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BRIEF REPORT

Does Positive Affect Broaden and Negative Affect Narrow Attentional Scope? A New Answer to an Old Question

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The current research challenges the common view that positive affect and negative affect generate a broadened or narrowed attentional focus, respectively. Contrary to this view, two studies found that the link between affect and attentional focus as measured by a traditional flanker task (Study 1) and a modified flanker task (Study 2) reflects whatever focus is momentarily dominant. Further, in these studies when neither focus was dominant, the link between affect and attentional focus vanished. These results demonstrate that, like reward, positive affect and negative affect are not dedicated to a particular broadened or narrowed attentional scope but rather provide embodied information about the value of currently accessible attentional orientations.

Keywords: affect, mood, global–local perception, attention, affect-as-information

"As our 'chutes opened . . . [something] hit my helmet. . . . Stunned, I made a bad landing and hit my head on the ground. My 'spatio-temporal field' shrank and slowly expanded" (Easterbrook, 1982, p. 20). This experience eventually led the psychologist Easterbrook (1959) to the general idea that stress controls the scope of attention. Nearly five decades later, the idea that negative emotion narrows attention and that positive emotion broadens attention has acquired considerable empirical support. The idea that positive and negative affect tune attentional scope now takes center stage in many affect-cognition theories (Derryberry & Tucker, 1994; Fredrickson, 2004; Friedman & Förster, 2010; Isen, 2008). These theories generally maintain that positive affect and negative affect directly generate a broader or narrower scope of attention, respectively.

Evidence for the influence of affect on attentional focus is illustrated in research showing that habitually anxious and depressed individuals attend to details (Basso, Schefft, Ris, & Dember, 1996), whereas manic individuals, who experience abnormally elated moods, focus more broadly (Andreasen & Powers, 1975). Manipulated and more fleeting affective cues, such as those from happy and sad moods, also appear capable of calling to mind a broader or narrower attentional scope. When judging the similarity between a series of geometric figures, people in happy moods tend to base their similarity judgments on the global features of the stimuli more than people in sad moods (Fredrickson & Branigan, 2003; Gasper & Clore, 2002). This affective modulation of attentional focus emerges even among young children (Schnall, Jaswal, & Rowe, 2008).

The impact of affect on many outcomes beyond those just discussed can also be explained by assuming that affect tunes the perceptual and conceptual systems to focus either broadly or narrowly. People in positive moods, compared with those in negative moods, rely on global, category-based information as the basis for their judgments (Isbell, Burns, & Haar, 2005). The global perspective elicited by happy mood increases people's reports that they find greater meaning in life (King, Hicks, Krull, & Del Gaiso, 2006). By increasing global focus, positive affect also eliminates own-race bias, as measured by accuracy in distinguishing members of one's own race from members of other races (Johnson & Fredrickson, 2005). By increasing local focus, negative affect disrupts holistic processing of faces (Curby, Johnson, & Tyson, 2011). The widened conceptual scope triggered by positive affect is also thought to explain why happy people display greater cognitive flexibility and creativity (Fredrickson, 2004; Isen, 2008; Rowe, Hirsh, & Anderson, 2007).

Recent studies using the Eriksen flanker task (Eriksen & Eriksen, 1974) suggest that positive and negative affect have these effects by fundamentally altering the scope of attention (Moriya & Nittono, 2011; Rowe et al., 2007). In this task, participants respond to the identity of a central letter while ignoring irrelevant flanking letters. On some trials the flanking letters are compatible (HHHHH), and on other trials the flanking letters are incompatible (HHSHH) with the central letter. The broadened attentional focus generated by positive affect should enhance perceptual encoding of irrelevant flanking distractors, impairing performance, whereas the narrowed attentional focus generated by negative affect should diminish such encoding, improving performance. Consistent with this logic, happy participants display greater flanker compatibility effects (i.e., slower reaction times on incompatible than on compatible trials) than sad participants.

Despite extensive evidence suggesting otherwise, there is reason to suspect the link between affect and attentional scope is actually

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flexible rather than fixed, and even that such a dedicated link may not exist. Support for this contrarian view comes from the affect-as-information model. The model proposes that affective cues from moods and emotions provide experiential information about the value of whatever thoughts and responses happen to be accessible at the moment (Clore & Huntsinger, 2007, 2009). From this perspective, positive affect serves as a "go signal" that promotes and negative affect serves as a "stop signal" that inhibits the use of such thoughts and responses.

Applied to the link between affect and attentional scope, the affect-as-information model suggests that this link should be flexibly responsive to changes in the momentary dominance of a global or local focus. Specifically, making a local focus dominant should reverse the influence of affect on standard measures of perceptual focus used in past research. Indeed, such flexibility was observed in recent research (Huntsinger, Clore, & Bar-Anan, 2010).

The present research moves beyond past research in several important ways. First, the present research provides evidence against an alternative interpretation of evidence for flexibility in the influence of affect on attentional scope. Past research (Huntsinger et al., 2010) revealed flexibility using global/local perceptual tasks (e.g., Navon letters and Kimchi figures). Flexibility on such tasks may reflect the operation of higher order cognitive processing (i.e., biases at the response selection stage), rather than changes in lower level perceptual processing (i.e., a fundamental change in attentional scope; Kimchi, 1992; Rowe et al., 2007). Therefore, it was imperative to demonstrate flexibility on an outcome employed in past research to establish genuine change in attentional scope as a result of affect: the Eriksen flanker task (Rowe et al., 2007).

Second, the present research provides a strong test of the possibility that, rather than directly tuning attentional scope, positive and negative affect have the attentional effects that they do merely by conferring positive or negative value on the dominant perceptual orientation in a given situation. Accordingly, a priming condition was included in which neither a global nor a local focus was dominant. If there is a direct link between affective valence and attentional scope, then one should observe differences in attentional scope in this condition, because positive and negative affect should tilt the momentarily balanced attentional scales toward either a broad or a narrow focus. If affect operates on whichever focus is dominant, then no association between mood and attentional scope should be evident in this condition.

Study 1

Participants first completed a perceptual priming manipulation in which a global focus or a local focus was primed or both perceptual orientations were primed equally. Next, participants read one of two stories designed to induce happy or sad moods. Finally, participants completed the Eriksen flanker task. I predicted that, conceptually replicating past research (Rowe et al., 2007), when a global focus was dominant, participants in happy moods would exhibit a greater flanker compatibility effect (FCE) than those in sad moods. When a local focus was dominant, I predicted that participants in happy moods would now exhibit a lesser FCE than those in sad moods. When no focus was dominant, and thus affect had nothing for which to serve as a go or stop signal, I predicted that no link between affect and attentional scope would be observed.

Method

Participants. Three hundred fifteen participants (190 men) completed the experiment for course credit.

Materials and procedure. The experiment involved several stages. First, participants completed a task that primed global–local focus. Second, to induce happy or sad mood, participants read one of two stories. Third, participants completed the flanker task and then several manipulation checks.

Global–local priming. Following past research (Förster, Liberman, Kuschel, 2008) a variant of the Navon letter task was use to prime perceptual focus. 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 *L*s), and four included local targets (e.g., an *L* made of *H*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, whereas in the local-priming condition all 80 trials had local-letter targets. In the balanced priming condition participants responded to 40 global-letter targets and 40 local-letter targets.

Mood manipulation. Ostensibly as part of a "media-classification task," participants read one of two stories shown in past research to induce strong positive and negative moods (Huntsinger, 2011).

Flanker task. In this task (Rowe et al., 2007), participants were asked to attend to a centrally presented target letter (an *H* or an *S*) flanked on either side by response-compatible or response-incompatible letters. Participants were instructed to identify the central letter as quickly as possible by pressing either the *H* or the *S* key. Spacing between the central and flanker letters was varied to be near and far (0 and 1 letter width) for each of the compatible and incompatible target and flanker combinations (e.g., compatible: HHHHH; incompatible: SSHSS). Letters appeared in uppercase in Times New Roman 20-point font. After reading the task instructions, participants completed seven practice trials, after which they completed three test blocks of 56 randomly presented trials each (interstimulus interval = 200 ms). Incorrect responses were met with a red ERROR message displayed on the screen.

Manipulation check. Participants indicated how happy (sad, positive, negative; 1 = *not at all* to 7 = *very*) they felt after reading the story to check the efficacy of the mood manipulation ($\alpha = .93$).[1]

Results

Manipulation check. Submitting the mood manipulation check to a 3 (prime) × 2 (mood) between-participants analysis of variance (ANOVA) revealed a significant main effect of mood, $F(1, 309) = 383.28$, $p < .0005$. Participants reported being happier

[1] To assess possible arousal differences across the mood inductions, participants were asked how alert they felt after reading the stories (Study 1) and after listening to the musical selections (Study 2). Arousal was unaffected by the mood manipulations, Fs < 1.5, ps $> .20$.

after reading the happy ($M = 5.80$) than the sad story ($M = 3.22$). No other effects were significant, Fs < 1.

Main analysis. Reaction time data from error trials (<5% of trials) and from trials whose reaction time exceeded 1,000 ms were discarded (<1% of trials). There were no significant main or interactive effects of mood and prime on overall reaction time or error rate on the flanker task, Fs < 1. To simplify analyses, a FCE score was created (compatible reaction time − incompatible reaction time). Because flanker distance did not qualify the results reported below, this factor was omitted from analyses.[2]

Submitting the FCE score to the same ANOVA used above revealed the predicted interaction, $F(2, 309) = 5.96$, $p < .005$, $\eta_p^2 = .037$ (see Figure 1). As predicted, when a global focus was primed, mirroring past research, participants in positive moods displayed a greater FCE than those in negative moods, $t(309) = 5.21$, $p < .05$, $d = 0.59$. When a local focus was primed, participants in positive moods displayed a lesser FCE than those in negative moods, $t(309) = 6.73$, $p < .05$, $d = 0.76$. Finally, when neither focus was dominant, mood no longer predicted the FCE, $t(309) = .29$, $p > .59$, $d = 0.03$. Neither main effect was significant, Fs $< .6$.

These results support the idea that flexibility in the influence of affect on attentional scope reflects genuine changes in lower level perceptual processing (i.e., a basic alteration in attentional scope), rather than the operation of higher order cognitive processing (i.e., biases at the response selection stage). Results also challenge the idea that positive affect and negative affect directly tune attentional scope.

Study 2

The purpose of Study 2 was to replicate the results of Study 1, in particular the null effect in the equal priming condition. The task used in this study is conceptually similar to a traditional flanker task in that participants are asked to attend to a central stimulus while ignoring irrelevant flanking stimuli. Specifically, participants saw a central cartoon character who was smiling and four smaller characters in the background who were either smiling (compatible condition) or frowning (incompatible condition). Participants were asked to indicate what emotion the central person was feeling. Past research using this task revealed an effect of context in which the central character is perceived as more happy when surrounded by smiling than frowning others (Masuda et al., 2008). As such, this task provides a measure of visual attentional scope in that it captures the extent to which spatially adjacent irrelevant information (i.e., the emotional expressions of the surrounding figures) leaks into performance (i.e., judgment of the central character's emotion).

When a global focus was dominant, I predicted that happy participants in the incompatible emotion condition would rate the central character as less happy than happy participants in the compatible emotion condition, whereas the ratings of sad participants would not differ across conditions. When a local focus was dominant, this pattern was predicted to reverse. When neither focus was dominant, no link between mood and attentional scope was predicted to emerge.

Method

Participants. One hundred eighty-nine participants (81 men) completed the experiment for course credit.

Materials and procedure. Participants first completed the identical global-local priming task from Study 1 and then, to induce a happy or sad mood, participants listened to one of two musical selections for 10 min. Next they completed the emotion-perception task and then manipulation check questions ($\alpha = .81$) similar to those from Study 1.

Mood manipulation. Mood was manipulated via musical selections shown in previous research to induce positive (Mozart's Eine kleine Nachtmusik) and negative moods (Mahler's Adagietto; Huntsinger, 2011).

Emotion-perception task. Identical to past research (Masuda et al., 2008), participants were randomly assigned to view one of two full-color cartoons ostensibly as pretesting for another experiment. The cartoons depicted a focal character (target) surrounded by four background characters (flankers). In the compatible emotion-context condition, the focal character and background characters were all happy. In the incompatible emotion-context condition, the focal character was happy and the background characters were all sad.

Emotion rating. Following past research (Masuda et al., 2008), participants were asked, "How happy is the central figure?" (1 = *not at all* to 8 = *very*).

Results

Manipulation check. Submitting the mood manipulation check to a 3 (prime) × 2 (mood) × 2 (emotion context) between-participants ANOVA revealed a significant main effect of mood, $F(1, 177) = 16.79$, $p < .0005$. Participants reported experiencing a more positive mood while listening to the happy ($M = 5.66$) than to the sad musical selection ($M = 4.98$). No other effects were significant, Fs < 1.1.

Main analysis. Submitting participants' emotion ratings to the same ANOVA used above revealed the predicted three-way interaction, $F(2, 177) = 7.62$, $p < .005$, $\eta_p^2 = .08$ (see Figure 2). As predicted, when a global focus was primed, happy participants in the incompatible emotion condition rated the central character as less happy than those in the compatible condition, $t(177) = 3.71$, $p < .0005$, $d = 0.56$, whereas sad participants rated the character as equally happy across conditions, $t(177) = .96$, $p = .34$, $d = 0.14$. When a local focus was primed, now happy participants rated the character equally happy across conditions, and sad participants in the incompatible emotion condition rated the character as less happy than those in the compatible condition, $t(177) = .76$, $p = .45$, $d = 0.12$, and $t(177) = 2.05$, $p < .05$, $d = 0.31$, respectively. Finally, when no perceptual focus was dominant, happy and sad participants rated the central character as similarly happy regardless of emotion condition, $t(177) = .37$, $p = .71$, $d = 0.06$, and $t(177) = 1.31$, $p = .19$, $d = 0.19$, respectively.

[2] Submitting reaction time data to a 3 (perceptual prime) × 2 (mood) × 2 (distance) repeated-measures ANOVA revealed the Predicted Mood × Prime Interaction, $F(2, 309) = 5.64$, $p < .005$, and a main effect of flanker distance, $F(1, 309) = 61.34$, $p < .005$. No other effects reached significance, Fs < 1.

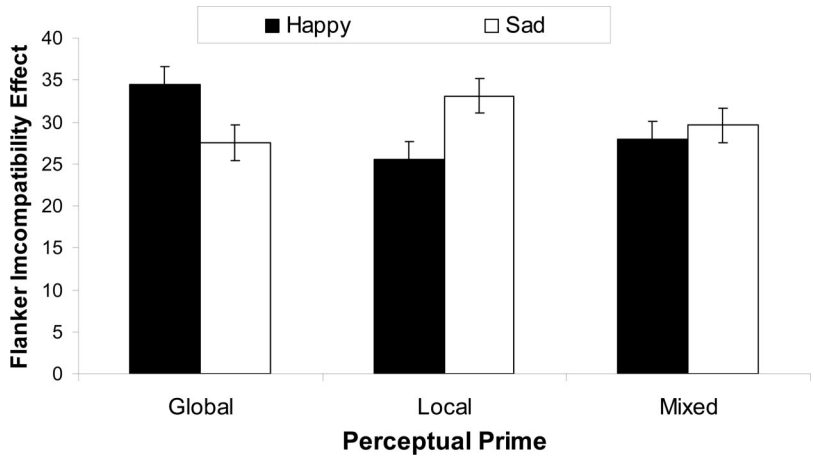

Figure 1. Flanker compatibility effect as a function of mood when a global focus is primed, a local focus is primed, and both are equally primed. Error bars indicate ±1 standard error of the mean.

General Discussion

The present studies reveal that the relationship between affect and attentional focus is more flexible than originally assumed. Past research appeared to show that the experience of positive affect made people quick to focus on the forest, whereas negative affect made people quick to focus on the trees. Across both experiments, when a global focus was made dominant, people in happy moods displayed a broadened focus, whereas those in negative moods displayed a narrowed focus. However, when a local focus was made dominant, this pattern reversed—people in happy moods now displayed a narrowed focus, whereas those in negative moods displayed a broadened focus. Moreover, providing evidence against the reality of a dedicated connection between affect and attentional scope, results of both experiments showed that when no perceptual focus was dominant, affect failed to tune attentional scope.

If the connection between affect and attentional scope is highly flexible, as argued here, why then did a link between positive and negative affect and attentional broadening or narrowing emerge with such regularity in past research? The answer to this question is simple. Although people exhibit an astounding ability to mentally zoom in and out, focusing on the forest or the trees, in the default case, a global focus takes precedence (Bruner, 1957; Kimchi, 1992; Kimchi & Palmer, 1982; Köhler, 1929; Navon, 1977, 1981; Navon & Norman, 1983; Pomerantz, Sager, & Stoever, 1977; Reicher, 1969). Similarly, a diffuse attentional spotlight appears to be the default (Eriksen & St. James, 1986; White, Ratcliff, & Starns, 2011). This general tendency to adopt a global focus is only reinforced in most experimental contexts (Clore & Huntsinger, 2007). Therefore, in past research (e.g., Rowe et al., 2007), positive and negative affect simply conferred positive and negative value on the usually dominant way of viewing the world, leading to the appearance of a fixed effect of affect on attentional scope.

People in sad moods in this research actively adopted the opposite attentional focus from that which was primed (see also Huntsinger et al., 2010). One way to understand this result is that the negative value placed on accessible mental content by negative affect leads to its exclusion from subsequent processing. A greater relative accessibility of a global orientation necessarily involves a reduced relative accessibility of a local orientation (Förster, 2012). Hence, to the extent that negative affect confers negative value on

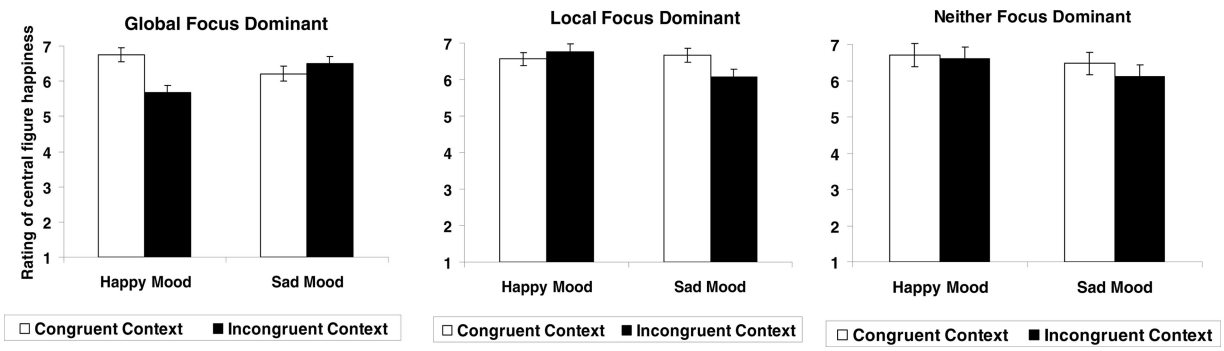

Figure 2. Emotion ratings as a function of mood (happy vs. sad) and emotion context (congruent vs. incongruent) when a global focus is primed (left panel), a local focus is primed (middle panel), and both a global focus and a local focus are primed (right panel). Error bars indicate ±1 standard error of the mean.

the most accessible orientation, it should be supplanted by responding on the basis of the other option. Thus, consistent with the observed findings, a broadened attentional focus should result from having either an accessible global orientation validated by positive affect or a local orientation invalidated by negative affect. Equally, a narrowed attentional focus should result from having either a primed local focus empowered by positive affect or a primed global focus inhibited by negative affect.

A limitation of this research is the lack of a neutral mood control. In principle, this condition would allow one to determine whether the global/local priming manipulation affects FCE in the absence of induced happy and sad moods. It is possible that this manipulation influences attentional scope only in combination with induced moods, although that would be a curious state of affairs not predicted by any alternative account. More critically, this condition would establish whether the effects are occurring for only happy mood or sad mood (or both). That is, for example, compared with neutral mood, happy mood may enhance the current perceptual orientation, whereas negative mood does not have an influence (or vice versa). Past research examining affective influences on attentional scope does not resolve this question. Some research found that negative moods led to greater narrowing than positive and neutral moods, which did not differ (Gasper & Clore, 2002), whereas other research found that the positive moods led to greater broadening than negative and neutral moods, which did not differ (Rowe et al., 2007; Schmitz, De Rosa & Anderson, 2009).

This apparent discrepancy may be due to the nature of the neutral mood condition. In some research participants in this condition completed the study in whatever resting mood they arrived in at the lab (Gasper & Clore, 2002). Such resting moods are usually quite positive (Diener & Diener, 1996), which explains why such conditions often resemble the positive mood group. Other research induced neutral moods (Rowe et al., 2007; Schmitz et al., 2009). These inductions seek to change people's usually positive baseline moods to a less positive neutral state. Research shows that people respond to change in affective values rather than to absolute affective values (Mellers, Schwartz, & Ritov, 1999). The change from a positive baseline mood to a less positive neutral mood, then, is experienced not as a neutral mood, but rather a negative mood. Indeed, if one answers a friend's greeting of "How are you?" by saying "Neutral," a likely response would be, "I'm sorry to hear that, what's wrong?" In other words, such neutral mood inductions often create functionally negative moods, which explains why they resemble negative mood conditions (for a similar argument, see Storbeck & Clore, 2008, 2011). Future research might include both types of neutral mood controls, arguing, perhaps, that a difference between the negative induced mood condition and the resting mood control suggests an active role for negative affect and a difference between the positive induced mood condition and the induced neutral mood control suggests an active role for positive affect.

Coda

Taken together these experiments cast doubt on the commonly held view that positive and negative affect are dedicated to corresponding global and local orientations. Rather, the influence of affect on attentional focus reliably responds to changes in the dominance of a global or local orientation. These results more generally support the view that positive affect and negative affect regulate cognition by providing experiential feedback about the value of currently accessible thoughts and thought processes. The influence of affect on cognition, then, is akin to reward in that it is not dedicated to any one outcome.

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