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Can Expressions of Anger Enhance Creativity?
A Test of the Emotions as Social Information (EASI) Model

Gerben A. Van Kleef

University of Amsterdam

Christina Anastasopoulou

University of Amsterdam

Bernard A. Nijstad

University of Groningen

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Correspondence concerning this article should be addressed to Gerben A. Van Kleef, University of Amsterdam, Department of Social Psychology, Roetersstraat 15, 1018 WB Amsterdam, The Netherlands, tel +31 20 525 6894, fax +31 20 639 1896, e-mail g.a.vankleef@uva.nl.

Abstract

We investigated whether expressions of anger can enhance creative performance. Building on the emotions as social information (EASI) model (Van Kleef, 2009), we predicted that the interpersonal effects of anger expressions on creativity depend on the target's epistemic motivation (EM) – the desire to develop an accurate understanding of the situation (Kruglanski, 1989). Participants worked on an idea generation task in the role of "generator." Then they received standardized feedback and tips from an "evaluator" (a trained actor) via a video setup. The feedback was delivered in an angry way or in a neutral way (via facial expressions, vocal intonation, and bodily postures). Participants with high EM exhibited greater fluency, originality, and flexibility after receiving angry rather than neutral feedback, whereas those with low EM were less creative after receiving angry feedback. These effects were mediated by task engagement and motivation, which anger increased (decreased) among high (low) EM participants.

Key words: Emotion, Anger, Creativity, Interpersonal Effects, Epistemic Motivation

Can Expressions of Anger Enhance Creativity?

A Test of the Emotions as Social Information (EASI) Model

Emotions play a pivotal role in coordinating social life. According to social-functional theories of emotion (e.g., Keltner & Haidt, 1999; Parkinson, 1996; Van Kleef, 2009), emotional expressions provide information to observers, which may influence their behavior. To date, most empirical support for such interpersonal effects of emotions on behavior comes from research on competitive interactions (e.g., conflict, negotiation), where parties have divergent interests and incompatible goals (Pruitt & Carnevale, 1993). Accordingly, most research has focused on the interpersonal effects of anger (an emotion that often arises in situations of negative interdependence), showing for instance that negotiators tend to concede when confronted with an angry counterpart (for a review, see Van Kleef, Van Dijk, Steinel, Harinck, & Van Beest, 2008). The interpersonal effects of anger have seldom been examined in cooperative settings, where people are positively interdependent and work together to achieve the same goal. To shed light on the interpersonal effects of anger in cooperative settings, the present study explores—for the first time—the interpersonal effects of anger on creativity.

Creativity is the process of generating ideas, problem solutions, or insights that are new and potentially useful (Amabile, 1983; Paulus & Nijstad, 2003; Runco, 2004; Sternberg & Lubart, 1999). So far, research on emotion and creativity has focused exclusively on *intra*personal effects, examining how an individual's emotional state influences his or her own creative performance. This work has documented favorable effects of positive emotional states (mostly happiness) on creative performance (for reviews, see Ashby, Isen, & Turken, 1999; Baas, De Dreu, & Nijstad, 2008). Findings

pertaining to negative emotional states have been less conclusive. A meta-analysis by Baas and colleagues (2008) revealed that negative emotional states can have both positive (e.g., Carlsson, 2002; Carlsson, Wendt, & Risberg, 2000) and negative (e.g., Mikulincer, Kedem, & Paz, 1990; Vosburg, 1998) effects on creative performance. Their meta-analysis also revealed that some negative emotions (e.g., sadness, anxiety) have been studied more often than others, and that the effects of anger in particular have received scant empirical attention. We aim to shed new light on the role of emotion in creativity by studying the interpersonal effects of anger. Can expressions of anger enhance creativity? To address this question, we draw on the emotions as social information (EASI) model (Van Kleef, 2009, 2010; Van Kleef, De Dreu, & Manstead, 2010).

According to the EASI model, emotional expressions influence observers' behavior by eliciting affective reactions in them and/or by triggering inferential processes. Affective reactions involve emotional contagion, or "catching" another's emotions (Hatfield, Cacioppo, & Rapson, 1992) as well as effects on impression formation and interpersonal liking. For instance, expressions of anger in negotiation have been shown to elicit negative feelings and impressions and to reduce the motivation to work together (e.g., Friedman et al., 2004; Kopelman, Rosette, & Thompson, 2006; Van Beest, Van Kleef, & Van Dijk, 2008; Van Dijk, Van Kleef, Steinel, & Van Beest, 2008; Van Kleef, De Dreu, & Manstead, 2004a, 2004b). These negative affective reactions may in turn influence the observer's behavior. In the context of a collaborative task, this reduced motivation to work together may lead to disengagement (Barsade, 2002; Van Kleef et al., 2010), thereby undermining the observer's (creative) performance.

Emotional expressions can also influence observers' behavior by providing relevant information and triggering inferential processes (Van Kleef, 2009). For example, an expression of anger signals dissatisfaction, frustration of goals, and a need for change (Fischer & Roseman, 2007; Smith, Haynes, Lazarus, & Pope, 1993; Van Kleef et al., 2010). Observers may draw inferences from such signals that in turn influence their behavior. In a collaborative performance context, individuals may infer from another's expressions of anger that performance is unsatisfactory, which may increase motivation and effort. As a case in point, research on leadership has demonstrated that followers use the emotions of their leaders to draw inferences about their performance, with positive emotional expressions leading to favorable performance inferences, and negative emotional expressions leading to unfavorable performance inferences (Sy, Côté, & Saavedra, 2005; Van Kleef, Homan, Beersma, van Knippenberg, van Knippenberg, & Damen, 2009). Accordingly, negative emotional displays led followers to invest more effort (Sy et al., 2005). Thus, in a collaborative task, a partner's expressions of anger may increase a focal person's motivation to perform well.

A similar prediction can be made based on Higgins' (2006) proposition that engagement in an activity is strengthened when people oppose interfering forces, as long as the opposition does not make them quit. According to Higgins, such interfering forces can range from a barrier that obstructs locomotion to information that disconfirms a belief. Expressions of anger may be construed as interfering forces in that they disconfirm the belief of satisfactory performance and goal attainment (Sy et al., 2005; Van Kleef et al., 2009), and as such expressions of anger may enhance motivation and task engagement. Increased task engagement, motivation, and effort may in turn enhance

creative performance via Osborn's (1953) "quantity breeds quality" principle—the more ideas people generate, the more likely they are to come up with high quality solutions (Amabile, 1983; Rietzschel, Nijstad, & Stroebe, 2006; Simonton, 1997, 2003).

According to the EASI model, the relative potency of inferential processes compared to affective reactions depends on the observer's epistemic motivation, that is, the desire to develop and maintain a rich and accurate understanding of the situation (Kruglanski, 1989). Heightened epistemic motivation has been shown to decrease the selective use of information (Stuhlmacher & Champagne, 2000), discourage the use of stereotypes and heuristics (Fiske & Neuberg, 1990), focus information search on diagnostic information (Kruglanski & Mayseless, 1988), reduce the tendency to reject divergent opinions (Kruglanski & Webster, 1991), and increase the tendency to engage in systematic information processing (Mayseless & Kruglanski, 1987; for reviews, see Kruglanski & Webster, 1996; De Dreu & Carnevale, 2003). Moreover, epistemic motivation may influence the processing of information conveyed by emotional expressions (for a review, see Van Kleef et al., 2010). For instance, Van Kleef and colleagues (2004b) found that negotiators only inferred task-relevant information from their opponents' emotions when they had high rather than low epistemic motivation. Likewise, a leader's anger displays only led team members to infer that their performance was suboptimal and to increase effort and performance when the members had high rather than low epistemic motivation (Van Kleef et al., 2009). This suggests that expressions of anger can enhance task engagement and, possibly, creative performance when observers have high rather than low epistemic motivation.

In addition, people with high epistemic motivation may be more intrinsically motivated to work on creative idea-generation tasks (Chirumbolo, Livi, Mannetti, Pierro, & Kruglanski, 2004; Chirumbolo, Mannetti, Pierro, Areni, & Kruglanski, 2005). This implies that they may be less inclined to disengage from the task when faced with "interfering" expressions of anger than their less epistemically motivated counterparts (Higgins, 2006). Indeed, leadership research indicates that followers with low epistemic motivation respond more negatively to a leader's expressions of anger than followers with high epistemic motivation, and that they are more likely to disengage from their task when confronted with an angry leader (Van Kleef et al., 2009).

In sum, we hypothesize that expressions of anger enhance task engagement and creative performance to the extent that observers have high epistemic motivation, whereas expressions of anger reduce engagement and creativity to the extent that observers have low epistemic motivation. Based on the above logic, we further hypothesize that the effect of anger expressions on creativity is mediated by the observer's task engagement and motivation, which expressions of anger should increase in individuals with high epistemic motivation but decrease in individuals with low epistemic motivation.

Method

Participants and Experimental Design

Sixty-three psychology bachelor students (47 female, 16 male; mean age 21.5 years, *SD* = 3.26) participated in return for 7 Euros or course credit. The design involved a manipulation of emotional expression (anger vs. no emotion) and a continuous measure

of epistemic motivation. Several indices of creativity and task engagement served as dependent variables.

Overview of Procedure

Upon arrival at the laboratory, participants were seated in individual cubicles. All instructions, questionnaires, and tasks were administered via the computer. First participants completed a measure of epistemic motivation. Next they were informed that they would cooperate with another participant via their computer and the webcam installed on it. They learned that their task would be to come up with as many solutions to a problem as possible. They further read that one of the participants would be assigned the role of "generator" and the other the role of "evaluator." It was stressed that the two roles were equally important, and that they had to work together to obtain the best result on the task. Participants read that the task of the generator would be to type in solutions to a problem, which would be sent to the evaluator's computer. The evaluator's role would be to review the generator's solutions and to provide him or her with feedback and tips for improvement via the webcam. The generator could then use these tips when working on a second task. After these instructions, all participants were assigned to the generator role. After generating solutions in the first task, they received feedback from the evaluator. The feedback was presented either in an angry way or in a neutral way, as detailed below. Then participants worked on a second idea generation task. Finally, participants completed a post-experimental questionnaire, were debriefed, thanked, and dismissed.

Assessment of Epistemic Motivation

Epistemic motivation was measured using the 11-item personal need for structure scale (Neuberg & Newsom, 1993; Thompson, Naccarato, Parker, & Moskowitz,, 2001).

Ample research has validated this scale's ability to distinguish among individuals with different chronic levels of information processing motivation (e.g., Moskowitz, 1993; Rietzschel, De Dreu, & Nijstad, 2007; Thompson et al., 2001; Van Kleef et al., 2009), making it a reliable and parsimonious measure of epistemic motivation (Neuberg & Newsom, 1993). Examples of scale items are: "It upsets me to go into a situation without knowing what I can expect from it"; "I become uncomfortable when the rules in a situation are not clear" (for full scale and psychometric properties see Neuberg & Newsom, 1993). Participants indicated their agreement with the statements on 5-point Likert scales (1 = *strongly disagree*, 5 = *strongly agree*. The mean score on the scale was 2.86 (*SD* = .73, α = .88). Individuals scoring on the low end of the scale are more inclined to search for and incorporate new information when making judgments (high epistemic motivation), whereas people on the high end strive to maintain simple structures (low epistemic motivation). To facilitate interpretation of the findings, responses were recoded so that higher scores reflect higher epistemic motivation.

Idea Generation Task 1

Next participants received instructions for the idea generation task. The task was a modified version of the widely used "brick task" (Guilford, 1968; Lamm & Trommsdorff, 1973). In the current version, participants were asked to write down as many ways as possible to use a potato. The standard brainstorming instructions were used to introduce it (Osborn, 1953; Rossiter & Lilien, 1994). Participants were given eight minutes to work on the task. Responses were recorded as a baseline measure of creativity to enable controlling for individual differences.

Manipulation of Anger Expression

After the first idea generation task, participants were asked to call the experimenter to establish a webcam connection with the evaluator. To strengthen their awareness of the presence of the other participant, the experimenter asked them which role they had been given and left them to wait for five minutes until the other would be ready and the webcam was set up. The experimenter then entered a code from a sheet of paper. To enhance credibility, in all cases the experimenter mistyped one digit of the code and the message "wrong code, please try again" appeared on the screen. In a second trial the message "connection being established" appeared. Shortly thereafter a prerecorded video clip of the evaluator was played.

The video clip of the evaluator had been recorded inside one of the laboratory cubicles. In the clip a male actor read out a standardized script, which contained the standard brainstorming instructions (Osborn, 1953; Rossiter & Lilien, 1994). Specifically, he explained to the participant that "the more ideas the better" and "the more unusual the idea the better"; instructed the participant to "combine and improve your ideas"; and stressed that it was important "not to criticize your ideas." Depending on the experimental condition, the actor expressed either anger or no emotion by means of facial expressions, vocal intonation, and bodily postures. Thus, in the anger condition he frowned a lot, spoke with an angry and irritable tone of voice, clenched his fists, and looked stern (Barsade, 2002; Van Kleef et al., 2009).

Prior to the experiment, we pre-tested the videos with respect to their emotionality. Seven participants saw the angry version and six saw the neutral version of the video, and they indicated on 5-point scales to what extent the person in the video appeared angry (3

items; M = 2.67, SD = 1.40, α = .95) and neutral (3 items; M = 2.31, SD = 1.35, α = .93). Independent samples t tests revealed that participants in the anger condition rated the actor as significantly angrier (M = 3.62, SD = 1.21) than did those in the neutral condition (M = 1.61, SD = .57), $t(12) = 3.71$, $p < .003$. Participants in the neutral condition rated the actor as significantly more neutral (M = 3.33, SD = 1.29) than did those in the anger condition (M = 1.43, SD = .53), $t(12) = -3.58$, $p < .004$). These results indicate that the manipulation was perceived as intended.

Idea Generation Task 2

After the evaluator's feedback participants were asked to write down as many ways as possible to use a brick. Participants were instructed to stop when they were sure that they could not think of any other idea (i.e., expectancy stop rule; Nijstad, Stroebe, & Lodewijkx, 1999; Nijstad, Van Vianen, Stroebe, & Lodewijkx, 2004). This allowed us to explore effects of the anger manipulation on the amount of time spent on the task (see below).

Creative Performance

Creative performance was measured by means of fluency, originality, and flexibility (Guilford, 1967; Sternberg & Lubart, 1999; Torrance, 1966). *Fluency* was measured as the number of unique ideas each participant generated. *Originality* was based on the average (in)frequency of ideas. The more often an idea appeared in the pool of ideas in the sample, the lower its originality score. This variable was recoded so that higher scores indicated higher originality. Finally, *flexibility* was assessed via the number of distinct semantic categories a person accessed. The more categories a participant accessed, the more flexible s/he was. All the unique ideas were content coded by a rater who assigned a

numerical code to each idea. Thirty-three semantic categories emerged from this process (see Appendix 1). A second rater coded a random subset (10%) of the ideas, using the semantic system of the first rater. The inter-rater reliability (κ) was .78, which is considered substantial (Landis & Koch, 1977). Both raters were blind to conditions and during the coding process ideas were placed in randomized order.

Task Engagement

Task engagement was measured both indirectly and directly. First, we recorded the amount of time spent on the second task as an indirect and unobtrusive measure of engagement. Second, we administered a four-item self-report measure of participants' motivation and engagement in the task (e.g., "I was motivated to generate ideas in the last task"; "I found it very engaging to come up with ideas in the last task"; "I tried my best to come up with as many ideas as possible in the last task"; 1 = *totally disagree* to 5 = *totally agree*; M = 3.77, SD = .72, α = .78).

Results

Treatment of the Data

Values for fluency, originality, flexibility, and time spent on idea generation task 2 were log-transformed to deal with right-skewed data and to meet normality (Field, 2005). We tested our hypotheses using hierarchical linear regression. Emotional expression was contrast coded (-1 for neutral and 1 for anger). Epistemic motivation was treated as a continuous variable and centered at the mean (Aiken & West, 1991). In Step 1 of the analysis we entered fluency in the first task (to control for a priori differences in creativity[1]), emotional expression, and epistemic motivation. In Step 2 we added the interaction between emotional expression and epistemic motivation.

Creative Performance: Fluency, Originality, and Flexibility

We predicted that expressions of anger would enhance creativity among participants high in epistemic motivation but undermine creativity among those low in epistemic motivation. Regression statistics regarding fluency, originality, and flexibility are presented in Table 1. As predicted, the interaction between emotional expression and epistemic motivation significantly predicted all three creativity indices. We probed the interactions using simple slope analysis (Aiken & West, 1991).

Fluency. Analyses concerning fluency showed that the simple slope for participants with high epistemic motivation was significant and positive, $\beta = .55$, $p < .004$, indicating that participants with high epistemic motivation exhibited greater fluency after their partner had expressed anger rather than no emotion. The simple slope for participants with low epistemic motivation was significant and negative, $\beta = -.40$, $p < .04$, showing that participants with low epistemic motivation were less fluent after their partner had expressed anger.

Originality. Results concerning originality followed the same pattern. Participants with high epistemic motivation were more original after their partner had expressed anger rather than no emotion, $\beta = .56$, $p < .004$; participants with low epistemic motivation were less original after their partner had expressed anger, $\beta = -.48$, $p < .03$. The interaction is depicted in Figure 1. We also analyzed the number of unique ideas *relative to* the total number of ideas written down. To this end, we computed an index of relative originality by dividing the number of unique ideas by the total number of ideas generated (i.e., originality / fluency). Regression involving this relative originality index revealed a similar interaction ($\beta = .32$, $p < .03$). Participants with high epistemic motivation

generated more original ideas after receiving angry feedback than after receiving neutral feedback (β = .38, $p < .03$), whereas those with low epistemic motivation generated less original ideas after receiving angry rather than neutral feedback (β = -.36, $p < .02$).

Flexibility. Results for flexibility showed a similar pattern. Participants with high epistemic motivation were more flexible after their partner had expressed anger rather than no emotion, β = .49, $p < .015$. The simple slope for people with low epistemic motivation was not significant, β = -.28, $p = .17$, indicating that the flexibility of participants with low epistemic motivation was not affected by the partner's anger. Analysis of flexibility relative to total number of ideas (flexibility / fluency) did not produce a significant interaction (β = .12, *ns*).

Task Engagement

In our initial analyses we treated self-reported motivation and time spent on the task as two separate indices of task engagement. For economy of exposition, and because the two measures were significantly correlated ($r = .27$, $p < .02$), here we report analyses involving a combined index of motivation and time spent on the task (based on z-transformed scores).[2] Analyses involving the separate measures led to identical conclusions.

Regression revealed a significant interaction between emotion and epistemic motivation on the task engagement index (see Table 1). Simple slope analyses showed that individuals with high epistemic motivation were significantly more engaged in the task after receiving angry as opposed to neutral feedback, β = .35, $p < .05$, whereas individuals with low epistemic motivation were less engaged after receiving angry feedback, β = -.34, $p < .07$.

Mediation Analyses

So far we have shown that for individuals with high epistemic motivation angry feedback had a positive impact on fluency, originality, and flexibility, whereas for individuals with low epistemic motivation angry feedback had a negative impact on fluency and originality (but not on flexibility). We have also shown that angry feedback increased task engagement among individuals with high epistemic motivation but not among those with low epistemic motivation. To explore whether task engagement mediates the interactive effect of emotional expression and epistemic motivation on creativity, we followed the mediated moderation procedure proposed by Muller, Judd, and Yzerbyt (2005).

Table 1 shows that after including task engagement in the regression model to predict fluency (see Step 3), a significant task engagement effect emerged, and the interaction between emotion and epistemic motivation was reduced to non-significance. A Sobel test indicated that this reduction was significant ($Z = 2.45$, $p < .01$). Similar results emerged for originality ($Z = 2.42$, $p < .01$) and flexibility ($Z = 2.44$, $p < .01$). These results show that task engagement fully mediated the interaction between anger expression and epistemic motivation on fluency, originality, and flexibility.

Discussion

This study explored the conditions under which expressions of anger facilitate or hinder creative performance. Drawing on the emotions as social information (EASI) model (Van Kleef, 2009, 2010; Van Kleef et al., 2010), we predicted and found that anger expressions increased creative performance when the observer had high epistemic motivation (i.e., a strong desire to develop and maintain a rich understanding of the

situation; Kruglanski, 1989), but decreased creative performance when the observer had low epistemic motivation. According to the EASI model, individuals with low epistemic motivation are less likely to consider the task-relevant implications of others' anger. Rather, they develop negative reactions towards their coworker, which leads to disengagement and lower performance. Accordingly, individuals with low epistemic motivation exhibited less fluency and originality after receiving angry feedback. Individuals with high epistemic motivation are more likely to consider the implications of others' anger (e.g., suboptimal performance), and accordingly their creative performance benefited from angry feedback, as reflected in increased fluency, originality, and flexibility.

Mediation analyses showed that these effects could be explained in terms of task engagement and time spent on the task, which expressions of anger increased among individuals high in epistemic motivation but decreased among those low in epistemic motivation. This observation resonates with Higgins' (2006) theorizing that "opposition to interfering forces…can increase engagement strength and thereby increase the intensity of attraction to or repulsion from a value target" (p. 450). Our findings qualify this idea in that increased engagement after angry feedback was only observed among people with high epistemic motivation. This makes sense in light of the nature of our creative task, for individuals with high epistemic motivation are likely to be more intrinsically motivated to work on an idea-generation task than those with low epistemic motivation (Chirumbolo et al., 2004, 2005). As a result, the former should be less likely to disengage when confronted with angry feedback.

Additional analyses revealed that among individuals with high epistemic motivation expressions of anger also increased *relative* originality, that is, the number of unique ideas relative to the total number of ideas generated. This indicates that expressions of anger do not just lead individuals to generate more ideas, but also to generate more original ideas. Interestingly, although we found effects of anger and epistemic motivation on flexibility (i.e., the number of different categories of ideas generated), no effects were obtained for *relative* flexibility (i.e., flexibility relative to the total number of ideas). In other words, the effects on flexibility were not independent of the number of ideas generated; the more ideas individuals generated, the more categories they used, but they did not use more categories per fixed amount of ideas. In conjunction with the significant interaction on relative originality, this suggests that expressions of anger trigger individuals with high epistemic motivation to think of more and more original ideas *within* rather than between categories. This conclusion informs the dual pathway to creativity model (De Dreu, Baas, & Nijstad., 2008). According to this model, fluency and originality can originate from persistence, flexibility, or some combination of both. Our findings suggest that individuals with high epistemic motivation who receive angry feedback become more creative via the persistence pathway rather than the flexibility pathway.

The current study brings together two lines of inquiry that have developed in isolation: research on the intrapersonal effects of mood and emotion on creativity (e.g., Ashby et al., 1999; Baas et al., 2008; De Dreu et al., 2008; Isen, 1987) and research on the interpersonal effects of emotions (e.g., Friedman et al., 2004; Sinaceur & Tiedens, 2006; Van Kleef et al., 2004a, 2009). Our findings contribute to both literatures. First,

they demonstrate that emotions affect not only the creative performance of the person experiencing them, but also the creative performance of those who observe them. Second, they corroborate a central proposition of the EASI model, namely that emotional expressions influence observers in different ways depending on their epistemic motivation (Van Kleef, 2009, 2010; Van Kleef et al., 2010). By examining – for the first time – the interpersonal effects of anger on creativity, we found evidence across different indices of creative performance that epistemic motivation shapes the direction of these effects.

Our findings have a number of important practical implications. While individuals with low epistemic motivation become less creative when confronted with angry feedback, individuals with high epistemic motivation benefit from it. Taking into account that creative responses of employees play a crucial role in the innovativeness of organizations, these findings have implications for how to approach people with different levels of epistemic motivation so as to boost creativity. Moreover, given that variables such as time pressure or environmental noise have been found to decrease epistemic motivation (for a review, see De Dreu & Carnevale, 2003), these findings suggest that expressions of anger are unlikely to enhance creativity under such conditions. Conversely, considering that accountability increases epistemic motivation (see De Dreu & Carnevale, 2003), angry feedback can be expected to foster creativity when people are held accountable for their performance.

Although our findings clearly point to a mediating role of task engagement, additional mediators may be involved. For instance, the EASI model (Van Kleef, 2009, 2010; Van Kleef et al., 2010) would suggest that performance inferences and affective

reactions play a role as well, most likely earlier in the process, by increasing versus decreasing engagement. That is, individuals with high epistemic motivation infer from the other's anger that they performed suboptimally, which increases their motivation and engagement in the task, resulting in better performance. Individuals with low epistemic motivation, in contrast, exhibit negative affective reactions in response to the other's anger, which reduces their motivation and engagement, resulting in poorer performance. Future research is needed to explore this mediating chain in greater detail.

If expressions of anger are indeed interpreted as negative performance feedback, as suggested by the EASI model and previous research on emotion and leadership (Sy et al., 2005; Van Kleef et al., 2009), then one could argue that negative but non-emotional evaluations might have similar effects. However, we suspect that those effects would not be moderated by epistemic motivation, because understanding the meaning and implications of explicit negative performance feedback arguably requires less interpretation and deep processing than does understanding the implications of negative emotional expressions. Future research could compare the effects of emotional and non-emotional feedback on (creative) performance to shed more light on this issue.

Another question for future research concerns the generalizability of our effects to creative performance on other tasks, such as the Remote Associates Task (RAT), which measures the capacity to integrate seemingly unrelated concepts (Mednick, 1962). For instance, respondents may be asked to find a common word that connects the words "barrel," "white," and "belly." This requires going beyond easily accessible solutions for each of the single concepts (e.g., "oil," "snow," or "fat," respectively), finding similarities among them, and activating less accessible associations that are shared by all of them

(e.g., "beer"). Arguably, the RAT requires a fair amount of flexibility. Given our tentative conclusion that expressions of anger enhance creativity via persistence rather than flexibility, one could predict that expressions of anger would not increase RAT performance (cf. Harkins, 2006). Future studies comparing different creative tasks could shed more light on the boundary conditions of our effects.

Pending future research, we conclude that—in line with the predictions derived from the EASI model—expressions of anger can influence creative performance, enhancing creativity among individuals with high epistemic motivation and undermining creativity among those with low epistemic motivation. This conclusion adds an exciting new chapter to the growing body of research on the social consequences of emotional expressions, pointing once again to the social constitution of emotion (Fischer & Van Kleef, in press; Parkinson, 1996). Emotions are not just inner states; they are expressed in social life, and these expressions shape others' behavior—including their creative performance.

Appendix 1

Semantic Categorical System Used to Extract the Flexibility Variable		
Label	Code	# unique ideas
Game (e.g., as Lego)	17	71
Build with (e.g., build a house)	1	69
Vandalize / aggression (e.g., throw it to police)	3	57
Tool (e.g., hammer)	10	57
Art (e.g., paint them in colors)	16	41
House accessories (e.g., pillow)	5	37
Accessories / cosmetics (e.g., sunglasses, lipstick)	9	37
Item of emotional value (e.g., as a friend)	15	28
Put it somewhere (e.g., on a night table, garden)	29	26
Rest verbs (e.g., bury it, deep freeze it)	33	26
Mark territory / protect (e.g., build a fence)	20	22
Fantasy (e.g., take it to another planet)	30	21
Technology item / equipment (e.g., phone)	11	19
Trade / money (e.g., sell it)	31	19
Food (e.g., eat it)	8	16
(e.g., throw it from a building)	2	16
Block something (e.g., keep a door	19	16

open)		
Science (e.g., experiment with it)	32	13
Support something (e.g., as a book end)	18	12
Furniture (e.g., as a desk)	4	12
Smash / cut / break it		21
Write accessories (e.g., pencil)	6	11
Exercise (e.g., weight to work out)	25	11
Heighten something (e.g., heighten a computer screen)	24	10
Therapy (e.g., treat back problems)	26	10
Heat / fire (e.g., heat it and use it to get warm)	28	10
Tease somebody / cheat / (e.g., put it in somebody's bag)	7	9
Component (e.g., wheel)	12	9
Vehicle (e.g., car)	14	8
Fill something up (e.g., fill up a gap)	22	8
Make something heavier (e.g., to make it sink)	23	8
Cloths(e.g., make a dress)	7	7
Musical instrument (e.g., drum on it)	13	6
Total *N* of unique ideas:		734

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Footnotes

[1] Analyses without controlling for fluency in task 1 led to identical conclusions.

[2] We thank an anonymous reviewer for this suggestion.

Table 1.

Regression Coefficients for Emotional Feedback, Epistemic Motivation, Task Engagement, and the Creativity Indices.

		Task Engagement	**Fluency**	**Originality**	**Flexibility**
Step1					
Fluency in Task 1		.07	.58**	.45**	.53**
Emotional Feedback		.02	-.09	-.05	-.12
Epistemic Motivation		-.15	-.18	-.13	-.10
Contribution to R^2		.02	.32**	.19**	.27**
Step 2					
Fluency in Task 1		.08	.60**	.46**	.54**
Emotional Feedback		.01	-.08	-.04	-.10
Epistemic Motivation		-.07	-.12	-.05	-.04
Emotional Expression × Epistemic Motivation.		.34**	.31**	.34**	.25*
Contribution to R^2		.11**	.09**	.11**	.06*
R^2		.13**	.40**	.29**	.33*
Step 3					
Fluency in Task 1			.55**	.42**	.50**
Emotional Feedback			-.08	-.04	.10
Epistemic Motivation			-.08	-.01	-.01
Emotional Expression × Epistemic Motivation			.13	.15	.06
Task Engagement			.53**	.55**	.57**

Contribution to R^2			.25**	.27**	.28**
R^2			.65**	.56**	.61**

N = 63. Standardized coefficients (β) are reported. Emotional feedback was contrast-coded (1 for angry, -1 for neutral).

* $p < .05$**

$p < .01$

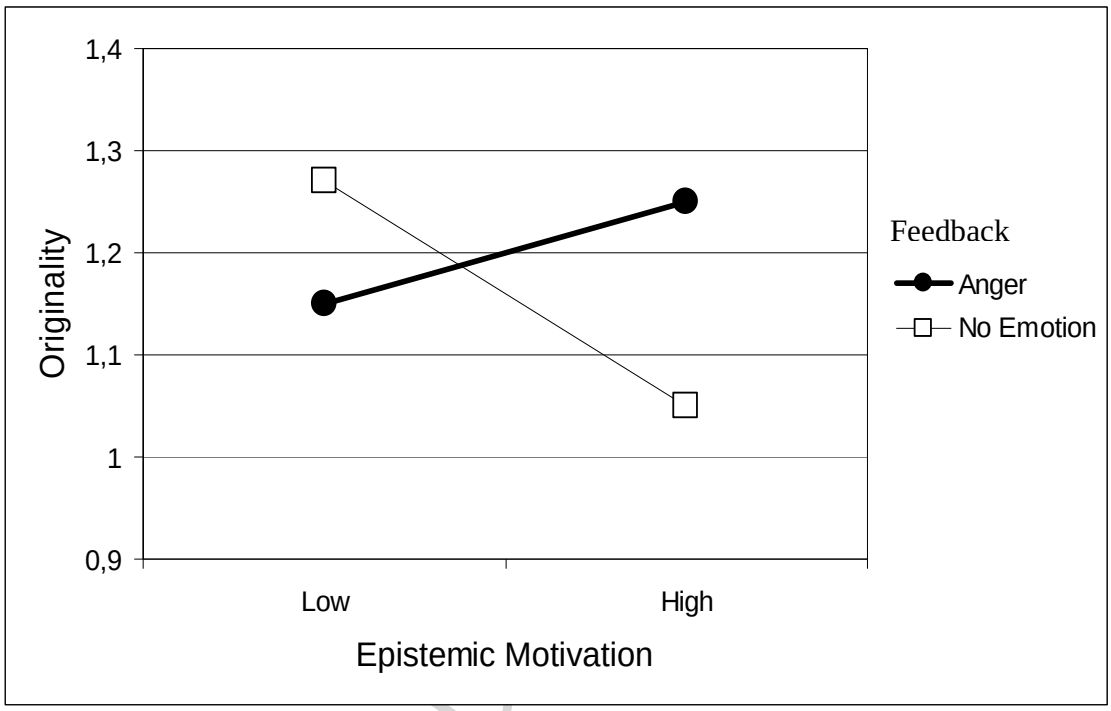

Figure 1. Originality in idea generation task 2 as a function of partner's emotional expression and participants' epistemic motivation. Originality scores were log-transformed. Results for fluency and flexibility showed a similar pattern.