

Positive emotions broaden the scope of attention and thought-action repertoires

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The broaden-and-build theory (Fredrickson, 1998, 2001) hypothesises that positive emotions broaden the scope of attention and thought-action repertoires. Two experiments with 104 college students tested these hypotheses. In each, participants viewed a film that elicited (a) amusement, (b) contentment, (c) neutrality, (d) anger, or (e) anxiety. Scope of attention was assessed using a global-local visual processing task (Experiment 1) and thought-action repertoires were assessed using a Twenty Statements Test (Experiment 2). Compared to a neutral state, positive emotions broadened the scope of attention in Experiment 1 and thought-action repertoires in Experiment 2. In Experiment 2, negative emotions, relative to a neutral state, narrowed thought-action repertoires. Implications for promoting emotional well-being and physical health are discussed.

Emotions are short-lived experiences that produce coordinated changes in people's thoughts, actions, and physiological responses. Several emotion theorists have explained these coordinated changes with the construct of *specific action tendencies* (Frijda, 1986; Lazarus, 1991; Levenson, 1994). During emotions, this reasoning holds, specific action tendencies infuse both mind and body, simultaneously narrowing individuals' action urges (e.g., flight in fear, attack in anger) while mobilising appropriate bodily support for those specific actions (e.g., increased blood flow to large muscles in fear). Specific action tendencies are also invoked to explain the evolutionary adaptive value of emotions: The specific action urges called forth during emotions are said to represent those actions that best ensured our ancestors' survival in life-or-death situations (Tooby & Cosmides, 1990).

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What about positive emotions?

Although most emotion theorists who discuss specific action tendencies extend their theorising to include positive emotions like joy and contentment (e.g., Frijda, 1986; Lazarus, 1991), we have argued (Fredrickson, 1998; Fredrickson & Branigan, 2001; Fredrickson & Levenson, 1998) that such extension is unwarranted. We base this conclusion on multiple observations within the scattered empirical and theoretical literature on positive emotions. One is that the action tendencies identified for positive emotions (e.g., free activation in joy, inactivity in contentment) are vague, better described as nonspecific than specific (Fredrickson & Levenson, 1998). A second is that positive emotions are often characterised by a relative lack of autonomic reactivity (Levenson, Ekman, & Friesen, 1990). To the extent that autonomic reactivity supports specific action tendencies, these two observations go hand-in-hand: If no specific action is called forth during positive emotional states, then no particular pattern of autonomic reactivity should be expected.

The broaden-and-build theory of positive emotions

If positive emotions do not share with negative emotions this hallmark feature of promoting and supporting specific action, then what good are they? Do positive emotions have any evolved adaptive value? Fredrickson's (1998, 2001) *broaden-and-build theory* of positive emotions suggests so, but contends that the form and function of positive and negative emotions are not isomorphic. Instead, they are distinct and complementary: Whereas many negative emotions narrow individuals' momentary thought-action repertoires¹ by calling forth specific action tendencies (e.g., attack, flee), many positive emotions *broaden* individuals' momentary thought-action repertoires, prompting them to pursue a wider range of thoughts and actions than is typical (e.g., play, explore, savour, and integrate; Fredrickson, 1998, 2001).

Whereas the narrowed thought-action repertoires of negative emotions were likely adaptive to our ancestors within specific threatening instances, the broadened thought-action repertoires of positive emotions were likely adaptive over the long-run. Broadened thought-action repertoires gain significance because they can *build* a variety of personal resources (Fredrickson, 1998,

¹ Previously, I proposed that, in order to better accommodate the positive emotions, the term "action tendencies" should be replaced by the more inclusive term "thought-action tendencies" (Fredrickson, 1998). This is because some positive emotions—like contentment and interest—do not necessarily spark changes in physical action, but instead seem to spark changes primarily in cognitive activity, with changes in physical activity (if any) following from these cognitive changes. Additionally, instead of presuming that thought-action tendencies are necessarily specific, I argued that more inclusive phrasing would be to discuss the "relative breadth of the momentary thought-action repertoire" (Fredrickson, 1998, p. 303).

2001). These resources may include physical resources (e.g., physical skills, health; Boulton & Smith, 1992; Danner, Snowdon, & Friesen, 2001), social resources (e.g., friendships, social support networks; Aron, Norman, Aron, McKenna, & Heyman, 2000; Lee, 1983), intellectual resources (e.g., knowledge, theory of mind, intellectual complexity, executive control; Csikszentmihalyi & Rathunde, 1998; Lesley, 1987; Panksepp, 1998), and psychological resources (e.g., resilience, optimism, creativity; Folkman & Moskowitz, 2000; Fredrickson, Tugade, Waugh, & Larkin, 2003). Importantly, the personal resources accrued during states of positive emotions are durable—they outlast the transient emotional states that led to their acquisition. As such, these resources can function as reserves to be drawn on later, to improve coping and odds of survival. Indeed, a recent study of elderly nuns found that those who expressed the most positive emotions in early adulthood lived an average of 10 years longer than those who expressed the least positive emotions (Danner et al., 2001; for related findings, see Levy, Slade, Kunkel, & Kasl, 2002; Moskowitz, 2003; Ostir, Markides, Black, & Goodwin, 2000; Ostir, Markides, Peek, & Goodwin, 2001). So, to the extent that positive emotions are linked to increments in personal resources, they can be viewed as evolved psychological adaptations that indirectly helped our ancestors survive inevitable threats to life and limb.

The broaden hypothesis

One central hypothesis stemming from Fredrickson's broaden-and-build theory is the *broaden hypothesis*. It states that positive emotions broaden the scopes of attention, cognition, and action, widening the array of percepts, thoughts, and actions presently in mind. A corollary *narrow hypothesis* states that negative emotions shrink these same arrays. Moreover, the broaden-and-build theory predicts that different discrete positive emotions—like amusement and contentment—although phenomenologically distinct, each produce broadening relative to neutral states.

Existing empirical evidence

Scope of cognition. Foundational evidence for the broaden hypothesis can be drawn from two decades of experiments on the effects of positive affect on cognition conducted by Isen and colleagues (for a review, see Isen, 2000). They have documented that people experiencing positive affect show patterns of thought that are notably unusual (Isen, Johnson, Mertz, & Robinson, 1985), flexible and inclusive (Isen & Daubman, 1984; see also Bolte, Goschke, & Kuhl, 2003), creative (Isen, Daubman, & Nowicki, 1987; see also Phillips, Bull, Adams, and Fraser, 2002), integrative (Isen, Rosenzweig, & Young, 1991), open to information (Estrada, Isen, & Young, 1997), and efficient (Isen & Means, 1983; Isen et al., 1991). To illustrate, in one experiment, compared to those in a neutral control condition, individuals induced to feel positive affect more often

saw fringe exemplars of a given category as included within the category (e.g., *elevator* and *camel* are fringe exemplars of the category *vehicle*, Isen & Daubman, 1984). Isen and colleagues have also shown that those experiencing positive affect report increased preference for variety and accept a broader array of behavioural options (Kahn & Isen, 1993). In general terms, Isen has suggested that positive affect produces a “broad, flexible cognitive organisation and ability to integrate diverse material” (Isen, 1990, p. 89), effects linked to increases in brain dopamine levels, particularly in the prefrontal cortex and anterior cingulate, which are thought to underlie better cognitive performance (Ashby, Isen, & Turken, 1999). Although Isen’s work does not target specific positive emotions or thought-action repertoires per se, it provides the strongest evidence that positive affect broadens cognition. Even so, many of the demonstrated effects of positive affect—such as flexible, creative, and unusual thinking—might be better conceptualised as consequences of broadening, rather than synonyms of it.

Scope of attention. Decades ago, Easterbrook (1959) proposed that negative states—particularly high arousal ones like anxiety and fear—narrow the scope of attention, making people miss the forest for the trees (or perhaps more aptly, the assailant’s garment type for the gun; for a review, see Derryberry & Tucker, 1994; see also Isen, 1970; Tyler & Tucker, 1981). Decades later, Derryberry and Tucker (1994) proposed that positive states—even high arousal ones like elation and mania—have the complementary effect of broadening the scope of attention. Suggestive evidence comes from clinical research on manic cognition showing that manic people, like creative artists, use overinclusive categories (Andreason & Powers, 1975; Richards & Kinney, 1990). Plus, manic people’s expansive thinking varies with lithium treatment: Lithium not only evens out mood swings but also diminishes creativity (Shaw, Mann, Stokes, & Manevitz, 1986). Complementing these findings, studies targeting nonclinical positive states have used global-local visual processing paradigms to assess biases in attentional focus (Basso, Schefft, Ris, & Dember, 1996; Derryberry & Reed, 1998; Gasper & Clore, 2002). In one such task, research participants judge which of two comparison figures is more similar to a standard figure (see Figure 1 a–d; standard figure is at the top of each item). One comparison figure resembles the standard in global configuration (see Figure 1, lower left of each item), and the other in local, detail elements (see Figure 1, lower right of each item). Personality traits associated with negative emotions (anxiety and depression) correlate with a local bias consistent with a narrowed attentional focus. By contrast, traits associated with positive emotions (subjective well-being and optimism) correlate with a global bias consistent with a broadened attentional focus (Basso et al., 1996). Similar findings have emerged for induced sad and happy moods, respectively (Gasper & Clore, 2002). Using similar stimuli in reaction-time tasks, other researchers have found that experimentally manipulated failure feedback produces a local bias, whereas success feedback

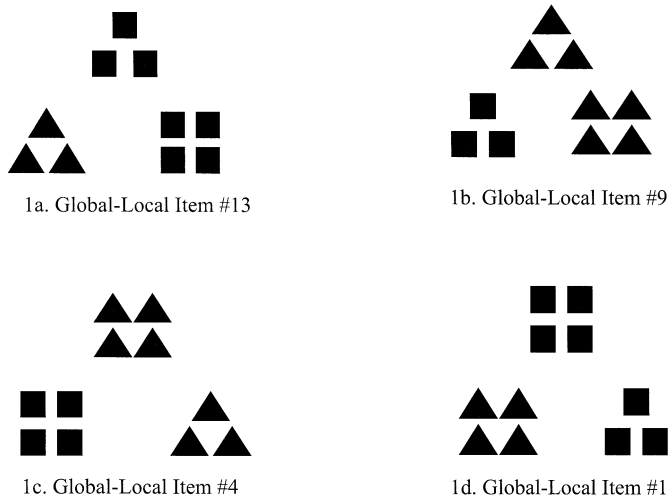


Figure 1. Example global-local items used in Experiment 1.

produces a global bias (Brandt, Derryberry, & Reed, 1992, cited in Derryberry & Tucker, 1994).

Although these findings are consistent with the claim that positive emotional states and traits broaden the scope of attention, the evidence is inconclusive: Much is correlational or, if experimental, lacking appropriate control conditions. Specifically, an important feature missing from the work on global bias in attention is a neutral comparison group. Without this, we cannot know whether the broader scope of attention following success or associated with positive traits and states is in fact broader than is typical. This becomes especially critical because past research has shown that, all things being equal, normal individuals (under normal conditions) tend to show a global bias, processing global features of stimuli before local details (Navon, 1977). More generally, comparing the effects of positive emotions (and related phenomena like traits, moods, and success) to those of negative emotions (and related phenomena) inevitably produces ambiguous results: It remains unclear whether differences should be attributed to positive emotions, negative emotions, or both. As long advanced by Isen (1987), comparisons between positive and neutral states are critical for stringent tests of the unique effects of positive emotions.²

² It should be noted that Gasper and Clore (2002) did include a neutral-mood comparison condition in their experiment testing the effects of induced happy and sad moods on global bias, and that they found no differences between happy-mood and neutral-mood participants. Critically, however, inspection of their manipulation check data indicate that participants in their neutral-mood condition reported experiencing just as much positive effect as those in their happy-mood condition, rendering their data inconclusive with respect to positive emotions.

Overview of studies

Although the existing research is consistent with the broaden hypothesis, not surprisingly (because much of it predated the broaden-and-build theory) it does not provide direct tests of it. In particular, yet to be tested is whether—relative to neutral states—distinct discrete positive emotions actually widen the arrays of activated percepts, thoughts, and action urges. Relatedly, do distinct discrete negative emotions, again relative to neutral states, shrink these same arrays? The experiments reported here test these hypotheses. In each, emotions were experimentally manipulated using short film clips. Two distinct positive emotions were targeted: amusement and contentment. Likewise, two distinct negative emotions were targeted: anger and anxiety. Each emotion is compared to a neutral control condition. Experiment 1 examines broadening and narrowing of the scope of attention using a global-local visual processing task. Experiment 2 examines broadening and narrowing of thought-action repertoires using an open-ended Twenty Statements Test. Our primary hypothesis is that, relative to a neutral state, two distinct positive emotions (amusement and contentment) will (a) produce a global bias on a global-local visual processing task, consistent with a broadened scope of attention, and (b) broaden momentary thought-action repertoires. We will also test the corollary hypothesis that, relative to a neutral state, two distinct negative emotions (anger and anxiety) will (a) produce a local bias on a global-local visual processing task, consistent with a narrowed scope of attention, and (b) narrow momentary thought-action repertoires.

EXPERIMENTS 1 AND 2

Method

Participant

Participants were 104 university students (66% women) enrolled in an introductory psychology course. Each received course credit in exchange for their participation in two experiments. Of the students, 81 were European American (64% women), and 23 were ethnic minorities (74% women; 3 Asian Americans, 7 African Americans and 13 of other/mixed ethnic backgrounds). All participants grew up in the United States. Tests of ethnic differences compared European Americans to ethnic minorities.

Materials

Written. Subjective experiences were assessed using Emotion Report Forms (adapted from Ekman, Friesen & Ancoli, 1980). Participants rated the greatest amount felt of the following nine emotions: amusement, anger, anxiety, contentment, disgust, fear, happiness, sadness, and serenity. Ratings were made on 9-point Likert scales (0 = none, 8 = a great deal).

Visual. Five videotaped film clips served as the experimental manipulation in this research. Two clips elicited two distinct positive emotions: “Penguins” (2 min 6 sec) shows groups of penguins waddling, swimming, and jumping and primarily elicits amusement. “Nature” (1 min 33 sec) shows fields, streams, and mountains in warm, sunny weather and primarily elicits contentment and serenity. Two additional clips elicited two distinct negative emotions: “Witness” (1 min 40 s) shows a group of young men taunting and insulting a group of Amish passers-by in the street and primarily elicits anger and disgust. “Cliffhanger” (2 min 50 s) shows a prolonged mountain climbing accident and primarily elicits anxiety and fear. A final clip served as a neutral control condition: “Sticks” (1 min 33 s) shows an abstract dynamic display of coloured sticks piling up and elicits virtually no emotion.

Dependent measures

Experiment 1. Breadth of attention was assessed using an 8-item global-local visual processing task adapted from Kimchi and Palmer (1982). In each item, a stimulus triad is presented that contains a standard figure on top and two comparison figures below it. Four of the items used are shown in Figures 1a–1d. The remaining four items were identical, except the two lower comparison figures within each were reversed. We chose these particular items because pilot testing revealed that global-local triads with standard figures comprised of few local elements (i.e., 3–4) produced the most variance in responding associated with emotional state. Our choice also concurs with Kimchi’s (1992) suggestion that few-element patterns may be best suited for tests of global precedence. The 8 test items were embedded within a larger set of 24 global-local items that also included 16 filler items with standard figures comprised of either 6 or 9 local elements. Participants circled A or B on a response form to indicate which of the two comparison figures was more similar to the standard figure. Judgements could be based either on the global-configural aspects of the standard figure, or the local elements comprising it. In Figure 1a, for example, the standard figure’s configuration is a triangle made up of square elements. If participants choose the comparison figure that is a triangle made up of triangular elements (Choice A in Figure 1a), their choice is based on the global configuration of the standard figure. By contrast, if they choose the comparison figure that is a square made up of square elements (Choice B in Figure 1a), that choice is based on the local detail elements of the standard figure. Participants were instructed to give their first, most immediate impression of which comparison figure looks more like the standard figure. Responses representing global choices were tallied (e.g., Choice A in Figures 1a–1d), with a possible range from 0 to 8. High scores reflect a global bias, which has been linked to a broadened scope of attention, whereas low scores reflect a local bias, which has been linked to a narrowed

scope of attention (Derryberry & Tucker, 1994). Internal reliability of this measure in the present study was satisfactory ($\alpha = .84$).

Experiment 2. Breadth of momentary thought-action repertoires was assessed using a modified, open-ended Twenty Statements Test (TST; Kuhn & McPartland, 1954). Just after viewing the film, but prior to the TST, participants were asked to describe, in a word or two, the strongest emotion they felt while viewing the film. Next, they were asked to step away from the specifics of the film and:

... take a moment to imagine being in a situation yourself in which this particular emotion would arise (the one you wrote on the previous page). Concentrate on all the emotion you would feel and live it as vividly and as deeply as possible. *Given this feeling, please list all the things you would like to do right now.*

These instructions were followed by 20 blank lines that began with: "I would like to ____." The number of statements participants completed was tallied, with a possible range from 0 to 20. Higher scores indicate a larger thought-action repertoire.

We also conducted an exploratory content analysis of participants' written responses. We reviewed the qualitative data and subsequently had two independent coders classify each response into one of several, mutually exclusive thought-activity categories. Categories included thoughts and activities such as: eat/drink, read, sleep/rest (e.g., go to bed, doze off, take a nap), schoolwork/work (e.g., do homework, finish my laundry, write my paper), exercise/sport (e.g., roller blade, play soccer, swim), outdoors/nature (e.g., take a walk, pick flowers, sit on the beach), relish/reminisce (e.g., take a long bath, look at old pictures, fantasise), play (e.g., play with my dog/cat, have fun, jump around), be social (e.g., call my mom, visit my friends, throw a party, hug), be antisocial (e.g., hit someone), be taken care of (e.g., have somebody help me, yell for help, be protected), and very positive feelings and thoughts (e.g., fly, soar, cheer, laugh smile). Interrater agreement was 94.4%. For each participant, we determined proportion scores for each activity by dividing the tally for that activity by the total number of statements the participant generated.

Procedure

Participants were tested individually. On arrival, they were seated in a comfortable chair in a small, well-lit room, and provided their informed consent. The participant was seated 7 feet (~2 m) in front of a 25 inch video monitor, which displayed written instructions, film clips, and the global-local test items. A nearby clipboard contained written materials.

For Experiment 1, participants were first familiarised with the global-local visual processing task, described as a "Similarity Judgement Task". The

experimenter presented an example item and emphasised that there were no right or wrong answers, but rather we were interested in their momentary impressions. Participants were randomly assigned to view one of the five film clips, after which they immediately completed the global-local task. Next, they completed an Emotion Report Form to indicate how they felt while viewing the film clip.

After a 5 minute break, Experiment 2 began. Random assignment of participants to film condition in Experiment 2 was yoked to Experiment 1 so that no participant viewed the same film twice. After viewing the assigned film clip, participants learned that they had 5 minutes to complete the TST, described as an ‘‘Imagery Task’’. A tone signalled the end of 5 minutes. Next, participants completed an Emotion Report Form to indicate how they felt while viewing the film clip.

Results

Overview of analytic strategy

We first confirmed that the film clips altered subjective experiences as intended by examining self-reported emotions. We then used one-tailed a priori contrasts to test the broaden hypothesis and the corollary narrow hypothesis, which are theory-driven and directional. We tested for sex and ethnic differences throughout. Our sample permitted comparisons of various ethnic minorities ($n = 23$) to European Americans ($n = 81$). Small and unequal cell sizes prevented us from examining interaction effects.

Manipulation check

To confirm that the five films clips influenced subjective experiences as intended, we examined participants’ responses on the Emotion Report Forms. Table 1 presents modal and mean emotion ratings for each film, collapsed across Experiments 1 and 2. Inspection of these data confirms that the films altered emotional experience as intended. Tukey pairwise comparisons confirmed that Penguins elicited more amusement than any other clip, Nature elicited more contentment and serenity, Witness elicited more anger and disgust, and Cliffhanger elicited more fear and anxiety (although the difference on anxiety between Cliffhanger and Witness was only marginal). Moreover, modal emotion reports for the targeted emotions were quite high (7 and 8 on an 8-point scale), and were typically zero for untargeted emotions. Finally, for the Sticks film, modal emotion reports were zero for all nine emotion terms, confirming its emotional neutrality. Emotion ratings did not differ by sex or ethnicity.

TABLE 1
Modal and mean self-reported emotion for film clips

<i>Emotion</i>	<i>Film clip</i>				
	<i>Penguins</i>	<i>Nature</i>	<i>Sticks</i>	<i>Witness</i>	<i>Cliffhanger</i>
<i>Amusement</i>					
Mode	7	0	0	0	0
Mean	5.33	2.57	2.69	2.22	2.76
(SD)	(2.36)	(2.38)	(2.11)	(2.19)	(2.40)
<i>Anger</i>					
Mode	0	0	0	8	0
Mean	0.24	0.19	1.19	6.00	1.95
(SD)	(0.82)	(0.74)	(1.76)	(2.36)	(2.29)
<i>Anxiety</i>					
Mode	0	0	0	5	8
Mean	0.48	0.67	1.62	4.20	5.18
(SD)	(1.27)	(1.41)	(2.07)	(2.56)	(2.72)
<i>Contentment</i>					
Mode	0	4, 7	0	0	0
Mean	3.62	4.60	2.24	1.17	0.83
(SD)	(2.51)	(2.41)	(1.94)	(1.58)	(1.46)
<i>Disgust</i>					
Mode	0	0	0	8	0
Mean	0.38	0.26	1.10	6.07	1.93
(SD)	(1.15)	(0.73)	(1.81)	(2.07)	(2.34)
<i>Fear</i>					
Mode	0	0	0	0	7
Mean	0.12	0.10	0.40	2.02	5.00
(SD)	(0.63)	(0.30)	(0.96)	(2.02)	(2.78)
<i>Happiness</i>					
Mode	5	4	0	0	0
Mean	4.19	4.46	2.14	1.29	0.88
(SD)	(2.49)	(2.27)	(1.79)	(1.83)	(1.47)
<i>Sadness</i>					
Mode	0	0	0	0	0
Mean	0.19	0.95	0.33	3.56	2.59
(SD)	(0.71)	(2.02)	(0.75)	(2.83)	(2.68)
<i>Serenity</i>					
Mode	0	4, 6, 7, 8	0	0	0
Mean	2.12	4.86	1.69	0.93	0.68
(SD)	(2.01)	(2.65)	(2.01)	(1.63)	(1.27)

Note: $N = 42$ for Penguin, Nature, and Sticks; $N = 41$ for Witness and Cliffhanger. Ratings were made on a 9-point scale, ranging from 0 = none to 8 = a great deal.

Experiment 1

Across all participants, the mean global bias was 4.62 ($SD = 2.65$). We tested for group differences in global bias scores using a $5 \times 2 \times 2$ ANOVA (Film Group \times Sex \times Ethnicity). The main effect for film group was the sole significant effect, $F(4, 96) = 4.23$, $p = .042$. Figure 2 presents mean global bias scores for each Film Group. The pattern of means shows that the two positive emotion film clips—Penguins and Nature—produced the largest global biases. A priori contrasts confirmed that these two positive emotion films combined yielded significantly larger global bias scores than did the neutral film, $t(99) = 1.87$, $p = .032$. Testing the positive films separately, a significant effect emerged for the amusing Penguins film, $t(99) = 1.71$, $p = .045$, and a marginal effect emerged for the serene Nature clip, $t(99) = 1.53$, $p = .064$. Global bias scores for the two positive emotion films did not differ from each other, ($t < 1$, n.s.). The two positive emotion films combined also produced significantly larger global bias scores than the two negative emotion films combined, $t(99) = 1.83$, $p = .035$. These results support our primary hypothesis, that positive emotions broaden the scope of attention relative to a neutral state. The data do not support the corollary hypothesis, that negative emotions narrow the scope of attention: A priori contrasts involving the two negative emotion film clips—Witness and Cliffhanger—tested in combination or separately, were not significant (all $ts < 1$, n.s.). Global bias scores for these two negative clips did not differ from each other, $t(99) = -1.21$, $p = .115$.

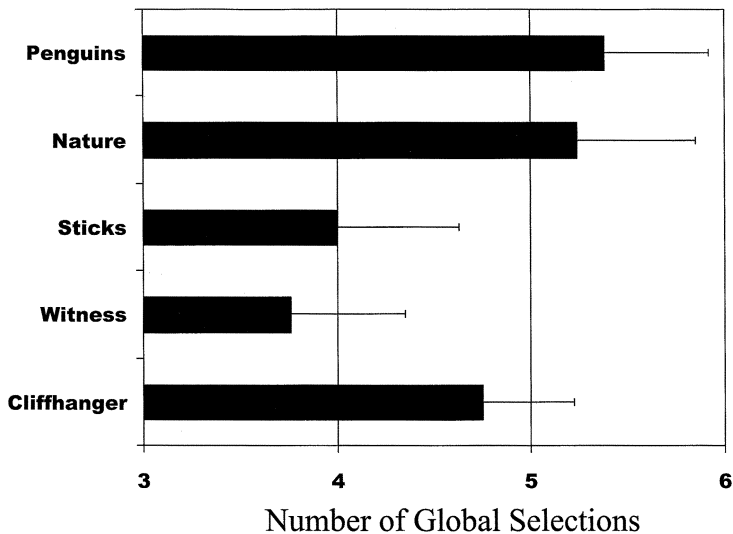


Figure 2. Global bias by emotion condition.

*Experiment 2*³

Across all participants, the mean thought-action repertoire size, as indexed by the number of statements completed on the TST, was 11.60 ($SD = 5.31$). We tested for group differences in repertoire size using a $5 \times 2 \times 2$ ANOVA (Film Group \times Sex \times Ethnicity). The main effect for film group was the sole significant effect, $F(4, 96) = 4.42, p = .003$. Figure 3 presents mean thought-action repertoire size for each Film Group. As for Experiment 1, the pattern of means shows that the two positive emotion film clips—Penguins and Nature—produced the largest thought-action repertoires. A priori contrasts confirmed that these two positive emotion films combined yielded significantly larger thought-action repertoires than did the neutral film, $t(98) = 1.86, p = .033$. Testing the positive films separately, a significant effect emerged for the amusing Penguins film, $t(98) = 1.98, p = .025$, and a trend emerged for the serene Nature clip, $t(98) = 1.24, p = .109$. Thought-action repertoire sizes for the two positive emotion films did not differ from each other ($t < 1, n.s.$). The two positive emotion films combined also produced significantly larger thought-action repertoires than the two negative emotion films combined, $t(98) = 4.12, p < .001$. These results again support our primary hypothesis, that positive emotions broaden thought-action repertoires relative to neutral states. The data also provide partial support for our corollary hypothesis, that negative emotions narrow thought-action repertoires.

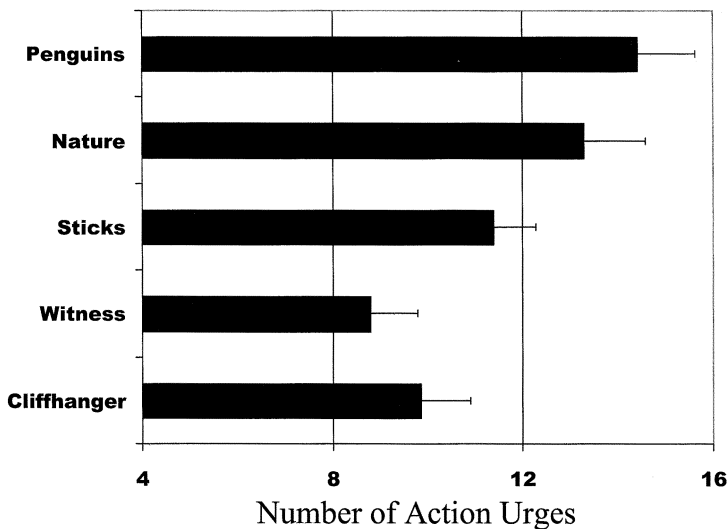


Figure 3. Thought-action repertoire size by emotion condition.

³One participant's data for Experiment 2 were missing.

A priori contrasts confirmed that the two negative emotion films combined yielded marginally smaller thought-action repertoires than did the neutral film, $t(98) = -1.53, p = .064$. Testing the negative films separately, a marginal effect emerged for the anger-eliciting Witness film, $t(98) = -1.64, p = .052$, whereas the difference for the anxiety-eliciting Cliffhanger clip did not reach significance, $t(98) = -.99, p = .162$. The repertoire sizes for these two negative clips did not differ from each other, $t < 1, n.s.$.

We explored differences in the content of participants' responses to the TST across the five Film Groups using two-tailed focused contrasts that compared the neutral film condition to each of the emotional film conditions. We found that, compared to participants who viewed the neutral film, those in both positive emotion film groups reported more frequent urges to engage in outdoor/nature activities: Penguins vs. Sticks, $t(97) = 2.65, p = .009$; Nature vs. Sticks, $t(97) = 5.54, p < .001$, and exercise/sport activities: Penguins vs. Sticks, $t(97) = 2.11, p = .038$; Nature vs. Sticks, $t(97) = 2.00, p = .048$. Those who viewed the amusing Penguins film also reported more frequent urges to play, $t(97) = 2.56, p = .012$, be social, $t(97) = 2.10, p = .038$, and have very positive feelings or thoughts, $t(97) = 3.08, p = .003$, and fewer urges to sleep/rest, $t(97) = -2.16, p = .034$. In sum, the two positive emotion films increased participants' thought-action repertoires by increasing their urges to be active and outdoors, and, for the amusing Penguins film, to be playful, social, and elated.

Examining the effects of the negative films on written responses, again compared to the neutral film, we found that participants in both negative emotion film groups reported fewer urges to eat/drink: Witness vs. Sticks, $t(97) = -2.93, p = .004$; Cliffhanger vs. Sticks, $t(97) = -2.64, p = .010$; relish/reminisce: Witness vs. Sticks, $t(97) = -3.12, p = .002$; Cliffhanger vs. Sticks, $t(97) = -2.16, p = .033$, and do schoolwork/work: Witness vs. Sticks, $t(97) = -2.29, p = .024$; Cliffhanger v. Sticks, $t(97) = -1.81, p = .073$. Those who viewed the anger-eliciting Witness film reported fewer urges to read, $t(97) = -1.90, p = .060$, and more urges to be antisocial, $t(97) = 4.39, p < .001$. Those who viewed the anxiety-eliciting Cliffhanger film reported more urges to be social, $t(97) = 2.58, p = .011$, and be taken care of by others, $t(97) = 3.30, p = .001$. In sum, the two negative emotion films shrunk participants' thought-action repertoires by decreasing their urges to consume, contemplate, and work. These reductions were accompanied by increases in urges to be antisocial (anger-eliciting Witness film only) or to affiliate with others (anxiety-eliciting Cliffhanger film only).

DISCUSSION

The broaden hypothesis was supported in Experiments 1 and 2. Notably, each experiment used conceptually and methodologically distinct measures to assess broadening, which enhances the generality of the findings. In Experiment 1,

responses on a global-local visual processing choice task suggested that people experiencing positive emotions exhibit broader scopes of attention than do people experiencing no particular emotion. To our knowledge, this is the first direct and unambiguous causal evidence for Derryberry and Tucker's (1994) assertion that positive emotions broaden the scope of attention. In Experiment 2, responses to an open-ended Twenty Statements Test showed that people experiencing positive emotions have more numerous thought-action urges than people experiencing no particular emotion. Importantly, the broadening effects in both experiments were demonstrated relative to neutral control conditions. Comparisons to neutral states provide more stringent tests of the broaden hypothesis and less ambiguous results than do comparisons to negative states. Additionally, in each experiment, evidence for broadening was obtained for two distinct types of positive emotions, a higher activation state of amusement as well as a lower activation state of contentment. This suggests that these two emotional states, although phenomenologically distinct, each share an ability to broaden people's momentary modes of perceiving and thinking. In sum, the data presented here support three central aspects of the broaden hypothesis. First, positive emotion broadens the scope of attention. Second, positive emotion broadens thought-action repertoires. And third, broadening effects emerge for two distinct types of positive emotion, namely amusement and contentment.

Support for the corollary narrow hypotheses was more limited. Experiment 1, using the global-local visual processing task, provided no evidence that negative emotions narrow the scope of attention relative to a neutral state, a finding inconsistent with prior research and theorising (Derryberry & Reed, 1998; Easterbrook, 1959; Isen, 1970; Tyler & Tucker, 1981). We speculate that our global-local task, which included only the simplest of stimulus triads, may have been insensitive to narrowing, perhaps exhibiting a floor effect. Alternatively, our negative emotion inductions may have been too weak or diffuse to produce narrowed attention. Experiment 2, using the open-ended Twenty Statements Test, did show limited support for the corollary hypothesis that negative emotions narrow thought-action repertoires, although evidence was marginally significant for the experience of anger/disgust and did not reach significance for the experience of anxiety/fear. Although the results for the two negative emotion conditions did not differ significantly from one another, it is worth noting that anger and disgust are object-focused negative emotions, whereas anxiety is often object-less and often experienced as undirected aversive arousal (Ohman, 2000). Post hoc, we might then expect attention and thought-action repertoires to be narrowed to a greater degree for object-focused negative emotions relative to object-less negative emotions. Additional research is needed to test this speculation.

Analysis of the qualitative data obtained in Experiment 2 revealed that the broadened thought-action repertoires produced by the positive emotions of amusement and contentment could be accounted for by more numerous urges to

be active and outdoors, and (for amusement only) playful and social. These findings are consistent with earlier work by Cunningham (1988), who found that people induced to feel elated, relative to those in a neutral control condition, indicated greater interest in social, prosocial, strenuous, and leisure activities on a shortened Pleasant Events Schedule. These data also revealed that the narrowed thought-action repertoires produced by the negative emotions of anger and anxiety could be accounted for by reductions in urges to consume, contemplate, and work alongside more urges to be antisocial (anger only) and affiliative (anxiety only). These findings are consistent both with the specific action tendency associated with anger (i.e., attack; Lazarus, 1991; Levenson, 1994), and with past research showing that people like to affiliate with others when anxious (Schachter, 1959).

Although the current results are consistent with the hypothesis that positive emotions broaden the scopes of attention and cognition, alternative accounts are also possible. For instance, multiple theorists have suggested that positive affect leads to reduced cognitive processing, either because it limits capacity for processing (e.g., Mackie & Worth, 1989), or it diminishes motivation to process effortfully (e.g., Martin, Ward, Achee, & Wyer, 1993; Wegener, Petty, & Smith, 1995). To the extent that processing global and configural aspect of visual stimuli is less effortful and more automatic than processing local-detail elements (Navon, 1977), these perspectives would make a similar prediction for Experiment 1 as was made here. The results of Experiment 2, however, diminish an interpretation based on reduced processing: In that study, those experiencing positive emotion generated more action urges, not fewer. Another account of the findings in Experiment 1 comes from the mood-as-information approach (Gasper & Clore, 2002; Schwarz & Clore, 1983). From that perspective, current feelings guide cognitive processing, with positive feelings promoting greater reliance on accessible information. To the extent that a global bias in visual perception is the more dominant strategy (Navon, 1977), Gasper and Clore predicted that positive affect would promote reliance on this accessible strategy. In the context of global-local visual processing, however, Gasper and Clore (2002) did not expect neutral and positive states to differ, both because people generally tend to be in positive moods, and because a global bias is considered normative (but see footnote 2). Data from Experiment 1, however, did reveal differences between positive and neutral states in global processing, findings that are not accounted for by the mood-as-information approach, but that are consistent with the broaden hypothesis. Taken together, then, we see the evidence from Experiments 1 and 2 as most consistent with the broaden hypothesis, which predicts that the cognitive consequences of positive states are distinct from those evident in neutral states.

This initial evidence for the broaden hypotheses is certainly encouraging. Even so, additional questions arise that merit empirical test. For instance, what are the basic cognitive processes that underlie these effects? Do positive

emotions speed responses to the global aspects of visual stimuli? Do they expand peripheral vision? Do they increase the span of working memory? Do they increase flexibility in allocating attention? What are the neurological underpinnings of these effects? Are increases in circulating brain dopamine implicated as suggested by Ashby and colleagues (1999)? What brain structures and pathways are involved? Finally, do broadening effects extend to positive emotions beyond amusement and contentment? Will the effect generalise to pre-goal attainment positive emotions such as desire, interest, or engagement?

Despite the inevitable lingering questions, the finding that two distinct positive emotions broaden the scopes of attention and thinking has implications for people's emotional well-being and physical health. For instance, past research has shown that people who experience and express positive emotions cope more effectively with chronic stress and other negative experiences (e.g., Aspinwall, 1998; Bonanno & Keltner, 1997; Folkman, 1997; Keltner & Bonanno, 1997; Martin, Kuiper, Olinger, & Dance, 1993; Stein, Folkman, Trabasso, & Richards, 1997). Consistent with the data reported here, and perhaps accounting for the effects of positive emotion on coping outcomes, Fredrickson and Joiner (2002) found that people who experience positive emotions show a style of broad-minded coping in which they step back from their current problems and consider them from multiple angles. The broadened scopes of attention and thinking inherent within such broad-minded coping, we speculate, might also underlie the three types of coping that Folkman and Moskowitz (2000) have linked to the occurrence and maintenance of positive emotions during chronic stress: positive reappraisal, goal-directed problem-focused coping, and the infusion of ordinary events with positive meaning. Together with positive emotions, these coping strategies have been linked to thriving despite adversity (Folkman, 1997).

Using positive emotions to regulate negative emotions and stress has physiological benefits as well. For instance, Fredrickson and colleagues have shown that positive emotion produces an *undoing effect*: Amusement and contentment speed recovery from the cardiovascular aftereffects of laboratory stressors that induce fear, sadness, or anxiety (Fredrickson & Levenson, 1998; Fredrickson, Mancuso, Branigan, & Tugade, 2000). To the extent that the breadth of an emotion's thought-action repertoire directs changes in physiological activity in preparation for action, broadening may be the cognitive mechanism that drives the physiological undoing effect (Fredrickson, 2000). As such, the broadening and undoing effects of positive emotion might together account for the salutary effects of positive emotions on health, physical functioning, and longevity (e.g., Danner et al., 2001; Moskowitz, 2003; Ostir et al., 2000, 2001). Indeed, Fredrickson and Joiner (2002) found that positive emotions and broadened thinking influence one another reciprocally, over time producing an upward spiral in which people become better able to cope and experience appreciable increases in their well-being.

So, although positive emotions are short-lived, the broaden-and-build theory posits that the coordinated changes they produce in people's thoughts, actions, and physiological responses have long-lasting consequences. The experiments reported here represent the first steps toward testing one hypothesis drawn from the broaden-and-build theory: The hypothesis that positive emotion broadens the scopes of attention and cognition. Whereas these tests supported two versions of the broaden hypothesis, studies are still needed to test the build hypothesis. This more far-reaching hypothesis states that to the extent that positive emotions broaden people's momentary thought-action repertoires, they promote the discovery and development of people's strengths and resources, which serve as enduring reserves that can be accessed in times of need. We hope that the findings reported here, together with the broaden-and-build theory, might inspire additional empirical work on positive emotions. This line of inquiry promises substantial real-world significance: From it we may learn how positive emotions might serve as keys to human flourishing.

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