Emotion

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A Flexible Influence of Affective Feelings on Creative and Analytic Performance

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Considerable research shows that positive affect improves performance on creative tasks and negative affect improves performance on analytic tasks. The present research entertained the idea that affective feelings have flexible, rather than fixed, effects on cognitive performance. Consistent with the idea that positive and negative affect signal the value of accessible processing inclinations, the influence of affective feelings on performance on analytic or creative tasks was found to be flexibly responsive to the relative accessibility of different styles of processing (i.e., heuristic vs. systematic, global vs. local). When a global processing orientation was accessible happy participants generated more creative uses for a brick (Experiment 1), successfully solved more remote associates and insight problems (Experiment 2) and displayed broader categorization (Experiment 3) than those in sad moods. When a local processing orientation was accessible this pattern reversed. When a heuristic processing style was accessible happy participants were more likely to commit the conjunction fallacy (Experiment 3) and showed less pronounced anchoring effects (Experiment 4) than sad participants. When a systematic processing style was accessible this pattern reversed. Implications of these results for relevant affect-cognition models are discussed.

Keywords: emotion, mood, cognitive performance, decision-making, creativity

The question of how emotion influences cognition is an old one. Early answers proposed that emotion was a contaminating influence, one that should be ignored or suppressed. Recent answers suggest instead that emotion adaptively regulates cognitive activity by providing feedback about the state of the current environment (Bless & Fiedler, 2006; Forgas, 2013; Schwarz, 2002; Schwarz & Clore, 2007). According to such cognitive tuning accounts, negative affect signals a problematic environment, which directly triggers a bottom-up, local, systematic, and detailed processing style. Positive affect signals a benign environment, which triggers a top-down, global, superficial, and heuristic processing style. Thus, from this view, whether emotion helps or harms cognitive performance should depend on the nature of the task (Forgas, 2013; Schwarz, 2002).

On tasks that capture creative thinking, the tendency of happy moods to produce a focus on the big picture and top-down processing facilitates performance, whereas the tendency of sad moods to produce a focus on the details and bottom-up processing impairs performance (for exceptions to this general pattern see, e.g., Gasper, 2003; George & Zhou, 2002; Kaufmann & Vosburg, 1997). Happy moods, for example, lead individuals to form more inclusive categories in which atypical or unusual exemplars (e.g., feet) are assigned to the category vehicle (Isen & Daubman, 1984). Relative to sad moods, happy moods have been associated with increased performance on the Remote Associates Task (RAT; Mednick, 1962), in which participants are given three words (e.g., mower, atomic, or foreign) and are asked to find one word that relates to each of them (e.g., power) (Isen, Daubman, & Nowicki, 1987; Rowe, Hirsh, & Anderson, 2007). Likewise, happy individuals have been shown to be better able to entertain ideas about how objects might serve different purposes and thus are more successful at solving Duncker's candle problem and creative insight problems (Isen et al., 1987).

On judgment and decision-making tasks, the tendency to adopt a more bottom-up, detailed style of thinking insulates sad people from many judgmental biases, whereas the tendency to adopt a more top-down, global style of thinking makes happy people commit cognitive mistakes. When forming impressions of others, for example, positive affect encourages reliance on cognitive shortcuts such as stereotypes, whereas negative affect encourages reliance on detailed behavioral information (Bodenhausen, 1993; Isbell, 2004). In a persuasion context, the attitudes of people in positive moods are largely immune to the quality of message arguments and instead are based on heuristic cues, such as source attractiveness. The attitudes of people in sad moods are unaffected by heuristic cues, and instead attuned to message quality such that they are more persuaded by strong than weak arguments (Schwarz, Bless, & Bohner, 1991). Research also shows that people in positive moods perform worse than those in sad moods on syllogistic reasoning tasks (Melton, 1995). And finally, individuals in happy moods are more likely that those in sad moods to fall prey to the availability bias (Ruder & Bless, 2003) and the conjunction fallacy (Gasper, 1999). There is considerable evidence, then, for the idea that positive and negative affect produce particular cognitive signatures and, therefore, improve performance on tasks that

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benefit from the type of processing produced by each affective state.

Despite such evidence, in the present research we asked if the influence of positive and negative affective feelings on cognitive performance might depend not only on the nature of the task, but also on the particular cognitive context (i.e., the relative accessibility of different processing styles) in which they are experienced. Such a possibility comes from theoretical approaches that suggest the information provided by affective feelings is more general and less constrained than often assumed (Clore & Huntsinger, 2007, 2009; Huntsinger, 2013a; Huntsinger, Isbell, & Clore, 2014; Isbell, Lair, & Rovenpor, 2013).

According to an affect-as-cognitive-feedback account (Huntsinger et al., 2014), rather than providing information only about the environment, affect may provide direct feedback about the adequacy of currently accessible styles of thinking. Specifically, positive affect signals that accessible styles of thinking are adequate to the task, thereby facilitating their use. Negative affect signals that accessible styles of thinking are inadequate, thereby inhibiting their use. This account, then, predicts that the impact of affective feelings on cognitive processing should be flexibly responsive to whether one or another processing orientation is momentarily accessible.

Evidence for a malleable, rather than fixed, influence of affective feelings on cognitive processing has been observed across a wide variety of domains (for a review, see Huntsinger et al., 2014). For example, although past research seemed to suggest that positive affect directly triggers a focus on the forest and negative affect a focus on the trees, recent research showed instead that this influence depends on whether one or the other focus is the default (Huntsinger, 2012; Huntsinger, Clore, & Bar-Anan, 2010). In this research, when a global focus was accessible, happy people focused on the forest and sad people the trees. However, this pattern reversed when a local focus was accessible, now happy people focused on the trees and sad people the forest. Similarly, in impression formation tasks, past research seemed to show that positive affect directly promoted global, category-based processing, and reliance on stereotypes, whereas negative affect promoted local, item-based processing, and reliance on behavioral information (Bless et al., 1996; Bodenhausen, Kramer, & Susser, 1994; Krauth-Gruber & Ric, 2000). Consistent with an affect as cognitive feedback account, recent research showed that this influence of affect on impression formation reversed when a local, item-based processing style was accessible (Hunsinger, Isbell, & Clore, 2012). Now, happy people relied more on behavioral information as the basis for their impressions than sad people, who instead relied on categorical information.

The purpose of the current project was to examine if varying the accessibility of particular styles of cognitive processing will modify the influence of affective feelings on cognitive performance, while holding constant the nature of the task (i.e., creative vs. analytic). Two discrete pairs of processing orientations were examined as they have different implications for creative and analytic performance, and both are often assumed to be directly tied to feeling a particular way. In experiments in which creative performance was the outcome, the processing distinction of interest was global versus local processing (Förster & Dannenberg, 2010; Friedman & Förster, 2010). A global processing orientation results in activation of more abstract or superordinate concepts that trigger activation of more remote concepts, which should improve creative performance. A local processing orientation results in activation of more concrete or lower-level concepts that chokes off activation of more remote concepts, which should undermine creative performance (see Finke, 1995; Mednick, 1962; Ward, 1995). In experiments in which analytic performance was the outcome the processing distinction of interest was heuristic versus systematic processing. Heuristic processing results in activation and application of judgmental shortcuts or "heuristics" that are well-learned and stored in memory, which should undermine analytic performance. Systematic processing results in comprehensive or detailed treatment of incoming information, with a focus on the content and validity of such information, which should improve analytic performance (Chaiken & Ledgerwood, 2012; Fiske & Taylor, 2008; Kahneman, 2011).

We predicted that when a global orientation is made accessible, positive affect should be associated with greater creativity than negative affect. When a local orientation is made accessible, positive affect should be associated with less creativity than negative affect. When a heuristic orientation is made accessible, positive affect should be associated with more cognitive mistakes than negative affect. When a systematic orientation is made accessible, positive affect should be associated with fewer cognitive mistakes than negative affect.

Experiment 1

Happy people are generally more creative and cognitively flexible in their thinking than are sad people (Davis, 2009; Isen, 1987, 2008). Effects on creativity are revealed in research using a variety of different tasks, such as the remote associates task (RAT; Mednick, 1962), insight problems, breadth of categorization, and creative generation tasks in which, for example, people are asked to write down creative and original uses for a brick. These findings are often taken to indicate that there is a direct connection between affective feelings and creativity, with positive affect prompting more creativity than negative affect (Isen, 2008).

Indeed, although past research demonstrated that the link between affect and task effort (e.g., how many uses for a brick were generated) was open to contextual influence, the link between affect and objective creativity of responses was resistant to such influences (e.g., Hirt, Levine, McDonald, Melton, & Martin, 1997; Martin & Stoner, 1996). In this research (Hirt et al., 1997) participants were placed in positive or negative moods and then performed a creative generation task in which they were asked to list as many modes of transportation as they could. Some of the participants were given instructions that emphasized enjoyment and others were given instructions that emphasized performance. The researchers examined the influence of mood and task framing on both quantitative measures of performance (e.g., number of responses generated, times spent on the task) and qualitative measures of performance (e.g., objective creativity of responses). When focused on enjoyment, happy participants spent more time on the task and generated more modes of transportation than sad participants because their positive mood signaled that the task is enjoyable. But when focused on performance happy participants spent less time on the task and generated fewer responses than sad participants because their positive mood signaled that they had done enough. However, regardless of task framing, when the objective creativity of responses was examined, the usual relation between affect and creativity was observed, with happy moods leading to greater creativity than sad moods (Hirt et al., 1997; see also Hirt, Devers, & McCrea, 2008).

The results of Martin and Stoner (1996) are often taken to provide evidence for a malleable link between mood and creativity. In this research happy and sad participants were asked to perform a word association task in which they were presented with a sequence of common words and were instructed to generate the first word that came to mind. Participants were then given the opportunity to generate another response if they wished. Participants were given one of two decision rules to use in deciding how to respond. One group was to ask themselves: “Can I come up with a better response?” The second group was asked: “Is my initial response a good one?” When given the “Can I come up with a better response?” decision rule, happy participants were more likely to generate a second response than sad participants. Presumably this occurred because for happy participants, their positive mood led them to more favorably evaluate the possibility of generating a better response. However this pattern reversed when participants were given the “Is my initial response a good one?” decision rule. Presumably this occurred because for happy participants, their positive mood led them to more favorably evaluate their first response.

There are two things to note here. First, as pointed out by Hirt, Devers, and McCrea (2008) these results reflect participants’ subjective experience of their own creativity, not the objective level of creativity of their responses. That is, mood influenced whether participants thought their first response was good or bad, and therefore whether or not they should attempt to generate a better response. Indeed, when the objective creativity of participants’ response was examined, Martin and Stoner (1996) found no differences across conditions. Thus, on closer inspection, these results do not provide good evidence against a fixed connection between feelings and creativity.

Past research, then, would seem to provide good support for a fixed link between affect and objective creativity and a context-dependent link between affect and creative effort (Hirt et al., 1997, 2008). Although this certainly may be the case, we suggest this asymmetry in context dependency has more to do with the manipulations of task focus (i.e., the stop-rule or processing goals given to participants) used in this research than the immutability of the link between affect and objective creativity. The manipulations of task focus used in this research targeted processing effort, persistence, and motivation (Hirt, Melton, McDonald, & Harackiewicz, 1996, p. 248), which influences the number of responses generated and time spent on the task (Hirt et al., 1996, 1997). They did not target processing style, in particular whether participants adopted a global or local processing orientation, which influences the objective creativity of responses generated (Nijstad et al., 2010). This would explain why, in past research, the usual relation between affect and creativity was observed on qualitative measures of performance. To observe flexibility in the link between affect and qualitative measures of creativity, particularly those that capture cognitive flexibility, one must manipulate processing style, rather than processing effort.

This possibility was examined in Experiment 1. The basic procedure was as follows. Participants were first primed with a global, top-down or a local, bottom-up processing orientation and next experienced the positive or negative mood induction. The outcome of interest was generation of creative uses for a brick. Performance on creative generation tasks benefits from a global or top-down processing orientation, and is impaired by a local or bottom-up processing orientation (Friedman & Förster, 2010; Isen, 2008; Nijstad, De Dreu, Rietzschel, & Baas, 2010). We expected that processing orientation and mood would interactively predict the creativity of uses generated by participants on this task. Specifically, when primed with a global orientation, participants in positive moods would generate more creative uses for a brick than those in sad moods. When participants were primed with a local focus, participants in positive moods should generate less creative responses than those in sad moods. We did not expect a similar influence on number of uses generated or time spent on task, consistent with past research that manipulated global and local attentional orientations independent of mood (Friedman, Fishbach, Förster, & Werth, 2003).

Method

Participants. Eighty-eight undergraduate students (49 women, 37 men, and 2 unspecified) at Loyola University Chicago participated in this experiment for partial fulfillment of a course requirement.[1] Three participants failed to complete the uses for a brick task, leaving a final sample of 85 participants (49 women, 36 men).

Procedure and materials. One to six participants took part in any given experimental session, but never interacted as they were run in individual cubicles. The entire experiment, including all instructions, manipulations, and measures, took place via computer using Inquisit 4.0.2 64bit (Draine, 2012) software. Participants first were randomly assigned to one of two priming conditions. This task, described below, was designed to activate either global or local processing. Participants then experienced the mood induction in which they were asked to recall either a positive or negative event from their past. After this, participants were asked to generate as many creative and unique uses for a brick as they could. Participants then answered questions checking on the effectiveness of the mood manipulation and several demographic items.

Priming manipulation. Following past research (Huntsinger, 2012; Huntsinger, Clore, & Bar-Anan, 2010) a variant of the Navon-letter-task was use to prime a global or local processing orientation. Participants were presented with 80 trials. On each trial, a large letter made up of smaller letters appeared on a computer screen. Four of the composite letters included global targets (e.g., an H made of F’s) and four included local targets (e.g., an F made of L’s). Participants were instructed to press the “L” key if the letter “L” appeared in the compound stimulus, and press the “H” key if the letter “H” appeared. In the global priming condition, all 80 trials had global-letter targets (i.e., each of the four global target composites was shown 20 times) whereas in the

[1] The stopping rule for data collection for all experiments was simple: Collect data from as many participants as possible during the course of an academic semester. Experiments 1 and 5 were conducted in spring semesters and Experiments 2, 3, and 4 were conducted in fall semesters. Sample sizes differ across experiments because the subject pool is generally larger in the fall than the spring, and the start dates for each experiment differed across semesters. No statistical tests were conducted until data collection was complete.

local priming condition all 80 trials had local-letter targets (i.e., each of the four local target composites was shown 20 times).

Mood induction. Following past research (Schwarz & Clore, 2007), participants were asked to collaborate in the construction of a life-events inventory that would be used in future research. In this task participants were asked to describe as vividly and in as much detail as possible an event that made them feel "really happy" or "really sad." Participants were further instructed to focus on the emotional aspects of the happy or sad event, thereby evoking a strong emotional response. Participants were given 10 min to complete the task.

Brick task. In this task participants were instructed to generate and type out as many creative uses for a brick as they could think of. Participants were given no time limit to complete this task.

Manipulation check. Similar to past research (Gasper & Clore, 2002), participants were asked six questions ("How happy [sad, good, bad, positive, negative] did the writing task make you feel?") to assess the efficacy of the mood manipulation (1 = *not at all*, 7 = *very*). Because these items formed a reliable scale (α = .97), after appropriate recoding a composite measure of participants' feelings was created such that higher values indicated more positive feelings.

Results and Discussion

Manipulation check. Submitting the mood manipulation check to a 2 (mood: positive, negative) $\times$ 2 (prime: global, local) analysis of variance (ANOVA) revealed that the mood manipulation was successful, $F(1, 81) = 101.67$, $p < .0005$, $\eta_p^2 = .56$. Participants reported experiencing more positive mood while recalling and writing about a happy event ($M = 5.83$, $SD = 1.24$) than a sad event ($M = 2.92$, $SD = 1.55$). No other significant effects emerged from this analysis, all Fs < 0.3, ps $> .6$.

Creativity. The outcome of interest was the creativity of the brick uses generated by participants. Following past research (e.g., Friedman et al., 2003), four independent coders were asked to rate the creativity of the different uses generated on a scale from 1 (*very uncreative*) to 9 (*very creative*), with 5 (*neither creative nor uncreative*). Interrater reliability was good (α = .96). Thus, the final creativity score was created by averaging scores across coders. To create a mean creativity score for each participant, ratings for each response were summed and then divided by the total number of responses generated (for a similar approach, see, e.g., Friedman et al., 2003).

The measure of creativity was submitted to a 2 (mood: positive, negative) $\times$ 2 (prime: global, local) between participants ANOVA. This analysis revealed the predicted mood by prime interaction, $F(1, 81) = 8.92$, $p = .004$, $\eta_p^2 = .10$. Happy participants primed with global processing generated more creative uses for a brick ($M = 3.19$, $SD = 0.84$) than similarly primed sad participants ($M = 2.27$, $SD = 1.10$), $t(81) = 2.39$, $p = .019$, $d = .53$. Happy participants primed with local processing generated fewer less creative uses for a brick ($M = 2.25$, $SD = 1.17$) than similarly primed sad participants ($M = 2.93$, $SD = 1.64$), though this effect failed to achieve significance, $t(81) = 1.82$, $p = .072$, $d = .40$. The main effects of mood, $F(1, 81) = 0.21$, $p = .65$, $\eta_p^2 = .003$, and prime, $F(1, 81) = 0.28$, $p = .60$, $\eta_p^2 = .003$, were not significant.

Submitting the total number of responses generated by participants to the same ANOVA revealed no significant effects, main effect of mood, $F(1, 81) = 0.00$, $p = .99$, $\eta_p^2 = .000$, and prime, $F(1, 81) = 0.89$, $p = .35$, $\eta_p^2 = .01$, and their interaction, $F(1, 81) = 0.47$, $p = .49$, $\eta_p^2 = .006$. Similarly, participants spent the same amount of time on the task across conditions, main effect of mood, $F(1, 81) = 0.05$, $p = .82$, $\eta_p^2 = .01$, and prime, $F(1, 81) = 0.15$, $p = .70$, $\eta_p^2 = .002$, and their interaction, $F(1, 81) = 1.14$, $p = .29$, $\eta_p^2 = .014$.

These results provide support for the idea that the link between mood and qualitative aspects of creative performance is flexibly responsive to the relative accessibility of global or local processing orientations. Coding of participants' responses for creativity and originality revealed that when a global orientation was primed, positive moods produced more creative responses than negative moods; whereas when a local orientation was primed, negative moods produced more creative responses than positive moods. No effect of affective feelings on quantitative performance was found (e.g., number of uses generated, time on task). This result is consistent with past research that manipulated global and local attentional orientations independent of mood.

Experiment 2

In this experiment we examined flexibility in creative performance for two other common measures of creativity: a remote associates task and insight problems. Past research showed that positive affect enhanced and negative affect reduced access to remote associates and the ability to solve insight problems (Isen, 2008). Performance on both tasks benefits from a global or broadened conceptual focus, and is compromised by a local or narrowed conceptual focus (Friedman & Förster, 2010; Isen, 2008; Nijstad et al., 2010). We predicted that whether positive affect or negative affect would facilitate or inhibit access to remote associates and the solution to insight problems would depend on the relative accessibility of global or local processing orientations. When a global processing orientation was accessible, happy moods would lead to better performance on the remote associates task and insight problems than sad moods. This pattern was expected to reverse when a local orientation was accessible. Now happy moods would lead to worse performance on both tasks than sad moods. Finally, because remote associates items and insight problems have objectively correct answers this study will provide additional evidence for flexibility in qualitative aspects of creative performance.

Method

Participants. There were 206 undergraduate students (153 women, 53 men) at Loyola University Chicago who took part in the experiment for partial fulfillment of a course requirement.

Procedure and materials. One to six participants took part in any given experimental session, but never interacted as they were run in individual cubicles. The entire experiment, including all instructions, manipulations, and measures, took place via computer. Participants first were randomly assigned to one of two priming conditions. This task, identical to that used in Experiment 1, was designed to activate either global or local processing. Participants then experienced the mood induction, which involved reading either a happy or a sad story. After this, participants completed the Remote Associates Test and four insight problems.

Finally, participants completed several questions about the mood manipulation, and then demographic questions.

Mood induction. This manipulation was identical to that used in past research to induce happy and sad moods (Erber, 1991; Huntsinger, 2012). Ostensibly as part of a "media-classification task," participants were asked to read one of two stories describing events that happened to a young female artist. The story used to produce a positive mood described a number of favorable events culminating in her receiving a scholarship to study art. The story used to produce a negative mood described how the same person was overcome by a rare, disabling illness (rheumatoid arthritis) at the end of her first year in college.

Remote Associates Task. This measure from past research (Slepian, Weisbuch, Rutchick, Newman, & Ambady, 2010) included 15 triads composed of three words. Participants were informed that three words would appear on the computer screen and that their job was to think of the one word that the three had in common. Participants were given an example problem (e.g., "poke go molasses") and the solution (e.g., "slow"). To avoid floor and ceiling effects, the 15 triads were of moderate difficulty (Bowden & Jung-Beeman, 2003). Below each triad was a text box where participants entered their answer. The triads appeared in a fixed order and participants were given 10 s to answer.

Insight problems. This measure from past research (Schooler, Ohlsson, & Brooks, 1993) included four word problems presented in a fixed order. Participants typed their response in a textbox and were given 5 min to solve each problem.

Manipulation check. Similar to Experiment 1, and following past research (Erber, 1991; Huntsinger, 2012), participants were asked six questions ("How happy [sad, good, bad, positive, negative] did you feel while reading the story?") to assess the efficacy of the mood manipulation (1 = *not at all*, 7 = *very*). A composite measure of participants' feelings was created such that higher values indicated more positive feelings ($\alpha = .91$).

Results and Discussion

Manipulation check. Submitting the mood manipulation check to a 2 (mood: positive, negative) $\times$ 2 (prime: global, local) ANOVA revealed that the mood manipulation was successful, $F(1, 202) = 123.37$, $p < .0005$, $\eta_p^2 = .38$. Participants reported experiencing more positive mood while reading the happy story ($M = 5.39$, $SD = 0.94$) than the sad story ($M = 3.73$, $SD = 1.19$). No other significant effects emerged from this analysis, all Fs < 1.7, ps $> .19$.

Creativity. Responses to the remote associates task and insight problems were scored as follows: Correct responses were assigned 1 and incorrect answers 0.[2] Responses to both measures were then separately summed to create composite scores with higher values indicating better performance. We expected equivalent results for both measures, $r = .34$, $p < .001$. Therefore, the two measures were individually standardized and submitted to a 2 (mood: positive, negative) $\times$ 2 (prime: global, local) $\times$ 2 (outcome: RAT, Insight) repeated measures ANOVA with outcome as a within subjects factor.

This analysis revealed the predicted mood by prime interaction, $F(1, 202) = 15.72$, $p < .001$, $\eta_p^2 = .072$, and that this interaction was not qualified by outcome, $F(1, 202) = 0.12$, $p = .73$, $\eta_p^2 = .001$. Happy participants primed with global processing displayed more creativity ($M = 0.34$, $SD = 0.74$) than similarly primed sad participants ($M = -0.15$, $SD = 0.81$), $t(202) = 3.19$, $p = .002$, $d = .45$. Happy participants primed with local processing displayed less creativity ($M = -0.27$, $SD = 0.76$) than similarly primed sad participants ($M = 0.11$, $SD = 0.85$), $t(202) = 2.43$, $p = .016$, $d = .34$. The main effects of mood, $F(1, 202) = 0.26$, $p = .61$, $\eta_p^2 = .001$, and prime, $F(1, 202) = 2.52$, $p = .11$, $\eta_p^2 = .012$, were not significant, and all remaining within-subject effects were similarly nonsignificant, all Fs < 1.7, ps $> .20$.[3]

Experiment 3

In this experiment we examined flexibility in the influence of affective feelings on categorization breadth. Work by Isen and her colleagues, for example, found that happy moods, compared to neutral ones, lead individuals to form more inclusive categories in which nonprototypical exemplars (e.g., cane) are included in common categories (e.g., clothing; Isen & Daubman, 1984). One explanation for such results is that, because it produces a global processing orientation, positive affect leads individuals to perceive relatedness among diverse stimuli (Friedman & Förster, 2010; Isen, 2008; Nijstad et al., 2010). Like in Experiments 1 and 2 we expected that this standard effect of positive and negative affect on categorization breadth would be found when a global processing orientation was accessible, but would reverse when a local processing orientation was accessible.

Method

Participants. There were 150 undergraduate students (105 women, 41 men, and 4 unknown) at Loyola University Chicago who participated in this experiment for partial fulfillment of a course requirement. Four participants experienced computer failure, leaving a final sample of 146 participants (105 women, 41 men).

Procedure and materials. One to six participants took part in any given experimental session, but never interacted as they were run in individual cubicles. The entire experiment, including all instructions, manipulations, and measures, took place via computer. Participants first experienced the processing manipulation and then the mood induction. Both manipulations were identical to those used in Experiment 1. After this, participants performed the categorization task in which they were asked to rate the degree to which they believed items belonged or did not belong to a given general category. Participants then answered questions checking on the effectiveness of the mood manipulation and several demographic items.

Categorization task. In this task, modeled after past research (Isen & Daubman, 1984), participants were instructed that they

[2] Two raters, unaware of experimental condition, coded responses to the insight problems. Initial interrater reliability was high, $\kappa = .95$. Disagreements were resolved via discussion.

[3] Separately submitting the unstandardized remote associates task and insight problems to a 2 $\times$ 2 between participants ANOVA yielded significant mood by prime interactions for each outcome: remote associates task, $F(1, 202) = 11.74$, $p = .001$, $\eta_p^2 = .055$, and insight problems, $F(1, 202) = 8.78$, $p = .003$, $\eta_p^2 = .042$. The pattern of means for each outcome was nearly identical to that reported above. Complete results of these analyses can be obtained from the first author.

would be asked to rate items along a 10-point scale, indicating the degree to which they felt each item belonged (10) or did not belong (1) to a given general category. For each item, the category appeared at the top of the screen and the individual exemplar appeared at the bottom of the screen. The rating scale appeared below each exemplar. The task was broken into four blocks, representing the four categories used here (vehicle, weapon, furniture, and tool). The categories were presented in a fixed order. For each category participants viewed nine items representing three excellent exemplars, three moderately good exemplars, and three weak exemplars (taken from Rosch's, 1975, norms). The items appeared in a fixed order in descending level of relatedness to the general category.

Manipulation check. Participants were asked two questions to assess the efficacy of the mood induction: "How happy (sad) did you feel during the writing task (i.e., the Life Events Inventory)?" (1 = *not at all*) to (7 = *very*). These two items were correlated, $r = -.497$, $p < .0005$. Thus, after appropriate rescoring, they were averaged together to form a composite measure of mood, with higher values indicating a more positive mood.

Results and Discussion

Manipulation check. Submitting the mood manipulation check to a 2 (mood: positive, negative) × 2 (prime: global, local) ANOVA revealed that the mood manipulation was successful, $F(1, 142) = 197.49$, $p < .0005$, $\eta_p^2 = .58$. Participants reported experiencing more positive mood while recalling and writing about a happy event ($M = 5.43$, $SD = 1.31$) than a sad event ($M = 2.49$, $SD = 1.21$). No other significant effects emerged from this analysis, all Fs < 2.5, ps $> .1.4$.

Creativity. The outcome of interest was the breadth of categorization displayed by participants. We predicted that when a global processing orientation was accessible happy participants would rate weak exemplars as better category members than sad participants, but that this pattern would reverse when a local processing orientation was accessible. Based on past research (Friedman & Förster, 2010; Isen & Daubman, 1984) we did not expect any main or interactive effects of processing orientation or mood on participants' rating of the moderate and high exemplars. To test this prediction we separately averaged the ratings for the weak, moderate, and high exemplars across categories.

Participants' rating of the low exemplars was submitted to a 2 (mood: positive, negative) × 2 (prime: global, local) between Participants ANOVA. This analysis revealed the predicted mood by prime interaction, $F(1, 142) = 11.03$, $p = .001$, $\eta_p^2 = .07$. Happy participants primed with global processing rated weak exemplars as better category members ($M = 6.72$, $SD = 1.44$) than similarly primed sad participants ($M = 5.97$, $SD = 1.69$), $t(142) = 2.14$, $p = .034$, $d = .35$. Happy participants primed with local processing rated weak exemplars as poorer category members ($M = 5.64$, $SD = 1.43$) than similarly primed sad participants ($M = 6.52$, $SD = 1.35$), $t(142) = 2.56$, $p = .01$, $d = .42$. The main effects of mood, $F(1, 142) = 0.075$, $p = .79$, $\eta_p^2 = .001$, and prime, $F(1, 142) = 1.16$, $p = .28$, $\eta_p^2 = .008$, were not significant.

Submitting the rating of moderate exemplars to the same ANOVA revealed no significant effects, main effect of mood, $F(1, 142) = 0.15$, $p = .70$, $\eta_p^2 = .001$, and prime, $F(1, 142) = 0.39$, $p = .53$, $\eta_p^2 = .003$, and their interaction, $F(1, 142) = 0.01$, $p = .94$, $\eta_p^2 = .000$. Similarly, rating of strong exemplars revealed no significant effects, main effect of mood, $F(1, 142) = 0.67$, $p = .41$, $\eta_p^2 = .005$, and prime, $F(1, 142) = 1.31$, $p = .25$, $\eta_p^2 = .009$, and their interaction, $F(1, 142) = 1.21$, $p = .27$, $\eta_p^2 = .008$.

Experiment 4

The first three experiments demonstrated flexibility in the influence of affective feelings on several different aspects of creative performance. Experiment 4 examined flexibility in the link between affective feelings and performance on analytic tasks, in particular the tendency to commit the conjunction fallacy (Tversky & Kahneman, 1983). In a classic example of this fallacy, people read a personality sketch of a woman named Linda in which she was described as outspoken and very bright, and was deeply concerned with issues of discrimination and social justice as a student. They were then asked which of two alternatives was most likely: (a) That Linda is a bank teller, or (b) Linda is a bank teller and active in the feminist movement. Most participants chose option two because it seems more "representative" of Linda based on the description they read (i.e., Linda just "looks like" a feminist), even though the conjunction of two events is necessarily less likely than either one occurring in isolation. Research indicates that participants in negative moods are less likely to commit this cognitive mistake than those in positive moods (Gasper, 1999).

Consistent with the idea that positive and negative affect merely signal the value of accessible processing styles, we predicted that whether positive affect or negative affect led participants to commit the conjunction fallacy would depend on the relative accessibility of heuristic or systematic processing tendencies. When a heuristic processing style is accessible, happy participants should be more likely to say that Linda was both a banker teller and active in the feminist movement than sad participants. However, when a systematic processing style is more accessible happy participants should be less likely to commit this error than sad participants.

Method

Participants. There were 215 undergraduate students (147 women, 65 men, and 3 unspecified) at Loyola University Chicago who took part in the experiment for partial fulfillment of a course requirement.

Procedure and materials. One to three participants took part in any given experimental session, but never interacted as they were run in individual cubicles. The entire experiment, including all instructions, manipulations, and measures, took place via computer. Participants first were randomly assigned to one of two priming conditions. This task, described below, was designed to activate either heuristic or systematic processing. Participants then experienced the positive or negative mood induction from Experiment 2. After the mood induction, participants were presented with the classic Linda problem (Tversky & Kahneman, 1983).

Linda is 31 years old, single, outspoken and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in antinuclear demonstrations. Which of these alternatives is more probable?

___ Linda is a bank teller.

___ Linda is a bank teller and is active in the feminist movement.

After indicating their response, for exploratory purposes, participants completed the 18-item Need for Cognition scale (Cacioppo, Petty, Feinstein, & Jarvis, 1996). Need for cognition did not meaningfully qualify any of the effects reported below. Participants then answered questions checking on the effectiveness of the mood manipulation ($\alpha = .91$), and several demographic items.

Priming manipulation. In this task adapted from past research (Huntsinger, 2011; White, 2005), participants were asked to solve a series of word problems in which they were presented with a word with a letter missing, and it was their job to fill in the missing letter. Participants were told that the number of missing letters varied, but they had been assigned to the condition in which only a single letter was missing (e.g., m_ssing). Participants were asked to write out the complete word underneath each of 15 target words. The following 10 words served as the heuristic primes: intuitive, spontaneous, impulsive, instinctive, quick, reactive, natural, effortless, sensing, and unstructured; the following 10 words served as the systematic primes: analytical, investigative, reasoned, logical, rational, methodical, critical, systematic, careful, and prepared. To mask the true purpose of the priming task, 5 neutral words (colossal, steep, round, small, and straight) were included in both conditions.

Results

Manipulation check. Submitting the mood manipulation check to a 2 (mood: positive, negative) $\times$ 2 (prime: heuristic, systematic) ANOVA revealed that the mood manipulation was successful, $F(1, 211) = 120.52$, $p < .0005$, $\eta_p^2 = .36$. Participants reported experiencing more positive feelings while reading the happy story ($M = 5.84$, $SD = 0.94$) than the sad story ($M = 4.13$, $SD = 1.32$). No other significant effects emerged from this analysis, all Fs < 1.2, ps $> .25$.

Linda problem. Participants' responses to the Linda problem were coded as follows: 0 = correct, 1 = incorrect. When this variable was submitted to a binary logistic regression, that included mood (1 = happy, -1 = sad) and prime (1 = heuristic, -1 = systematic) and their interaction as predictors, a significant interaction between mood and prime was observed, $B = -0.65$ ($SE = .246$), *Wald* $\chi^2 = 7.05$, $p = .008$. Consistent with predictions, happy participants primed with heuristic processing were more likely to commit the conjunction fallacy ($M = 96\%$) than similarly primed sad participants ($M = 82\%$). This differences was significant, $\chi^2(1) = 5.2$, $p = .023$, $\phi = .22$. Also consistent with predictions, happy participants primed with systematic processing were less likely to commit the conjunction fallacy ($M = 79\%$) than similarly primed sad participants ($M = 91\%$); however, this difference failed to achieve statistical significance, $\chi^2(1) = 2.84$, $p = .092$, $\phi = .16$. This analysis revealed no significant main effects of prime or mood, $B = -0.275$ ($SE = .246$), *Wald* $\chi^2 = 1.25$, $p = .27$ and $B = -0.18$ ($SE = .246$), *Wald* $\chi^2 = 0.56$, $p = .46$, respectively.

Experiment 5

Although the tendency to think more systematically may insulate sad people from many judgmental biases, one exception can be found in research examining the influence of affective feelings on anchoring effects. Anchoring effects occur when judgments are influenced by a salient anchor or starting point, even when the value of the anchor is arbitrary or meaningless.

In a classic demonstration of this effect Tversky and Kahneman (1974) asked their participants two consecutive questions about the percentage of African countries in the United Nations. The first question asked participants to say whether the percentage of countries was higher or lower than an arbitrary number (e.g., 65% or 10%) that was chosen by spinning a wheel. Participants were then asked to estimate of this percentage. Final estimates were higher when the initial anchor was a higher value and lower when the anchor was a smaller value.

One explanation for anchoring effects is that when people entertain an initial starting value, they begin by testing the possibility that this value is correct (Mussweiler, 2003). This biased hypothesis testing calls to mind information consistent with the anchor (e.g., "Africa is huge," "There must be a lot of countries in Africa"), which in turn increases the impact of this initial value on final judgments. The more extensively individuals entertain the idea that an anchor is correct, the more information consistent with the anchor that comes to mind, ultimately biasing final judgments toward the anchor. The more elaborate and extensive processing of information triggered by negative affect should increase the accessibility of information consistent with the anchor. As a result sad individuals are more susceptible to judgmental anchoring (Bodenhausen, Gabriel, & Lineberger, 2000).

We predicted that whether positive affect or negative affect led to more or less pronounced anchoring effects would depend on the relative accessibility of heuristic or systematic processing tendencies. Specifically, when primed with heuristic processing, happy participants should be less susceptible to anchoring effects than sad participants. However, when primed with systematic processing, happy participants should be more susceptible to anchoring effects than sad participants.

Method

Participants. There were 135 undergraduate students (85 women, 47 men, and 3 unspecified) at Loyola University Chicago who took part in the experiment for partial fulfillment of a course requirement. Eight participants failed to complete one or more anchoring questions, leaving a final sample of 127 participants (81 women, 43 men, and 3 unspecified). Including these participants does not meaningfully change the results presented below.

Procedure and materials. One to three participants took part in any given experimental session, but never interacted as they were run in individual cubicles. The entire experiment, including all instructions, manipulations, and measures, took place via computer. Participants first were randomly assigned to one of two processing conditions. This task was identical to that used in Experiment 4. Participants then experienced the same positive or negative mood induction from Experiments 2 and 4. After the mood induction, participants were presented with the anchoring task. Finally, participants completed the same mood manipulation check ($\alpha = .93$) and demographic questions from Experiments 2 and 4.

Anchoring task. In this task from past research (Bodenhausen et al., 2000; Jacowitz & Kahneman, 1995), participants were asked to make judgments in a range of real-world knowledge domains (e.g., "the height of the Eiffel Tower"). For each target item, they were first asked to make a binary comparative judgment (e.g., "Is the Eiffel Tower taller or shorter than 1,200 feet?"). They were then asked to provide an absolute estimate of the target item (e.g., "How tall is the Eiffel Tower?"). Participants were told that the number provided for each comparative judgment was randomly chosen and should not be assumed to have any relation to the correct answer. In reality, the anchor values were set to be high or low based on values from past research (Jacowitz & Kahneman, 1995). Participants recorded their estimate for each of the 15 domains in a textbox located below each question. There were two versions of the task, each with high anchors for some questions and low anchors for others. Direction of the anchor for each question was counterbalanced across participants. The questions always appeared in the same order.

Results

Manipulation check. Submitting the mood manipulation check to a 2 (mood: positive, negative) × 2 (prime: heuristic, systematic) ANOVA revealed that the mood manipulation was successful, $F(1, 123) = 87.10$, $p < .0005$, $\eta_p^2 = .415$. Participants reported experiencing more positive feelings while reading the happy story ($M = 5.62$, $SD = 1.03$) than the sad story ($M = 3.72$, $SD = 1.23$). No other significant effects emerged from this analysis, all Fs < 0.3, ps $> .5$.

Anchoring. We predicted that when primed with heuristic processing, happy participants would show a less pronounced anchoring effect than sad participants, but when primed with systematic processing, happy participants would display a more pronounced anchoring effect than sad participants. To test this prediction, following past research (Bodenhausen et al., 2000) participants' absolute numerical estimates were standardized and then averaged into two composite scores, one for the high-anchor items and one for the low-anchor items. To simplify presentation of results, a difference score was computer by subtracting the low-anchor composite from the high-anchor composite. Higher values, thus, reflect a stronger anchoring effect.

The difference score was entered into a 2 (mood: happy, sad) × 2 (prime: heuristic, systematic) ANOVA. This analysis revealed the predicted mood by prime interaction, $F(1, 123) = 12.98$, $p < .0005$, $\eta_p^2 = .095$. No other effects achieved significance, all Fs < 0.2, ps $> .6$. Consistent with predictions when primed with heuristic processing, happy participants displayed a weaker anchoring effect ($M = .28$, $SD = .42$) than sad participants ($M = .55$, $SD = .35$), $t(123) = 2.28$, $p = .025$, $d = .41$. By contrast, when primed with systematic processing, happy participants displayed a stronger anchoring effect ($M = .59$, $SD = .42$) than sad participants ($M = .26$, $SD = .68$), $t(123) = 2.81$, $p = .006$, $d = .51$.[4]

General Discussion

Emotion has long been viewed as an unruly, disruptive and disorganizing force in the mind. A more rosy and nuanced view emerged in recent years. Rather than offering a blanket condemnation of emotion, particular emotions are thought instead to promote performance on particular kinds of cognitive tasks because they prompt particular styles of processing. Negative affect triggers a bottom-up, local, systematic and detailed processing style, and positive affect triggers a top-down, global, superficial and heuristic processing style. Thus, negative affect should improve performance on tasks that benefit from analytic thinking and positive affect should improve performance on tasks that benefit from creative thinking. Past research seemed to support this view (for reviews, see Forgas, 2013; Schwarz & Clore, 2007).

The results presented here suggest that such a view may not capture the complete psychological picture. The first three experiments found that the influence of affective feelings on creativity was flexibly responsive to the accessibility of global or local styles of processing. In both experiments, when a global processing orientation was accessible, happy participants generated more creative uses for a brick, successfully solved more remote associates and insight problems, and demonstrated broader categorization than those in sad moods. When a local processing orientation was accessible, the opposite pattern of cognitive performance was observed. Now, happy participants generated less creative uses for a brick, solved fewer remote associates and insight problems, and showed narrower categorization than sad participants. The next two experiments found that the influence of affective feelings on tendencies to commit judgmental mistakes depended on the relative accessibility of heuristic or systematic styles of processing. When a heuristic processing style was accessible, happy participants were more likely to commit the conjunction fallacy and show less pronounced anchoring effects than sad participants. This pattern was reversed when a systematic processing styles was accessible. Now, happy participants were less likely to commit the conjunction fallacy and show a more pronounced anchoring effect than those in sad moods.

Across studies the general pattern of results was consistent with predictions, however some simple effects achieved statistical significance while others did not. Therefore we conducted a meta-analysis of these simple effect tests across studies. In particular, we focused on the effect of positive and negative affect within each processing condition (e.g., happy vs. sad mood within the global processing condition). Results of this analysis indicated that dif-

[4] An alternative analytic strategy to that pursued above would be to submit the high and low anchor composites to a 2 (mood: happy, sad) × 2 (prime: heuristic, systematic) × 2 (anchor: high, low) ANOVA with the last factor varying within participants. This analysis revealed a robust anchoring effect, $F(1, 123) = 96.20$, $p < .0005$, $\eta_p^2 = .44$. High anchors resulted in higher estimates ($M = 0.22$, $SD = 0.36$) than low anchors ($M = -0.22$, $SD = 0.38$). More critically, the predicted mood by prime by anchor interaction was significant, $F(1, 123) = 7.09$, $p < .001$, $\eta_p^2 = .055$. No other within or between participants effects achieved significance, all Fs < 0.5, ps $> .4$. When primed with heuristic processing, happy participants displayed a weaker anchoring effect ($M_{HIGH} = 0.09$, $SD_{HIGH} = 0.26$ vs. $M_{LOW} = -0.18$, $SD_{LOW} = 0.34$), $t(123) = 3.11$, $p = .002$, $d = .56$, than sad participants ($M_{HIGH} = 0.28$, $SD_{HIGH} = 0.37$ vs. $M_{LOW} = -0.27$, $SD_{LOW} = 0.14$), $t(123) = 6.48$, $p < .001$, $d = 1.17$. The simple mood by anchor interaction in the heuristic processing condition was significant, $F(1, 61) = 8.07$, $p = .006$, $\eta_p^2 = .12$. By contrast, when primed with systematic processing, happy participants displayed a stronger anchoring effect ($M_{HIGH} = 0.27$, $SD_{HIGH} = 0.43$ vs. $M_{LOW} = -0.26$, $SD_{LOW} = 0.13$), $t(123) = 6.29$, $p < .001$, $d = 1.14$, than sad participants ($M_{HIGH} = 0.21$, $SD_{HIGH} = 0.33$ vs. $M_{LOW} = -0.13$, $SD_{LOW} = 0.68$), $t(123) = 3.84$, $p < .001$, $d = .69$. However, the simple mood by anchor interaction in the systematic processing condition was not significant, $F(1, 62) = 1.71$, $p = .196$, $\eta_p^2 = .027$. In summary, this analytic strategy yields results similar to those reported above.

ferences between positive and negative affect within each processing condition were quite robust when meta-analytically averaged across studies: global/heuristic processing conditions, $g_{weighted}$ = .43 (95% confidence interval [CI] = [.23, .63]), $Z = 4.17$, $p <$ .0001 and local/heuristic processing conditions, $g_{weighted}$ = .38 (95% CI = [.18, .58]), $Z = 3.74$, $p < .005$.[5]

In summary, our results suggest that affective feelings may not be tied to particular styles of thinking and therefore they do not produce a particular pattern of performance. Rather, their influence is flexibly responsive to changing cognitive contexts, including the relative accessibility of different styles of thinking. These results more generally reinforce the view that affective feelings may have their influence on the course of cognitive activity by providing feedback about the value of accessible styles of processing. Thus, positive and negative affect are like reward and punishment in that they are not tied to any particular cognitive outcome.

Limitations

Across studies we activated one processing style or another. We did not include a baseline condition in which no processing style was activated. Such a condition, in theory, would provide evidence about default processing styles. Although we acknowledge that including such a condition would have been valuable, we suggest that this condition has effectively been run already in past research in which processing styles have not been manipulated (i.e., all past work on creativity and that on heuristics and biases). The results in the global priming and the heuristic priming conditions in our work nicely mimic the results of this past research in which no processing style was activated (e.g., Bodenhausen et al., 2000; Isen & Daubman, 1984; Isen et al., 1987; Gasper, 1999). This provides evidence that both are the default when approaching the tasks used in this research.

Furthermore, it is well documented that a global orientation and heuristic processing are usually the default processing orientations for most people and in most circumstances (for a discussion, see Huntsinger et al., 2014; for evidence regarding default processing styles, see Allport, 1954; Bruner, 1957; Chaiken & Ledgerwood, 2012; Fiske & Taylor, 2008; Kahneman, 2011; McGuire, 1969; Navon, 1977; Neisser, 1976).

Implications and Future Directions

Does the current work overturn past findings? Although an affirmative response to this question may at first appear proper, we believe it would be unwise to draw such a conclusion. Our research suggests that understanding how affect influences creative and analytic thought requires knowing the default or most accessible style of thinking in a particular situation. Because a global or heuristic style of thinking is often the default, as discussed earlier, the customary influence of affective feelings on creative and analytic performance should be observed in most experimental contexts. The current research, then, does not undermine past work so much as it clarifies our understanding of the affective regulation of thought.

Our results have implications for interventions aimed at improving creativity and innovation in academic and organizational settings. Although past research seemed to suggest that one only needs to create a happy workforce to boost creativity and innovation, the current research shows that this may not be enough. Indeed, our research indicates that a happy mood will only boost creativity when accompanied by a tendency to think in a broadened or global fashion. Thus, one needs to target not only affective experience but also the mental context in which affect is experienced to facilitate creativity and innovation in academic and organizational settings.

Future work may explore whether specific emotions show a similarly flexible influence on creative and analytic thought. In a new line of research we find that anger, an emotion that confers positive value on one's thoughts and inclinations (Huntsinger, 2013b; Huntsinger et al., 2014), shows a pattern of flexibility similar to that of happy mood. In this research (Huntsinger & Ray, 2016), for example, when primed with a global focus, angry participants successfully solved more remote associates and insight problems than sad participants. This pattern was reversed, however, when a local focus was primed. Now angry participants solved fewer remote associates and insight problems than sad participants. Thus, although it is a negative emotion, anger has effects similar to those of happy mood because the information it carries about one's thoughts and processing inclinations is decidedly positive.

Comparison to Past Research and Other Theories

Past research on creativity demonstrated that the link between affect and task effort (e.g., how many uses for a brick were generated) was responsive to contextual influences, but that the link between affect and objective creativity of responses was resistant to such influences (Hirt et al., 1996, 1997). Indeed, on qualitative outcomes the usual relation between affect and creativity was regularly observed, with happy moods leading to greater creativity than sad moods. The results presented here demonstrated the opposite pattern of contextual influence. This discrepancy, we suggest, can be resolved by considering the manipulations used in this research. The manipulations of task focus used in past research targeted processing effort, which influences the number of responses generated, and they did not target processing style, which influences the objective creativity of responses generated. In summary, the link between affective feelings and both quantitative and qualitative aspects of performance on creativity tasks would appear quite flexible, albeit under different contexts.

Our approach has in common with the hedonic contingency model (Wegener & Petty, 1994, 2001) the idea that there is not a fixed link between affective valence and processing style. According to this model whether happy or sad moods lead to heuristic or systematic processing depends on the perceived hedonic consequences of engaging in one processing style or another. Happy people are motivated to maintain their positive mood, and because most activities will serve to depress their mood they will generally process information in a superficial fashion. Happy people will only engage in systematic, detailed processing if they believe that such processing will sustain their mood. Sad people are motivated to elevate their negative mood, and because virtually any activity will be hedonically rewarding they will generally process information in a systematic fashion. This model has recently been

[5] The meta-analysis was conducted following DeCoster (2009).

successfully applied to explain why happy moods generally lead to greater creativity than sad moods (Hirt, Devers, & McCrea, 2008).

We acknowledge that people may consider the hedonic consequences of their actions, and that such considerations may play an important role in determining the influence of affective feelings on cognitive performance. However, it is difficult to see how such concerns played a role in our work. The manipulations of processing style used in our studies are unlikely to have influenced participants' perceptions of the hedonic significance of the focal tasks. That being said, future research is necessary to determine those conditions in which hedonic concerns motivate flexibility in the link between affect and cognitive processing, and those conditions in which the processes outlined by our approach operate.

Like the perspective offered here, the mood-as-input model (Martin, 2001) assumes that the influence of affective feelings is context dependent. Research testing that model centered on the link between affective feelings and processing effort and motivation, focusing on the use of affect as a basis for deciding whether to terminate or continue engaging in goal-directed activities (see Wyer, Clore, & Isbell, 1999). This model provided early evidence for contextual moderation of the link between affect and quantitative aspects of creative performance. Our focus was on contextual shifts in styles of cognitive processing, a topic about which the mood-as-input model is theoretically silent. Our results also provide novel evidence for contextual moderation of the link between affect and qualitative aspects of performance, a result not demonstrated in studies examining mood-as-input processes.

As discussed elsewhere (Huntsinger et al., 2014) a more critical difference, perhaps, is how the two approaches treat the information about value conveyed by affect. According to the mood-as-input model, context determines whether positive or negative feelings convey positive or negative information (Martin, 2001). Evidence taken to support this idea comes from research in which positive and negative moods were induced before participants rating the success of stories designed to elicit happy or sad emotions (Martin, Abend, Sedikides, & Green, 1997). When participants' current feelings and a story's intended emotion matched (i.e., positive mood—happy story or negative mood—sad story), they judged the story positively, but when feelings and the story's emotion mismatched, they judged it negatively. Martin (2001) interpreted such mood incongruent judgments as revealing that context changes the information conveyed by mood. From our perspective, context changed the judgmental criterion, not the information about positive and negative value conveyed by affect (see also Schwarz, 2001). If we feel sad while reading a sad story, this indicates that the story produced the intended emotion, and so we rate it positively. This does not imply that sad mood conveyed positive information. Thus, we would suggest that context changes the object of affect (i.e., the question to which it provides an answer), rather than the information about value carried by affect (Clore & Huntsinger, 2009). That said, we see the two approaches as largely compatible, but not redundant.

Coda

To know whether positive or negative affect will help or harm performance, it is not enough to know whether the task benefits from analytic or creative thinking. One must also know the particular cognitive operation that is in mind at the moment for which affect will serve as a green light or red light. Because a top-down, global, superficial and heuristic processing style is often the default, the customary influence of affective feelings on cognitive performance should be observed in most experimental settings. These results, then, do not overturn past findings so much as they sharpen our understanding of the complex connection between emotion and cognition.

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