes in a performance context.

To achieve our research goals, in two studies, we tested the hypotheses that individuals higher in neuroticism would *prefer* recalling worrisome (vs. happy) events in anticipation of performing a creativity task (Study 1), and that when *induced* to recall a worrisome (vs. happy) event, individuals higher in neuroticism would have better performance in a challenging creativity task (Study 2). Whereas Study 1 attempted to demonstrate that individuals higher in neuroticism would display stronger preferences for experiencing worry-related events prior to performing a creativity task, Study 2 sought to show that the actual experience with worry-related events would enhance creative performance. In Study 2, we measured participants' creative performance with peer ratings to demonstrate that experiencing trait-consistent emotions would generate objective creative benefits, at least among individuals with relatively high levels of neuroticism.

If these hypotheses are confirmed, the results will highlight the role of instrumental (rather than hedonic) emotion regulation in creative performance [19]. These results will extend the contextual view of the emotions-creativity relationship [8] by showing that negative emotions can improve creative performance only for individuals who have dispositional preferences for experiencing negative emotions before engaging in a challenging creativity task. Thus, in addition to extending the applicability of the instrumental view of emotion regulation to the domain of creativity, our results will highlight a more dynamic functional account of the emotions-creativity link. They will also illustrate the functional congruence of individuals' preferences for trait-consistent emotions and the effect of experiencing trait-consistent emotions on objective performance in a challenging creativity task context.

STUDY 1

Preferences for trait-consistent emotions are relatively prevalent in the pursuit of an effortful performance goal, because such situations engage effortful self-regulation of emotions to maximize task performance [18, 20]. Therefore, we led the participants to anticipate a challenging creativity task before asking them to rate how much they preferred recalling different types of emotional events. We predicted that neuroticism would be related to higher preferences for recalling worrisome (vs. happy) events.

Participants

The participants were 261 Taiwanese students (178 males, 82 females; 1 did not report gender; $Mean_{age}$=20.36, $Standard\ Deviation_{age}$=1.29) from a public university in Tainan, Taiwan who completed the study to receive course requirement credits.

Measures

Current Emotion Measure. Participants rated their current emotions with a 5-point scale (1=*not at all* to 5=*extremely*; adapted from [18]; see also [13]). The emotions included in the scale included happiness (*happy*, *up*, and *enthusiastic*; α=.84), worry (*anxious* and *worried*; α=.81), sadness (*sad*, *down*, and *depressed*; α=.90), and calmness (*calm*, *relaxed*, and *pleased*; α=.56).

Neuroticism scale. Participants completed the neuroticism subscale of Goldberg's (1992) IPIP Big Five factor markers (e.g., "I often feel blue;" α=.85) [10]. They indicated how accurately self-descriptive each statement was on a 1 (*very inaccurate*) to 5 (*very accurate*) scale.

Preference for recalled events. Participants were presented with a list of 12 events [18], with four events in each of the following contexts: family, friendship, and school. The four events in each context included an event that had evoked happiness (positive, high arousal emotion), worry (negative, high arousal emotion), calmness (positive, low arousal emotion), or boredom (negative, low arousal emotion). The participants rated (1=*not at all* to 5=*extremely*) the degree to which they would like to spend 10 minutes recalling each of the 12 events.

Procedures

The study was conducted via an online survey. Under the cover that the study examined the relationship between memory and task performance, participants first completed the current emotion measure and the neuroticism subscale. Next, participants were told to recall a past event before working on a demanding creativity task that was described as requiring individuals to acknowledge and reconcile seemingly opposing perspectives in order to derive a creative solution. At this point, they rated the degree to which they would prefer recalling each of the 12 emotional events. To check whether participants expected the upcoming task to involve an effortful creativity goal, they rated how (a) effortful and (b) cognitively demanding (α=.79) the task would be (1=*not at all* to 5=*extremely*).

Results

As predicted, participants' average ratings of expected effort of the creativity task was higher than the scale midpoint (3; M=3.71, SD=.73), $t(258)$=15.62, p<.0001, indicating that participants expected the task to be an effortful one.

Preliminary analysis showed that the contexts (family, friendship, and school) did not qualify the effect of neuroticism on the type of emotional events (happy, worrisome, calm, and boring events) the participants preferred to recall ($F(1, 249)$=1.57, p=.21, η_p^2=.01), thus we collapsed the recall preference ratings across the three contexts to form recall preference ratings for the four kinds of emotional events (happiness, calmness, worry, and boredom). Next, we performed a mixed design General Linear Model analysis on the four recall preferences, with the level of arousal (high vs. low) and valence (positive vs. negative) of the emotional events as within-participant factors and neuroticism (mean centered) as a continuous predictor. We also controlled for the main and interaction effects of the four current emotions (all mean centered) and gender in the analysis.

Two main effects were significant. Participants preferred recalling positive (M=3.67, SD=.62) versus negative events (M=2.82, SD=.67), $F(1, 253)$=307.88, p<.0001, η_p^2=.55, and events that induced higher (M=3.59, SD=.65) versus lower arousal (M=2.89, SD=.57), $F(1, 253)$=272.69, p<.0001, η_p^2=.52. The predicted Arousal X Valence X Neuroticism interaction was also significant, $F(1, 253)$=10.21, p=.002, η_p^2=.04. To interpret this interaction, we ran separate multiple regressions on the preferences for recalling happy, worrisome, calm, and boring memories, with neuroticism as the predictor, again controlling for the main and interaction effects of current emotions and gender. Supporting our hypothesis, neuroticism predicted greater preferences for recalling worrisome memories (β=.47, SE=.09, t=5.04, p<.0001), but not those for happy, calm, and boring memories (ts<1.72). No effects involving current emotions (Fs<3.70) and gender (F<.03) were significant in these analyses.

STUDY 2

Having shown in Study 1 that individuals higher in neuroticism display stronger preferences for experiencing worry-related events in anticipation of an effortful creativity task, in the current study, we sought to show that the actual experience of a worry-related event would enhance creative performance. In Study 2, we manipulated participants' emotional experiences before having them engage in a creative idea generation task. We predicted that the peer-rated creative performance of individuals higher in neuroticism would benefit more from experiencing a worrisome (vs. happy) state.

Participants

Forty Taiwanese students (19 males, 20 females; 1 did not indicate gender; $Mean_{age}$=22.55, $Standard\ Deviation_{age}$=4.78) from a public university in Tainan, Taiwan participated in a two-day creativity workshop. They completed the study as workshop activities on the first day.

Procedure and Materials

In the morning session of the workshop, participants completed the same neuroticism subscale used in Study 1 (α=.87) and other individual difference assessments unrelated to the current study. When the afternoon session began, through random assignment we manipulated participants' emotional experience by asking them to recall either a happy or worrisome experience. Participants were given 15 minutes to provide vivid and detailed descriptions of the recalled experience [16, 17]. Next, they filled in the 20-item PANAS (10 positive emotions, e.g., "enthusiastic," α=.83 and 10 negative emotions, e.g., "irritable," α=.89) to report the extent to which they had felt each emotion at that moment [7].

After this, the participants completed a creativity task that required them to generate a new design for an airplane passenger seat in 30 minutes. Upon completing their design, participants convened in a pre-assigned group of three to five participants (a total of 10 groups) and gave a five-minute presentation of their design. Each group member then rated the design on three criteria ("It is creative," "It extends and breaks boundaries in design," and "It meets the stated goal of the design;" α=.80) on a 7-point scale (1=*not at all* to 7=*extremely*). The composite scores given by all members constituted our dependent measure of creativity. The task was intended to be an effortful one, given that the participants would work on it for 30 minutes, give a public presentation, and receive peer evaluations of their design.

Results

As a manipulation check, we performed a Recall Condition (between-participants factor: happy vs. worrisome) X Emotion Valence (within-participant factor: positive vs. negative) Analysis of Variance on the average amounts of positive and negative emotions reported by the participants. The two-way interaction was significant, $F(1, 38)$=14, p=.001, η^2_p=.27. Participants reported more positive emotions in the happy (M=3.11, SD=.63) than the worrisome condition (M=2.53, SD=.75), $F(1, 38)$=7.19, p=.01, η^2_p=.16. They also reported more negative emotions in the worrisome (M=2.23, SD=.73) than the happy (M=1.56, SD=.60) condition, $F(1, 38)$=9.97, p=.003, η^2_p=.21. The recall task as a manipulation of participants' current emotional experiences was successful.

To test our hypothesis, we performed a Recall Condition X Neuroticism (mean centered) regression on the creativity composite score. Consistent with prediction, the two-way interaction was significant, β=-.52, SE=.26, t=-1.98, p=.055. No other effects were significant, ts<1.63. Figure 1

shows the simple main effects of the recall condition on creative performance among individuals with relatively high (one standard deviation above mean) and low (one standard deviation below mean) levels of neuroticism. Among individuals with relatively high levels of neuroticism, there was a trend that they performed more creatively after recalling a worrisome instead of a happy event (β=1.30, *SE*=.69, *t*=1.87, *p*=.07). Among individuals with relatively low levels of neuroticism, they performed more creatively after recalling a happy instead of a worrisome event (β=2.09, *SE*=1.08, *t*=1.93, *p*=.06).

Because each participant was nested within a group and rated by other group members, according to the Social Relations Model [SOREMO; 11, 12], it is important to separate three types of effects on the ratings: (a) the *rater effect,* which represents raters' individual differences in ratings, with some raters on average giving targets higher or lower ratings than other raters; (b) the *target effect*, which represents consistent differences in how the targets are rated, with some targets in each group consistently being rated higher or lower than other targets; and (c) the *relationship effect*, which represents the rater by target interaction, or the unique relationship between a given rater and a given target that has affected the ratings above and beyond the rater and target effects.

Accordingly, we conducted further analyses using the SOREMO program by organizing the dyadic rating data into a round-robin structure. Specifically, we organized the creativity scores of each group into separate matrices, with each row of the matrix indicating the raters' ratings towards each target and the columns indicating the targets being rated. The diagonal entries of the matrices were zero because we did not collect participants' self-ratings. We also entered the recall condition, neuroticism (mean centered), and the interaction of recall condition and neuroticism into the analysis. Because SOREMO partitioned the variance in the creativity ratings into the rater, target, and relationship effects, we could examine whether the average percentage of variance of ratings attributable to each source differed significantly from zero.

Results revealed a non-significant rater effect (relative variance=.43, *t*=1.72, *p*=.12), suggesting that different raters rated the same targets similarly. There was a marginally significant target effect (relative variance=.18, *t*=1.95, *p*=.08), suggesting that different raters had consensual agreement with each other on the rated creativity of the same targets. The relationship effect was not significant (relative variance=.40, *t*=-1.37, *p*=.20).

SOREMO also allowed us to test whether the target effect was associated with other variables of interest. We were particularly interested in the interaction between recall condition and neuroticism. Findings are consistent with the analysis of variance results: Although there was a significant main effect of neuroticism (*t*=2.65, *p*=.01; *r*=.54), it was qualified by a significant interaction of recall condition and neuroticism (*t*=2.09, *p*=.046). Individuals higher in neuroticism received higher creativity ratings from their peers after recalling worrisome (vs. happy) events, but the reverse was true for individuals lower in neuroticism.

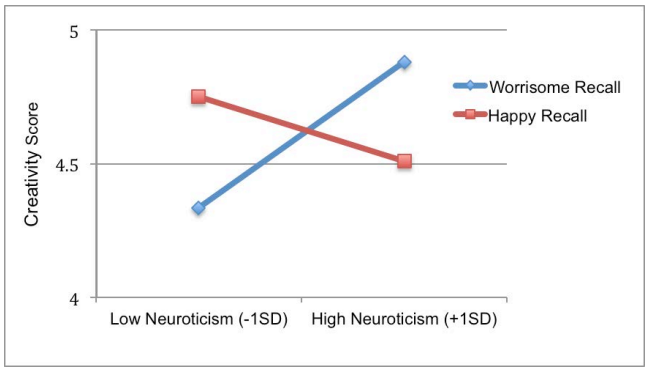

Figure 1. The effect of recall of emotion events on creativity task performance, Study 2.

GENERAL DISCUSSION

In two studies, we have demonstrated the role of instrumental emotion regulation in the emotions-creativity link. Individuals higher (vs. lower) in neuroticism showed stronger preferences for experiencing worrisome emotions in anticipation of a creativity task (Study 1) and those who actually experienced worrisome emotions produced creative designs that were rated more creatively by their peers (Study 2).

The present findings offer new insights into the controversy concerning the relationship between emotional states and creativity. The kind of emotions that benefits creativity might not be the same for all individuals. Rather, individuals vary in their preferences for experiencing positive or negative emotions prior to upcoming creativity tasks. Furthermore, their choices of emotional experiences are likely to be consistent with the experiences they typically encounter [15]. These results highlight that trait-consistent emotion regulation is instrumentally as opposed to hedonically motivated [22].

The current findings support the regulatory benefits of worrisome (vs. happy) emotional experiences for neurotic individuals pursuing a creative performance goal. Future research could explore the instrumental creative benefits of emotion regulation with other personality traits (e.g., openness to experience) and identify the specific kind of motivationally adaptive emotional states for a given trait. Such research efforts would broaden our understanding of the pragmatic benefits of experiencing trait-consistent affect.

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