The Blues Broaden, but the Nasty Narrows : Attentional Consequences of Negative Affects Low and High in Motivational Intensity

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The Blues Broaden, but the Nasty Narrows: Attentional Consequences of Negative Affects Low and High in Motivational Intensity

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Abstract

Positive and negative affects high in motivational intensity cause a narrowing of attentional focus. In contrast, positive affects low in motivational intensity cause a broadening of attentional focus. The attentional consequences of negative affects low in motivational intensity have not been experimentally investigated. Experiment 1 compared the attentional consequences of negative affect low in motivational intensity (sadness) relative to a neutral affective state. Results indicated that low-motivation negative affect caused attentional broadening. Experiment 2 found that disgust, a high-motivation negative affect not previously investigated in attentional studies, narrowed attentional focus. These experiments support the conceptual model linking high-motivation affective states to narrowed attention and low-motivation affective states to broadened attention.

Keywords

motivation, attentional precedence, emotion, sadness, disgust

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A loaded gun is pointed in your face. A coiled and hissing rattlesnake startles you. If you have experienced these situations, you probably recall how your attention became intensely focused on the source of the negative emotion you felt. More than that, such negative affective experiences narrow one's attentional focus generally and affect one's processing of other stimuli, as more than 50 years of research have revealed (Chajut & Algom, 2003; Easterbrook, 1959; Wells & Matthews, 1994). But is that the whole story? Do all negative affective states cause a narrowing of attention?

Along similar lines, more than 20 years of research suggested that all positive affective states cause the opposite effect on attention—that positive affect broadens attention (Fredrickson & Branigan, 2005; Hicks & King, 2007). However, recent research suggests that the intensity of approach motivation should be considered, as this intensity plays a role in whether positive affect causes broadening or narrowing of attention (Harmon-Jones & Gable, 2008). Whereas positive affects low in approach motivational intensity broaden attentional scope (Fredrickson & Branigan, 2005; Gable & Harmon-Jones, 2008), positive affects high in approach motivational intensity narrow attentional scope (Gable & Harmon-Jones, 2008; Harmon-Jones & Gable, 2009). Does the motivational intensity of negative affective states also play a role in how negative affect influences attentional scope?

Motivational Intensity Levels Within Negative Affects

Negative affects vary in motivational intensity. For example, disgust and fear are higher in motivational intensity than sadness. Motivational intensity, or the impetus to act, is related directly to arousal, but unlike arousal, motivation always has action implications (even if they are vague). In Bradley and Lang's (2007) biphasic view of emotion, "judgments of arousal index (again, roughly) the degree of activation in each motivation system" (p. 585). The more motivationally intense a negative affective state, the greater the activation of the sympathetic nervous system (for a review, Bradley & Lang, 2007).

Research Examining Attentional Consequences of Negative Affects

Negative affects high in motivational intensity are associated with a narrowing of attention, and these states have been the primary negative states examined in research on emotion and

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attentional scope. Early work on emotion and attention found that negative affect with high withdrawal motivation narrowed attentional focus (Easterbrook, 1959). Easterbrook posited that drive caused a narrowing of attention. By drive, Easterbrook meant "a dimension of emotional arousal or general covert excitement, the innate response to a state of biological deprivation or noxious stimulation . . . in subjects under stress or threat" (p. 184). Other studies have found that attentional narrowing is associated with negative affect high in motivational intensity that is evoked by social stress (Sanders, Baron, & Moore, 1978), electric shock (Wachtel, 1968), scary novel situations (Weltman & Egstrom, 1966), faces expressing negative emotion (Fenske & Eastwood, 2003), difficult ego-threatening tasks, and noise stimuli (Chajut & Algom, 2003).

Research investigating the effect of low-motivation negative affects on attentional scope is less abundant, less direct, and primarily correlational. For example, individuals with depression tend to be more creative than average (Andreasen, 1987; Ludwig, 1994) and show broadening of memory (von Hecker & Meiser, 2005). These results suggest that negative affects low in motivational intensity may broaden attention much as positive affects low in motivational intensity do. However, no direct tests of this hypothesis have been performed.

Negative affects low in motivational intensity (e.g., sadness) may promote broadened attention because they assist with disengagement from terminally blocked goals and cause the organism to become open to new and previously irrelevant possibilities (Klinger, 1975). In such negative-affect situations, "a more open, unfocused, unselective, low-effort mode of attention would prove not deficient but, on the contrary, beneficial" (von Hecker & Meiser, 2005, p. 456).

The Present Experiments

On the basis of this reasoning, we predicted that negative affects low in motivational intensity would increase attentional breadth, whereas negative affects high in motivational intensity would decrease attentional breadth. Experiment 1 focused on sadness because no past research has experimentally tested its hypothesized attentional broadening effect. Experiment 2 focused on disgust, using the same design as Experiment 1, so that we could be sure that the attentional effects observed in the first experiment were caused by motivational intensity and were not due to our particular methods of manipulating affect or assessing attentional scope. We did not combine both types of negative affect within the same experiment because we were concerned that one negative affect might spill over into the other and lead to a mixed sad-disgusted state (Gable & Harmon-Jones, 2009).

In both experiments, breadth of attention was measured using Navon's (1977) global-local letter task, an objective measure of attentional breadth used in many past experiments (Yovel, Revelle, & Mineka, 2005; for a review, see Kimchi, 1992). We expected sadness to cause a broadened attentional scope and disgust to cause a narrowed attentional scope, as revealed by the difference between local and global reaction times (RTs). This prediction was based on past positive-affect research using local-global stimuli, which found that approach-motivated positive affect slowed global reactions (Gable & Harmon-Jones, 2008, Experiment 3; Gable & Harmon-Jones, in press; Harmon-Jones & Gable, 2009), or both slowed global and speeded local reactions (Gable & Harmon-Jones, 2008, Experiment 2). Similar effects have also emerged in some past research on arousing negative affect (e.g., Wachtel, 1968; Weltman & Egstrom, 1966).

Experiment 1

Method

Participants were 35 (21 female, 14 male) introductory psychology students participating for course credit. They viewed 32 color photographs, selected from the International Affective Picture System (Lang, Bradley, & Cuthbert, 2005). Half of the photographs were unpleasant, low in arousal, and selected because they were likely to evoke sadness. The other half were neutral, and matched with the unpleasant pictures for color, brightness, object size, and human presence.

Each trial began with a 3-s fixation cross. One of the 32 pictures was then displayed for 6 s, followed by another fixation cross (500 ms). Next, a Navon letter was displayed until the participant responded. If a response did not occur within 5 s, the next trial began. The intertrial interval varied between 8 and 10 s. Six neutral practice trials were completed before the recorded trials.

As already noted, the Navon (1977) letters task was used to assess attentional breadth. In this task, each stimulus consists of a large letter composed of smaller letters (five closely spaced local letters on each vertical or horizontal line of the global letter). For example, a large *H* might be composed of small *F*s. Participants were asked to respond to each stimulus "as quickly as possible," pressing a key on the left if the picture contained the letter *T* and a key on the right if the picture contained the letter *H*. Global targets were those in which a large *T* or *H* was composed of smaller *L*s or *F*s. Local targets were those in which a large *L* or *F* was composed of smaller *T*s or *H*s. Faster responses to the large letters indicated a global (broad) focus, whereas faster responses to the small letters indicated a local (narrow) focus. Sixteen local and 16 global trials were randomly presented. RTs were logarithmically transformed. Trials with incorrect responses (2.9% of the sample) or with RTs more than 3 standard deviations from the mean (0.86% of the sample) for each stimulus were removed (Fazio, 1990). There were insufficient errors to permit analyses of error rates.

After all trials were completed, participants viewed all the affective pictures and half the neutral pictures (to conserve time). Each picture was displayed for 2 s, and participants used the Self-Assessment Manikin (Bradley & Lang, 1994) to indicate their pleasure (1 = *very pleasant*, 9 = *very unpleasant*)

and arousal (1 = *excited*, 9 = *calm*). They also rated how disgusted and sad the picture made them feel (1 = *no emotion*, 9 = *strongest feeling*).

Results and discussion

After viewing sad pictures, participants responded faster to global targets than to local targets, p_{rep} = .99. After viewing neutral pictures, participants also responded faster to global targets than to local targets, p_{rep} = .91; thus, the often observed global bias was replicated (Navon, 1977). Critically, the RT difference between global and local targets was larger after sad pictures than after neutral pictures, as revealed by a 2 (sad or neutral picture) × 2 (local or global target) analysis of variance (ANOVA), which yielded a significant interaction, $F(1, 34) = 4.54$, $p_{rep} = .89$, $\eta_p^2 = .12$. RTs to local targets were slower after sad pictures than after neutral pictures, $p_{rep} = .91$. RTs to global targets were similar across conditions, $p_{rep} = .54$. (See Fig. 1.)

For the picture ratings, a 4 (valence, arousal, disgust, or sadness) × 2 (sad or neutral picture) within-subjects ANOVA revealed a significant interaction, $F(3, 72) = 38.42$, $p_{rep} = .99$, $\eta_p^2 = .62$. Sad pictures were more unpleasant ($M = 6.31$, $SD = 4.25$), disgusting ($M = 1.98$, $SD = 1.00$), and sad ($M = 4.05$, $SD = 1.00$) than neutral pictures ($M = 4.53$, $SD = 2.13$; $M = 1.36$, $SD = 1.00$; $M = 1.47$, $SD = 1.00$), p_{rep}s > .95. Sad pictures ($M = 7.37$, $SD = 3.63$) were similar in arousal to neutral pictures ($M = 7.38$, $SD = 3.00$), $p_{rep} = .48$. Also, the sad pictures evoked significantly more sadness than disgust, $p_{rep} = .99$.

In support of our hypothesis and in contrast to much past conceptualizing, these results indicate that sad pictures caused broadening of attention, relative to neutral pictures. Furthermore, the sad pictures were rated as more unpleasant than, but equivalent in arousal to, the neutral pictures, which is consistent with the idea that the sad pictures were low in arousal and thus motivational intensity.

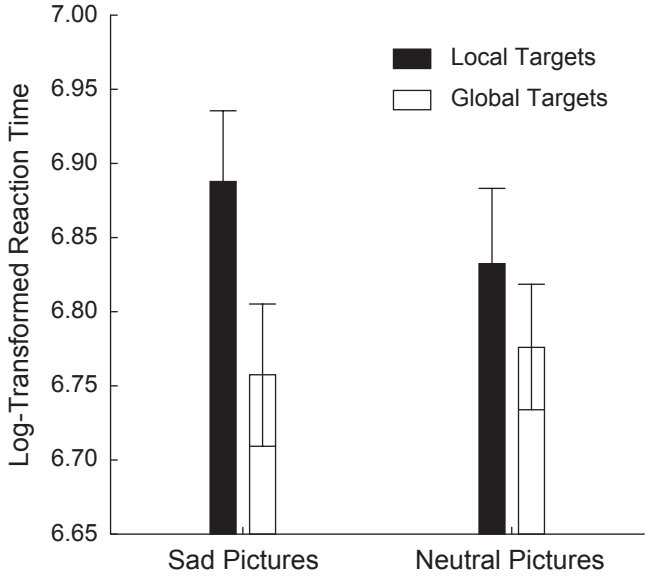

Fig. 1. Participants' mean reaction times for local and global Navon letter targets after viewing sad and neutral pictures in Experiment 1. Error bars indicate standard errors.

Experiment 2

Experiment 2 was conducted to assess whether the attentional effects observed in Experiment 1 were caused by motivational intensity and were not due to our methods of manipulating affect or assessing attentional scope. Therefore, in Experiment 2, we again used picture presentations to evoke negative affect and Navon stimuli to assess breadth of attention, but instead of examining the effect of low-motivation negative affect, we examined the effect of high-motivation negative affect. On the basis of our conceptual model linking intense emotive states to narrowed attention, we predicted that high-motivation negative affect would cause narrowed attention relative to neutral affect. In addition, because most previous experiments showing that high-motivation negative affect narrowed attention used fear- or anxiety-producing stimuli, we thought it important to assess whether narrowed attention would result from another motivating negative affect, disgust. Such a result would support our conceptual analysis by showing that highly motivating negative affects in general, rather than specifically fear and anxiety, narrow attention.

Method

Participants were 115 (56 female, 59 male) introductory psychology students participating for course credit. They viewed 64 color photographs collected from the Internet. Half of the photographs were selected because they were likely to evoke disgust; the other half were selected because they appeared neutral. The neutral pictures were matched with the unpleasant pictures for color, brightness, object size, and human presence.

Procedures were identical to those in the previous experiment. RTs were logarithmically transformed. Trials with incorrect responses (1.8% of the sample) or with RTs more than 3 standard deviations from the mean (0.73% of the sample) for each stimulus were removed (Fazio, 1990).

After all trials were completed, participants viewed all the affective and neutral pictures (6 s each) and rated how each picture made them feel using the same ratings as in Experiment 1.

Results and discussion

After viewing disgusting pictures, participants responded faster to local targets than to global targets, $p_{rep} = .91$. In contrast, after viewing neutral pictures, participants responded faster to global targets than to local targets, $p_{rep} = .99$; again, this result replicated the often observed global bias (Navon, 1977). RTs to global targets were slower after disgusting pictures than after neutral pictures, $p_{rep} = .99$. RTs to local targets were similar across conditions, $p_{rep} = .36$. (See Fig. 2.) The 2

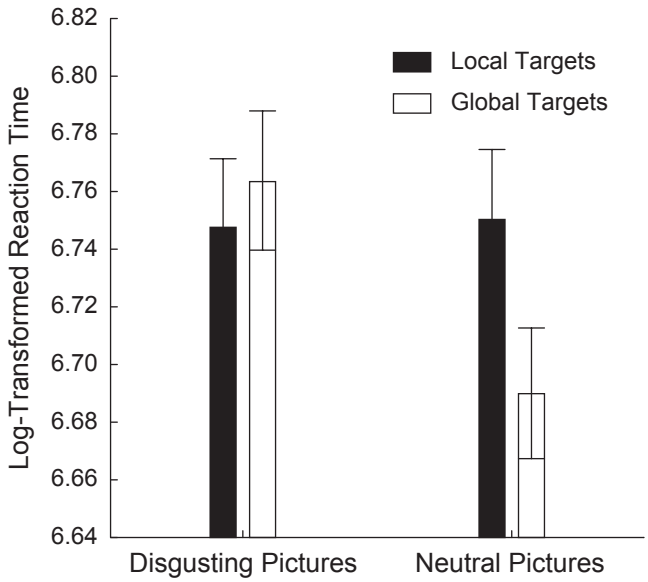

Fig. 2. Participants' mean reaction times for local and global Navon letter targets after viewing disgusting and neutral pictures in Experiment 2. Error bars indicate standard errors.

(disgusting or neutral picture) × 2 (local or global target) ANOVA yielded a significant interaction, $F(1, 115) = 48.91$, $p_{rep} = .99$, $\eta_p^2 = .30$.

For the picture ratings, a 4 (valence, arousal, sadness, or disgust) × 2 (disgusting or neutral picture) within-subjects ANOVA revealed a significant interaction, $F(3, 342) = 469.78$, $p_{rep} = .99$, $\eta_p^2 = .80$. Disgusting pictures were more unpleasant ($M = 7.61$, $SD = 1.22$), arousing ($M = 3.94$, $SD = 2.15$), sad ($M = 6.48$, $SD = 2.25$), and disgusting ($M = 7.21$, $SD = 2.02$) than neutral pictures ($M = 3.89$, $SD = 1.22$; $M = 7.39$, $SD = 1.60$; $M = 1.34$, $SD = 0.56$; $M = 1.19$, $SD = 0.39$), p_{rep}s > .99. Also, the disgusting pictures evoked significantly more disgust than sadness, $p_{rep} = .99$.

Consistent with predictions, these results indicated that disgusting pictures caused a narrowing of attention, relative to neutral pictures. These results extend previous findings by showing that disgust, in addition to fear and anxiety, reduces the breadth of attention. This important extension reveals that highly motivating negative affects in general cause a narrowing of attention.

General Discussion

These two experiments revealed that the relationship between negative affect and attentional precedence is more complex than commonly thought. In line with past theory and evidence, Experiment 2 demonstrated that negative affect caused a narrowing of attention. However, this narrowing occurred only when negative affect was high in motivational intensity. When negative affect was low in motivational intensity, in Experiment 1, it caused a broadening of attention. These results are consistent with the idea that the effect of emotion on local/global precedence is not due to negative versus positive affect, but is instead due to motivational intensity. Positive and negative affects of low motivational intensity broaden attention, whereas positive and negative affects of high motivational intensity narrow attention.

We view motivational intensity as being closely related to the arousal level of affective states (Bradley & Lang, 2007). As expected from this line of reasoning, the sad stimuli used in Experiment 1 evoked low self-reported arousal, equivalent to the arousal reported in response to the neutral stimuli. In contrast, the disgusting stimuli used in Experiment 2 evoked high self-reported arousal, significantly higher than the arousal reported in response to the neutral stimuli. But arousal and motivation are not identical. Arousal created through physical exercise does not cause narrowing of attention (Harmon-Jones, Gable, & Hobbs, 2009).

Taken together with the results of other recent research on the effect of motivational intensity of positive affects on attention (Gable & Harmon-Jones, 2008), the present research suggests that exploring negative affects along the dimension of motivational intensity and investigating how negative affects are related to attentional and cognitive processes will help to provide a better understanding of negative affects and affect-cognition interactions. These results are consistent with a growing trend in research on emotion-cognition interactions to emphasize the importance of motivation (Larson & Steuer, 2009; Levine & Edelstein, 2009).

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Declaration of Conflicting Interests

The authors declared that they had no conflicts of interests with respect to their authorship and/or the publication of this article.

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