

Variations on a human universal: Individual differences in positivity offset and negativity bias

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The *positivity offset* refers to a tendency for the positive motivational system to respond more than the negative motivation system at low levels of evaluative input. The *negativity bias* refers to a tendency for the negative motivational system to respond more intensely than the positive motivational system when evaluative input increases. While there is evidence that these represent general aspects of evaluative responding, individuals also vary in their level of positivity offset and negativity bias. In two studies, we explore individual differences in these features of evaluative responding to determine if they are stable across time, internally consistent, only modestly related to self-report measures of affect, and have predictive validity. We found that individuals with stronger positivity offsets formed more positive impressions of targets described by only neutral information and individuals with stronger negativity biases formed even more negative impressions of targets described by negative information.

According to the Evaluative Space Model (ESM), positive and negative evaluative responses are governed by separable underlying motivational substrates. Moreover, these separable positivity and negativity systems are assumed to possess different operating characteristics (Cacioppo & Berntson, 1994; Cacioppo, Gardner, & Berntson, 1999; Ito & Cacioppo, 2001). Each motivational system is described by an activation function, which translates the value

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of separate and multifarious inputs onto common evaluative (positivity, negativity) metrics. The activation functions for positivity and negativity are hypothesised to differ in important ways. First, the positive motivational system is characterised by what has been called a *positivity offset*. This represents a tendency for the positive motivational system to respond more than the negative motivational system to comparably low levels of evaluative input (Boucher & Osgood, 1969; Cacioppo, Gardner, & Berntson, 1997; Kaplan, 1973; Matlin & Stang, 1978; Peeters & Czapinski, 1990). Said differently, when evaluative input is weak or absent, there will be more output from the positive than the negative motivational system. The second difference in the activation functions is a *negativity bias*, which represents a tendency for the negative motivational system to respond more intensely than the positive motivational system to comparable increases in input (Cacioppo et al., 1997; Kahneman & Tversky, 1984; Kanouse & Hanson, 1971; Peeters & Czapinski, 1990; Taylor, 1991). That is, as negative and positive inputs increase, the negative systems responds with greater relative increases in motivational output per quantum of activation than does the positive system.

Our assumption is that these features provide complementary adaptive benefits of appropriate exploration and approach in the absence of signals of danger, with intense responses when signals of harm do appear. Consistent with this, the positivity offset and negativity bias have been observed at the mean level in the attitude judgements of a wide range of objects, locations, animals, and people shown in colour photographs (Ito, Cacioppo, & Lang, 1998a). Another way of conceptualising the activation functions is as regression parameters, with the positivity offset representing a higher intercept value for the positive activation function and the negativity bias representing a steeper slope for the negative activation function. Using this approach, we assessed the positivity offset and negativity bias by performing regression analyses predicting strength of positive and negative reactions elicited by each stimulus from ratings of arousal, which were used as a proxy for motivational activation or input.¹ As expected, we obtained a higher intercept value predicting positivity than negativity from arousal ratings (the positivity offset) but a steeper regression line predicting negativity than positivity ratings from arousal (the negativity bias) (see Figure 1). These same effects have been replicated in evaluative reactions to words in a dataset called the Affective Norms for English Words

¹ Stimulus input strength—the variable of conceptual interest—represents features of the external stimulus that convey its affective meaning. In Ito et al. (1998a) as well as in the present studies, we use participants' responses to the stimuli as a proxy of the inherent properties of the stimuli. Although evaluative responses might seem like a reasonable candidate, they were not used because these are the very responses we wished to predict. Instead, we used normative arousal ratings of the stimuli. This was based both on arousal's common usage to represent response intensity and because valence and arousal are viewed as representing major (orthogonal) dimensions of affect/evaluation (e.g., Lang, Greenwald, Bradley, & Hamm, 1993; Russell, 1979).

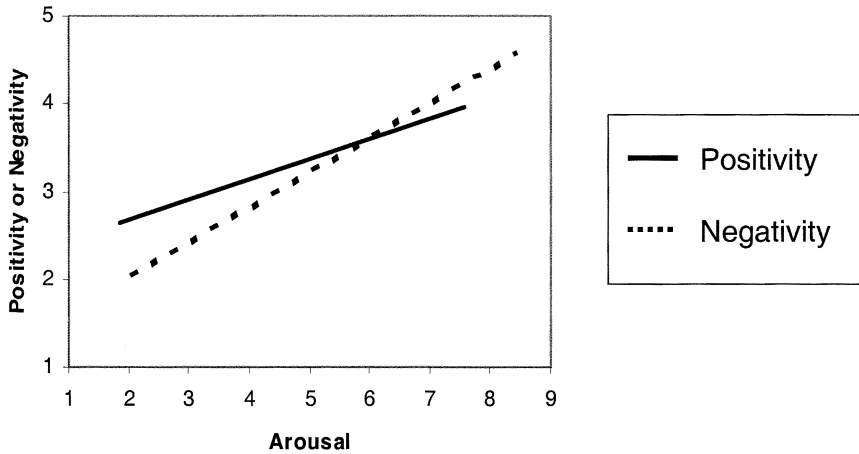


Figure 1. The positivity offset and negativity bias as seen in regression lines predicting mean positivity or mean negativity from mean arousal ratings of 256 positive and 216 negative items. For positivity, intercept = 2.20 and slope = 0.24. For negativity, intercept = 0.40 and slope = 1.19. (Adapted from: “Eliciting Affect Using the International Affective Picture System: Trajectories Through Evaluative Space,” by T. A. Ito, J. T. Cacioppo, and P. J. Lang, 1998, *Personality and Social Psychology Bulletin*, 8, p.872. Copyright 1998 by the Society for Personality and Social Psychology, Inc.)

(Ito, Larsen, Smith, & Cacioppo, 1998b). In addition, these activation functions manifest not only in self-report, but are also seen at the electrophysiological level (Ito & Cacioppo, 2000; Ito et al., 1998b; Smith, Cacioppo, Larsen, & Chartrand, 2003).

While a positivity offset and negativity bias appear to describe the general functional properties of the underlying positive and negative motivational systems, it is also possible that individuals differ in the strength of their positivity offset and negativity bias (for a similar argument, see Gohm & Clore, 2000). In fact, because variation is the engine of natural selection, we would expect features with adaptive benefits to vary among individuals. Thus, we would expect corresponding differences among individuals in the extremity of their responses when motivational input is held constant. Individuals with a stronger positivity offset would be expected to show even more positive responses at relatively low levels of activation of the positive evaluative system. Likewise, individuals with a stronger negativity bias would be expected to show even stronger responses to negative evaluative input. In two studies, we assess the temporal stability, internal consistency, and discriminant validity of these individual differences, and demonstrate their predictive validity in the form of individual differences in impression formation.

STUDY 1

Study 1 was designed to assess the temporal stability of individual differences in the positivity offset and negativity bias, their internal consistency, and aspects of discriminant validity. Conceptually, two types of evaluative responding are frequently studied: Specific reactions to concrete situations (e.g., whether a person feels less anxious before an exam if the number of test items is known) and more general response tendencies (e.g., whether the person is generally anxious and restless). For each of these dimensions, it is possible to assess how participants behave in these actual situations (e.g., by putting them in different types of test-taking situations, or by assessing lots of situations and making a general assessment of anxiety), or to ask for the participants' own construals of themselves along these dimensions (e.g., by asking the questions "Before a test, I feel much less anxious if I know how many questions there will be" or "I generally feel nervous and restless"). Our goal was to create a measure that was more process-based (i.e., relied on actual evaluative performance rather than retrospective recollections of evaluative behaviour). To do this, we employed procedures and analyses similar to those in Ito et al. (1998a) in which participants report their evaluations to a wide range of stimuli, with adaptations to allow for the assessment of individual differences. We compare our more process-based measures to a range of self-report measures of affective and evaluative experience.

Method

Overview and participants. A total of 78 students from introductory psychology classes at the Ohio State University participated in return for partial class credit. All completed two nearly identical sessions, separated by exactly one week and completed at the same time of day. In each session, participants reported the strength of their positive and negative evaluations of 100 pictured items. Packets of questionnaires were also completed in each session. Eleven participants were dropped from the analysis either because they failed to follow directions ($n = 7$) or because their picture ratings showed little to no variability ($n = 4$).² Analyses are therefore based on 67 participants.

Materials. Strength of positive and negative reactions to the pictures was rated using shortened versions of the Bivariate Evaluation and Ambivalence Measures (BEAMs; Cacioppo et al., 1997). The BEAMs contains subscales to separately measure positive and negative evaluations by asking participants to

² An additional 12 participants completed session 1 but did not return for session 2.

rate how well a series of adjectives describes their reactions. The full version of the BEAMs contains eight adjectives per dimension. In the interest of time, following Ito et al. (1998a), we had participants in the present experiment rate their reactions to each picture in terms of three adjectives. In addition, we used two alternative forms of the BEAMs for each rating, with different adjectives on each form. The specific adjectives used were: (a) positive form A, *delighted, approving, pleasant*; (b) positive form B, *happy, satisfied, good*; (c) negative form A, *unlikeable, unattractive, bad*; and (d) negative form B, *disapproving, distressed, disagreeable*.

A total of 50 generally positive and 50 generally negative pictures were chosen from the International Affective Picture System (Center for the Study of Emotion and Attention, 1995). Our goal was to equally sample stimuli across the full range from low valence/low arousal to high valence/high arousal. To do this, we used normative ratings of the pictures obtained in a previous term (Ito et al., 1998a). For stimuli that received normative bipolar valence ratings above the scale midpoint indicative of generally positive reactions, we fit a regression line predicting normative unipolar positivity ratings from normative arousal ratings. We then randomly choose 50 stimuli whose mean positivity ratings fell within ± 1 scale point of their predicted positivity ratings. Likewise, for stimuli that received a bipolar valence rating below the scale midpoint indicative of generally negative reactions, we fit a regression line predicting normative unipolar negativity ratings from normative arousal ratings and randomly choose 50 stimuli whose mean negativity ratings fell within ± 1 scale point of their predicted negativity ratings. This procedure ensured that unusual stimuli (e.g., a highly negative stimulus with extremely low arousal ratings) were not chosen.³

Participants completed four separate questionnaire packets throughout the two sessions. We had two goals in selecting questionnaires to administer. First, in order to minimise the possibility that the unipolar positivity and negativity BEAMs scales used to rate their reactions to the pictures would be treated as bipolar dimensions, we had participants complete one of the

³The picture numbers of the stimuli were: 1111, 1120, 1275, 1300, 1310, 1500, 1590, 1601, 1610, 1670, 1811, 1900, 1999, 2053, 2070, 2080, 2170, 2205, 2490, 2500, 2501, 2510, 2700, 2710, 2750, 2900, 3000, 3051, 3060, 3102, 3400, 4531, 4533, 4599, 4640, 4700, 5600, 5621, 5628, 5660, 5720, 5750, 5800, 5870, 5890, 5990, 6150, 6211, 6212, 6250, 6300, 6370, 6410, 6530, 6900, 6930, 7010, 7030, 7090, 7170, 7280, 7281, 7330, 7340, 7380, 7390, 7550, 7560, 7620, 7830, 7900, 8030, 8040, 8120, 8162, 8210, 8280, 8340, 8400, 8420, 8460, 8500, 9090, 9110, 9181, 9210, 9220, 9270, 9320, 9390, 9410, 9421, 9500, 9530, 9570, 9600, 9620, 9912, 9920, and 9921. Normative unipolar positivity and negativity ratings from Ito et al. (1998a) (rated on 5-point scales) were compared for the positive and negative pictures, revealing equivalent mean levels of evaluative extremity, $M_{\text{pos pictures}} = 3.48$ (range = 2.06–4.32), $M_{\text{neg pictures}} = 3.40$ (range = 1.08–4.77), $t(98) = 0.53$. Normative arousal ratings (related on a 9-point scale) were higher for negative ($M = 5.40$, range = 2.36–7.58) than positive pictures ($M = 4.48$, range = 2.07–7.80), $t(98) = 3.36$, $p < .001$, which is representative of the larger set of stimuli from which these were drawn (Ito et al., 1998a).

questionnaire packets in between ratings of positive and negative reactions to the pictures. In both sessions, the questionnaires in this packet emphasized cognitive as compared to affective or evaluative constructs, such as the Need for Cognition (Cacioppo & Petty, 1982). Because they are not of theoretical relevance, responses to these questionnaires will not be considered further. Our second goal in selecting questionnaires was to allow an assessment of the discriminant validity of our positivity offset and negativity bias measures. These questionnaires were contained in the second questionnaire packet completed in each session, which was administered after all evaluative reactions to the pictures had been collected. A subset of these were chosen because they separately assess an aspect of positive or negative evaluative processing (e.g., the Positive and Negative Affect Schedule, the Anger Expression Scale) and others because they assess commonalities or differences between two evaluative systems (e.g., the Affect Intensity Measure). In session one, this second packet consisted of: (a) Cook-Medley Hostility Scale (CMHo; Cook & Medley, 1954); (b) Life Orientation Test (LOT; Scheier, Carver, & Bridges, 1994); (c) Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1992); (d) Alexithymia (Taylor, Ryan, & Bagby, 1985); (e) UCLA Loneliness Scale (Russell, Peplau & Cutrona, 1980); and (f) Anger Expression Scale (AX; Spielberger et al., 1985). In session two, this second packet consisted of: (a) 12-item Fear of Negative Evaluation (FNE; Leary, 1983); (b) the trait version of the State-Trait Anxiety inventory (Spielberger, 1983); (c) the trait version of the State-Trait Anger Scale (Spielberger, Jacobs, Russell, & Crane, 1983); (d) Need to Evaluate (Jarvis & Petty, 1996); (e) Beck Depression Inventory (BDI; Beck, 1967); (f) Positive and Negative Affect Schedule (PANAS), completed with respect to the past week (Watson, Clark, & Tellegen, 1988); (g) Behavioral Inhibition System/Behavioral Activation System Scales (BIS/BAS; Carver & White, 1994); and (h) Affect Intensity Measure (AIM; Larsen & Diener, 1987).

Procedure. Experimental sessions involved between 2 and 11 participants seated at individual computer terminals. Participants viewed the pictures two times, separately rating the strength of their positive and negative evaluations toward the pictures. Order of the positive and negative ratings varied among sessions. The same general procedure was followed regardless of the type of rating performed. Each picture was shown on the screen for 6 seconds. Participants registered their rating by entering it directly on to their computer keypad. They could make their rating any time during the presentation of the picture. If the participant did not enter a rating during the picture presentation, the screen remained blank until the rating was entered. The next picture was shown one second after either the offset of the previous picture or the entry of the last rating, whichever came first.

The first adjective for the relevant rating dimension was displayed at the bottom of the computer screen simultaneous with the onset of the picture.

Participants rated the extent to which each adjective was a good descriptor of their reactions to the picture being shown on a 5-point scale by choosing among the options “very slightly/not at all”, “a little”, “moderately”, “quite a bit”, and “extremely”. After participants entered their rating for that adjective, the second and third adjective were sequentially displayed. A card mounted above the keypad displayed the labels for the five response options. Order of the adjectives varied across participants, with individual participants always receiving adjectives in the same order. Within a session, some participants used BEAMs form A and others form B.

After initial instructions were read, each participant worked at his/her own pace through the first presentation of the pictures. Once all pictures had been rated, a message on the computer screen instructed each participant to begin completing a packet of questionnaires. Written instructions at the end of the packet explained the next rating task and directed them back to the computer monitor, where they watched the pictures for a second time. Participants who had rated their positive evaluations during the first presentation now rated their negative evaluations and vice versa. Once finished with the picture ratings, a final questionnaire packet was completed.

Identical procedures were employed in the second session, except that different questionnaires were completed and pictures were presented in a different random order. Order of the rating task (positive first or negative first) and BEAMs version (form A or B) always matched the first session.

Computation of positivity offset and negativity bias indices. As previously noted, the positivity offset and negativity bias can be conceptualised in terms of regression parameters, with the positivity offset represented as the intercept for positivity (the output at zero input) and the negativity bias represented as the slope for negativity (greater rate of change in output per unit of input). In Ito et al. (1998a), we assessed the positivity offset and negativity bias *across* participants using two regression analyses in which mean arousal ratings, used as an indication of evaluative activation, separately predicted mean positivity and mean negativity ratings (see Figure 1). Similar analyses are performed here, with modifications to assess the positivity offset and negativity bias at the individual level.

Specifically, two regression analyses were conducted for each participant using the equation $E = Ax + b$, where E was either the participant’s unipolar positivity or negativity ratings, and A was the mean normative arousal rating from Ito et al. (1998a) for the corresponding picture. As in prior research (Ito et al., 1998a) arousal was used to represent motivational activation or input (see note 1). Although perhaps reducing the precision of our estimates, normative rather than participants’ own ratings were used because we were already collecting a large number of ratings from participants.

To model operation of the positive motivational system, this equation was computed using ratings of the generally positive stimuli, with each individual’s

unipolar positivity ratings serving as E . The intercept value represents the strength of the positivity offset. To model operation of the negative motivational system, this equation was computed using ratings of the generally negative stimuli, with unipolar negativity ratings serving as E . The slope represents the strength of the negativity bias. In this way, we obtained estimates of the positivity offset and negativity bias for each individual based on his or her own evaluative reactions.

Results

Presence of positivity offset and negativity bias at mean level. Each participant completed evaluative ratings of the picture stimuli on two occasions, separated by one week. We therefore computed positivity offset and negativity bias estimates at both time points. We first inspected the means of these estimates to assess replication of prior research in which the positivity offset and negativity bias were seen at the mean level (Ito et al., 1998a). Consistent with prior research, the equation predicting positivity was associated with a higher intercept ($M_{\text{time1}} = 2.52$ and $M_{\text{time2}} = 2.38$) than the equation predicting negativity ($M_{\text{time1}} = 1.30$ and $M_{\text{time2}} = 1.32$) in both sessions, $t(66) = 9.12$ and 5.96 , respectively, $ps < .0001$. There was also evidence of a negativity bias, with the slope for negativity ($M_{\text{time1}} = 0.39$ and $M_{\text{time2}} = 0.40$) significantly steeper than the slope for positivity ($M_{\text{time1}} = 0.23$ and $M_{\text{time2}} = 0.24$) in both sessions, $t(66) = 7.48$ and 5.93 , respectively, $ps < .0001$.

To further explore effects at the nomothetic level, we performed a 2 (Participant gender) \times 2 (Order of ratings: positive first, negative first) \times 2 (BEAMs version: form A, form B) analysis of variance (ANOVA) on each of the positivity offset and negativity bias parameters. There were significant main effects of gender on positivity offset at both time 1 and time 2, $F_s(1, 59) = 14.93$ and 15.21 , respectively, $ps < .001$. In both assessments, women ($M_{\text{time1}} = 2.89$ and $M_{\text{time2}} = 2.84$) had a higher positivity offset than did men ($M_{\text{time1}} = 2.18$ and $M_{\text{time2}} = 1.96$). There were no gender differences in the negativity bias at either assessment.

The positivity offset and negativity bias appear to represent independent aspects of evaluative processing, as suggested by nonsignificant correlations between participants' positive intercept and negative slope estimates at both time 1, $r(65) = -.08$, and time 2, $r(65) = .10$.

Temporal stability. Having confirmed that the positivity offset and negativity bias are seen on the mean level, we next assessed the temporal stability of these parameters by comparing time 1 and time 2 responses. To the extent that our indices reflect stable variations in level of positivity offset and negativity bias, we expect stability across the two testing sessions. This was obtained, with the positive intercepts yielding a time 1-time 2 correlation of

$r(65) = .67$ ($p < .001$), and the negative slopes also yielding a correlation of $r(65) = .67$ ($p < .001$).

The positive intercept and negative slope values in the preceding analysis can be viewed as raw component scores that directly reflect the offset and bias in the positive and negative evaluative systems, respectively. The positivity offset and negativity bias can also be assessed in a relative sense. Consequently, a difference score was computed by subtracting the intercept for the negativity equation from the intercept in the positivity equation, with increases in this difference indicating a larger positivity offset. Similarly, a second difference score subtracted the slope for the positivity equation from the slope for the negativity equation, with increases in this difference indicating a larger negativity bias. We assessed time 1-time 2 correlations for these difference scores, which were $r(65) = .57$, $p < .001$, for the positivity offset and $r(65) = .60$, $p < .001$, for the negativity bias.⁴

Taken together, these results confirm that both when the positivity offset and negativity bias are assessed in terms of the relevant raw component processes (i.e., the intercept for the positivity equation and the slope for the negativity equation, respectively), and when they are operationalised in a relative sense (i.e., the intercept in the positivity equation relative to the intercept in the negativity equation and the slope for the negativity equation relative to the slope for the positivity equation, respectively), there is consistency within an individual across time. Not surprisingly, the temporal stability of the raw component scores was slightly better than that for the difference scores.

Internal consistency. To obtain an estimate of the internal consistency of our positivity offset and negativity bias estimates, we performed a split-half analysis by randomly dividing the positive and negative pictures into two subsets. We then ran the regression analyses estimating the positivity offset and negativity bias separately using data from each subset of pictures. Internal consistency was assessed as the relationship between estimates from the two different subsets of pictures. This was done separately for the time 1 and time 2 data, yielding an assessment of internal consistency at both measurements.

This internal consistency analysis was first performed on the raw component estimates (i.e., the positive intercept and negative slope) revealing acceptable levels of internal consistency. In all cases, the estimates obtained from the split-halves were significantly correlated. Considering first the positivity offset estimates, the correlation of the positive intercept values at time 1 between the analyses run on the two split-halves was $r(65) = .49$, $p < .001$. In the time 2 data,

⁴The correlations among the values that form the difference scores were as follows: positive intercept with negative intercept at time 1, $r = .25$, $p < .05$; positive intercept and negative intercept at time 2, $r = -.10$; negative slope with positive slope at time 1, $r = .12$; and negative slope with positive slope at time 2, $r = -.11$.

this correlation was $r(65) = .59, p < .001$. For the negativity bias, the correlation of the negative slopes at time 1 between the two split-halves was $r(65) = 0.51, p < .001$. At time 2, this correlation was $r(65) = 0.56, p < .001$.

We also computed the internal consistency of the difference scores, computed as described earlier, which operationalise the positivity offset as the operation of the positive motivational system relative to the negative motivation system and the negativity bias as the operation of the negative motivational system relative to the positive motivational system. This analysis yielded four estimates for each parameter (e.g., for the positivity offset, these were the positivity offset difference score for the first half of time 1 data, the second half of time 1, the first half of time 2 data, and the second half of time 2 data). For the positivity offset difference score, the correlations between the estimates based on the split-halves of the data were $r(65) = .41, p < .001$ at time 1, and $r(65) = .65, p = .001$ at time 2. For the negativity bias difference score, the correlations between the estimates based on the split-halves of the data were $r(65) = .21, p = .09$ at time 1 and $r(65) = .51, p < .001$ at time 2. On balance, while some of the difference scores demonstrated adequate internal consistency, the raw component scores tended to outperform the difference scores on this dimension.

Issues of discriminant validity. The final issue we wished to address in this study was whether individual differences in the positivity offset and negativity bias are distinguishable from other mood and affect-related constructs. We chose to evaluate this by assessing the relation of the questionnaires to the positivity intercept and negativity slope values (rather than the difference scores) for three reasons. First, as previously noted, many of the administered questionnaires were chosen because they separately assessed an aspect of positive or negative affective processing. Using the raw scores as opposed to difference scores should increase our sensitivity to any relations with these types of questionnaires. Second, temporal stability and internal consistency were higher for the raw component scores as compared to the differences scores. Third, the raw scores and difference scores were significantly correlated.⁵ Thus, for conceptual and psychometric reasons, the raw scores seemed more appropriate. Nevertheless, in recognition that the positivity offset and negativity bias are each influenced by the operation of both evaluative systems, we computed partial correlations. To account for the operation of the negative evaluative system at low levels of input, the correlation of the positive intercept value with the questionnaires controlled for negative intercept values. Similarly, to account for responsiveness of the positive evaluative system, the correlation of

⁵ The correlation between the positive intercept values and the positivity offset difference score was $r = .46, p < .0001$ at time 1, and $r = .61, p < .0001$ at time 2. The correlation between the negative slope values and the negativity bias difference score was $r = .77, p < .0001$ at time 1, and $r = .78, p < .0001$ at time 2.

the negative slope value with the questionnaires controlled for positive slope values.

We accommodated one final statistical consideration. Because the arousal values we used have only positive values, the intercept and slope values from a single regression analysis will be negatively correlated. To assess variance due to the operation of the positive evaluative system at low levels of activation (the intercept) that is independent of any effects of the change in positivity due to increases in activation (the slope), the partial correlations of positive intercept values also controlled for positive slope values. Similarly, to assess variance in negative evaluations due to increases in activation (the slope) that is independent of negative activation at low levels of activation (the intercept), the partial correlations of negative slope values also controlled for negative intercept values.

Correlations of the positivity offset and negativity bias parameters with the administered questionnaires are shown in Table 1. The number of participants with complete data varied across scales and is also shown in the table. To increase sensitivity, each questionnaire was correlated with the positivity offset and negativity bias indices computed from the session in which it was administered. That is, a questionnaire administered in session 1 was correlated with the indices calculated from ratings also collected in session 1.

The most notable feature of these results is the relatively weak relations of the positivity offset and negativity bias indices to other mood and affect-related constructs, suggesting that we are assessing aspects of the affect systems different than those tapped by traditional self-report measures. Of the 52 correlations shown in Table 1, only 4 reached statistical significance: The positivity offset was negatively correlated with loneliness, but positively so with the PA subscale of the PANAS. The negativity bias was positively correlated with PA and with the AIM.⁶

Discussion

Study 1 provides initial support for our hypothesis that individuals can differ with respect to the strength of their positivity offset and negativity bias. Using a procedure designed to assess evaluative reactions to a wide range of stimuli, we observed individual differences that were reasonably stable across time and

⁶ We also examined the simple correlations between the questionnaire measures and the positivity offset and negativity bias raw component scores. As with our main analyses, there were generally weak relations. Only three significant correlations were obtained: (a) positivity offset with total BIS, $r = -.24, p < .05$; (b) negativity bias with Alexithymia; $r = -.25, p < .05$; and (c) negativity bias with Anger In, $r = -.29, p < .05$. We also correlated the positivity offset and negativity bias difference scores with the questionnaires, revealing no significant relations. Thus, these additional analyses are consistent with the conclusion that our measures of positivity offset and negativity bias are distinguishable from the constructs tapped by these questionnaire measures.

TABLE 1
Study 1: Correlations of positivity offset and negativity bias with administered questionnaires

		<i>Session 1, Packet 2</i>									
<i>CMHo</i>		<i>LOT</i>	<i>POMS Total disturbance</i>	<i>POMS Tension-anxiety subscale</i>	<i>POMS Anger-hostility subscale</i>	<i>POMS Vigor-activity subscale</i>	<i>POMS Confusion-bewilderment subscale</i>	<i>POMS Fatigue-inertia subscale</i>	<i>POMS Depression-dejection subscale</i>		
Positive intercept	<i>r</i>	.05	-.01	-.05	.03	.04	.04	.08	.01		
	<i>N</i>	63	65	65	65	65	65	65	65		
Negative slope	<i>r</i>	.04	-.13	-.06	-.03	.17	-.01	-.05	.04		
	<i>N</i>	63	65	65	65	65	65	65	65		

		<i>Session 2, Packet 2</i>									
<i>Alexithymia</i>		<i>UCLA Loneliness</i>	<i>Anger control subscale</i>	<i>Anger in subscale</i>	<i>Anger out subscale</i>	<i>FNE</i>	<i>Trait anger</i>	<i>Trait anxiety</i>	<i>Need to evaluate</i>	<i>BDI</i>	
Positive intercept	<i>r</i>	-.02	-.12	-.10	-.10	-.03	-.09	-.04	.00	-.14	
	<i>N</i>	63	64	63	64	65	65	65	65	65	
Negative slope	<i>r</i>	-.12	-.23	-.16	-.03	-.08	-.04	-.08	-.14	-.19	
	<i>N</i>	63	64	63	64	65	65	65	65	65	

Session 2, Packet 2

	<i>PA</i>	<i>NA</i>	<i>BIS</i>	<i>BAS</i> <i>Reward</i> <i>potential</i> <i>subscale</i>	<i>BAS</i> <i>Drive</i> <i>subscale</i>	<i>BAS</i> <i>Fun-seeking</i> <i>subscale</i>	<i>AIM</i>
Positive intercept	<i>r</i> .24 ^a	-.06	-.10	-.21	-.04	-.18	.20
	<i>N</i> 65	65	65	65	65	65	65
Negative slope	<i>r</i> .35**	-.13	.02	-.07	-.16	-.15	.26*
	<i>N</i> 65	65	65	65	65	65	65

Note: Values are partial correlations. Correlations with positive intercept control for negative intercept and positive slope, and correlations with negative slope control for positive slope and negative intercept. * $p < .05$; ** $p < .01$; ^a $p = .054$.

internally consistent. Conceptually, both the positivity offset and negativity bias describe relative differences in the activation functions of the positive and negative motivational substrates. Psychometrically, however, it was not surprising that when the positivity offset and negativity bias were operationalised as difference scores, internal consistency, and temporal stability were weaker than when these properties were assessed with the raw component scores (i.e., intercept in the positivity equation and slope in the negativity equation). These results suggest that individual differences may be best captured in the raw component scores.

STUDY 2

While Study 1 represents a first step in assessing implications of individual differences in affective asymmetry, it did not address the predictive utility of these individual differences. For example, in prior research, the positivity offset has manifested in outcomes such as more positive than negative evaluations of individuals described only by neutral information (Cacioppo et al., 1997). The negativity bias has been demonstrated in outcomes such as greater change in evaluations following the presentation of negative than comparably extreme positive information (Cacioppo et al., 1997; Kanouse & Hanson, 1971). To the extent that individuals vary in the strength of their positivity offset and negativity bias, we would expect to see individual variability in these manifestations of evaluative output. Accordingly, our goal in Study 2 was to assess differences in evaluative responding as a function of differences in individuals' positivity offsets and negativity biases.

Because it represents such a ubiquitous aspect of daily experience, the evaluative implications of these individual differences on impression formation were assessed. We also chose this domain because effects of the positivity offset and negativity bias on impression formation have been previously observed at the nomothetic level (Cacioppo et al., 1997). We presented participants with behavioural descriptions of differing evaluative implications. In the first phase, all participants read only neutral descriptions. Impressions measured here assess the operation of the positivity offset (i.e., positive output at low levels of activation). If our positivity offset index represents stable, cross-situational differences in the operation of the positive evaluative system, we would expect the positivity of impressions after the presentation of only neutral information to increase as a function of the strength of an individual's positivity offset. In a subsequent phase, positive, negative, or a combination of positive and negative behavioural descriptions were presented. Since the evaluative systems are receiving evaluative input, impressions assessed here address the negativity bias. When negative information is received, either alone or in combination with positive information, we expect the negativity of impressions to increase as a function of the strength of an individual's negativity bias. As in Study 1, the

positivity offset and negativity bias were estimated for each individual based on the picture rating task.

The sample size of Study 1 raises the possibility that statistical power contributed to the general absence of significant relations of the positivity offset and negativity bias indices with the questionnaires. Note, however, that the correlations in Table 1 not only failed to reach statistical significance, but were also modest in absolute size. Nevertheless, to ensure a more robust assessment, a subset of the questionnaires from Study 1 were administered again in Study 2, which contained a much larger sample.

Method

Participants and overview. A total of 177 students from introductory psychology classes at the University of Colorado participated in return for partial class credit. All completed a single two-task session, first rating pictures along dimensions of positivity and negativity, then completing an impression formation task modeled after Cacioppo et al. (1997). Data from 31 participants were omitted because of program errors ($n = 6$), or because participants failed to follow directions ($n = 24$),⁷ or their picture ratings showed no variability ($n = 1$). Analyses are therefore based on 146 participants.

Materials. As in Study 1, the three-item versions of the BEAMs were used to obtain positivity and negativity ratings of the picture stimuli. Because ratings of only a single individual were required, the full eight-item version was used to collect positive and negative reactions to the impression formation target in the second part of the study. In addition to the three items used for the picture ratings, adjectives on the eight-item versions were: (a) positive form A, *favourable, agreeable, appealing, comfortable, rewarding*; (b) positive version B, *desirable, positive, likeable, supporting, attractive*; (c) negative version A, *unsatisfying, opposing, negative, unhappy, undesirable*; and (d) negative version B, *unfavourable, unappealing, unpleasant, punishing, uncomfortable*.

The same picture stimuli from Study 1 were used here. Due to an error in programming, two of the pictures (numbers 7010 and 9210) were never shown. The analyses reported here are therefore based on responses to 48 negative and 50 positive stimuli

Six each of behavioural descriptions of a fictitious person named Sam that had been pilot tested to be neutral (e.g., “Sam was exposed to sunlight”), positive (e.g., “Sam gave back extra change at the supermarket”), or negative

⁷More participants appeared to have trouble following procedures in Study 2 because their ratings were recorded on paper rather than entered directly into the computer. This provided more opportunity for error, as the omitted participants at some point recorded the rating for a given picture on the line allocated for another one. The resulting ambiguity about which picture the value referred to lead us to conservatively drop their data.

(e.g., “Sam stole vegetables from his neighbour’s garden”) were chosen from Gardner (1996).

Procedure. One to six individuals participated in a single session, with each seated at a computer located in a separate room adjacent to a common room. The first part of the experiment consisted of the picture rating task from which individual difference estimates of positivity offset and negativity bias were obtained. Procedures were identical to Study 1 except participants recorded their ratings on an answer sheet rather than entering them directly into the computer. Participants again completed filler questionnaires, such as the Need for Cognition, between the two ratings. A message on the computer screen instructed participants to inform the experimenter when they had finished the second picture rating task. At this point, the experimenter provided instructions for the impression formation task. They were told they would be shown information and were to form an impression about a person named Sam. Behavioural descriptions were then presented on their computer, with each description presented for 7 s.

All participants were initially presented with six evaluatively neutral descriptions and then were directed to a questionnaire packet in which to report their impressions of Sam. This packet contained the BEAMs positivity and negativity. The valence of the ratings made first about Sam matched the valence of the ratings made first in the picture rating task. For example, if participants had completed positivity ratings first during the picture task, they also rated their positive impressions of Sam first. The other evaluative dimension was rated second. The version of the BEAMs used in this phase was the same as the one used in the picture rating task. That is, if participants used BEAMs form A in the picture task, they also used BEAMs form A to report their initial impressions of Sam. As with the picture tasks, we inserted filler questionnaires in between the ratings to minimise carryover.

After rating their initial impressions of Sam, participants were shown six additional behavioural descriptions in a second impression formation phase. Participants were randomly assigned to one of three different information valence conditions at this point, receiving either six positive, six negative, or a mix of three positive and three negative behaviours. This latter condition was included to provide an assessment of whether the negativity bias predicts the strength of negative reactions under conditions in which information of mixed valences is presented. Participants then completed a final questionnaire packet in which they reported their final impression of Sam. Order of the evaluative ratings was the same as in the picture rating task and the initial impression formation assessment. However, participants used the alternative form of the BEAMs. Thus, if a participant used BEAMs form A to rate the pictures and convey their initial impressions of Sam, they now used form B. The PANAS and the BIS/BAS questionnaires were inserted in between the two evaluative measures, and the LOT was completed at the end.

Results

Presence of positivity offset and negativity bias at mean level. Positivity offset and negativity bias parameters were computed for each individual according to the procedures described in Study 1. As in Study 1, the positivity offset and negativity bias were seen at the mean level. The equation predicting positivity produced higher intercepts ($M = 2.67$) than the equation predicting negativity ($M = 1.03$, $t(145) = 15.63$, $p < .001$) and the slope for negativity ($M = 0.41$) was significantly steeper than the slope for positivity, $M = 0.18$, $t(145) = 13.24$, $p < .001$. Thus, replicating Ito et al. (1998a), positivity offset and negativity bias were again seen across participants.

As in Study 1, we performed a 2 (Participant gender) \times 2 (Order of ratings: positive first, negative first) \times 2 (BEAMs version used in picture task: form A, form B) ANOVA on the positivity offset and negativity bias parameters. Replicating Study 1, there was a main effect of gender for positivity offset, $F(1, 137) = 9.05$, $p < .005$, with women showing a stronger positivity offset ($M = 2.91$) than men ($M = 2.41$). The gender main effect for negativity bias approached significance in this study, $F(1, 137) = 3.36$, $p = .07$, with women showing a stronger negativity bias ($M = 0.43$) than men ($M = 0.39$).

In Study 1 the intercept in the positivity equation and the slope in the negativity equation were virtually uncorrelated at both measurements. In Study 2, the correlation was still modest in size, but did reach statistical significance, $r(144) = .17$, $p < .05$.

Discriminant validity. Questionnaires in Study 2 were always administered between positive and negative versions of the BEAMs. Although their primary purpose was to decrease consistency pressures among the separate measures, we included some questionnaires that measure individual differences in aspects of positive and negative affect—the PANAS, BIS/BAS, and LOT. In order to provide an additional assessment of discriminant validity, we examined the relationship between these questionnaires and the positivity offset and negativity bias indices. As in Study 1, questionnaire responses were compared to the raw positive intercept and negative slope values rather than to difference scores and represent partial correlations in which the r for positivity offset controls for the intercept in the negativity equation and slope in the positivity equation, and the r for the negativity bias controls for the slope in the positivity equation and intercept in the negativity equation.⁸ Replicating Study 1, the positivity offset

⁸To compare to Study 1 (see notes 5 and 6), the correlation of positive intercept with negative intercept was $r = .12$, n.s. Between negative slope and positive slope, $r = -.30$, n.s. The raw component scores for positivity offset and negativity bias were correlated with the difference scores, as in Study 1. Specifically, the correlation between the positive intercept value the positivity offset difference score (positive intercept-negative intercept) was $r = .76$, $p < .0001$. The correlation between the negative slope value and the negativity bias difference score (negative slope-positive slope) was $r = .73$, $p < .0001$.

was positively correlated with PA (see Table 2). Positivity offset was also negatively correlated with the BAS Reward Potential subscale of the BAS/BIS and positively correlated with the LOT. The negativity bias was negatively correlated with the BIS subscale of the BIS/BAS.⁹

Predicting attitude formation and change. The main goal of this study was to assess the effects of differences in the strength of the positivity offset and negativity bias on impression formation. This was assessed in a series of regression analyses predicting different aspects of impressions of Sam, the impression formation target. Given the superior psychometric properties of the raw component scores (i.e., intercept in the positivity equation and slope in the negativity equation) as compared to intercept and slope difference scores, we performed these analyses using the former. Positive and negative attitudes toward Sam after the presentation of only neutral behavioural information were predicted in separate regression analyses using the following predictors: (a) the positivity offset index; (b) the negativity bias index; (c) the order of positive and negative ratings of Sam; (d) BEAMs version (form A or B); (e) the valence of second Sam information; (f) the slope in the positivity analysis; and (f) the intercept in the negativity analysis. As with the correlational analyses, the last predictors were included so the operation of the positive evaluative system at

TABLE 2
Study 2: Correlations of positivity offset and negativity bias with administered questionnaires

		<i>PA</i>	<i>NA</i>	<i>BIS</i>	<i>BAS</i> <i>Reward</i> <i>potential</i> <i>subscale</i>	<i>BAS</i> <i>Drive</i> <i>subscale</i>	<i>BAS</i> <i>Fun-</i> <i>seeking</i> <i>subscale</i>	<i>LOT</i>
Positive intercept	<i>r</i>	.21**	-.01	-.01	-.17*	.04	-.12	.17*
	<i>N</i>	142	142	139	141	141	141	142
Negative slope	<i>r</i>	.09	.03	-.26**	-.15	.15	.04	.04
	<i>N</i>	142	142	139	141	141	141	142

Note: Values are partial correlations. Correlations with positive intercept control for negative intercept and positive slope, and correlations with negative slope control for positive slope and negative intercept. * $p < .05$; ** $p < .01$.

⁹ As in Study 1, we also examined the simple correlations of the positivity offset and negativity bias raw component scores with the questionnaires, which replicated the relation between positivity offset and PA, $r = .20$, $p < .05$. We also compared the positivity offset and negativity bias difference scores to the questionnaires. Consistent with the partial and simple correlation analyses, the positivity offset difference score was correlated with PA, $r = .25$, $p < .01$. The negativity bias difference score was also correlated with PA, $r = .17$, $p < .05$, and with the BAS Fun subscale, $r = .21$, $p < .05$.

low levels of input could be assessed independent of any effects of the change in positivity due to increases in activation, and the response of the negative evaluative system could be assessed independent of any effects of negativity at low levels of activation. Although valence of the information learned about Sam in the second phase was not expected to predict impression formation after only the first phase of information presentation, we included this variable for the sake of completeness. We did so with two contrasts, with the first comparing the positive information condition to the negative and mixed conditions (contrast weights of 2, -1, -1, respectively), and the second comparing the negative to the mixed information condition (contrast weights of 1, -1, respectively). This resulted in eight total predictors in the analysis.

To assess attitude change after the second phase of behavioral descriptions, we computed change scores (phase 2-phase 1) for positive and negative attitudes. These analyses included the same predictors as the phase 1 data, plus interaction terms between the individual difference indices and the two contrasts coding for valence of information. Continuous variables were mean deviated in all analyses.

Positive attitudes in phase 1: Hypothesis 1. Nomothetically, the positivity offset predicts that attitudes will be more positive than negative when only neutral information is known. Idiographically, individuals with a stronger positivity offset should report even more positive evaluations of Sam after receiving only neutral information. This was examined by assessing the intensity of positive attitudes following the first phase of (neutral) behavioural descriptions. As predicted, strength of positivity offset was a significant predictor of positive attitudes, $B = 0.33$, $t(138) = 2.90$, $p < .005$. No other predictors were significant.

Change in negative attitudes: Hypothesis 2. Hypothesis 2 states that reactions to negative information should increase as a function of the strength of an individual's negativity bias. Thus, we would expect the strength of the negativity bias to predict increases in negative attitudes among participants exposed to negative behavioural descriptions in phase 2 (the negative and mixed valence conditions). Analyses revealed that the strength of the negativity bias predicted the increase in negative attitudes in phase 2, $B = 1.67$, $t(134) = 2.06$, $p < .05$. More importantly, this effect was moderated by the valence of the information presented about Sam in phase 2, which took the form of an interaction between negativity bias and the condition contrast comparing positive to the negative and mixed information conditions, $B = -1.74$, $t(134) = 2.28$, $p < .05$. The interaction was explored by computing the simple slopes predicting change in negative attitudes toward Sam from the strength of an individual's negativity bias in the negative and mixed versus the positive information condition. These revealed the expected positive relation when negative and mixed information was presented, $B = 3.42$, indicating that when any negative information was learned about Sam (i.e., either

the negative or mixed condition), people with a larger negativity bias responded with larger increases in negative attitudes. Said differently, individuals with a stronger negativity bias form more negative attitudes when presented with negative behavioural information than do individuals with a weaker negativity bias. The simple slope when positive information was learned was $B = -1.81$.

This analysis also revealed main effects of condition. Negative attitudes increased more in the negative and mixed valenced conditions than in the positive condition, $B = -0.49$, $t(134) = 8.72$, $p < .001$. The negative condition, in turn, led to larger increases than the mixed condition, $B = 0.62$, $t(134) = 6.43$, $p < .001$. These results indicate that our manipulations of information valence were successful in affecting final impressions.

GENERAL DISCUSSION

The ability to perform positive and negative evaluations is a human universal, with survival depending on appropriately recognising beneficial and harmful stimuli. Even when not relevant to immediate survival, evaluative processes contribute to a harmonious and rewarding social life. According to the ESM, these necessary evaluations are performed by separable positive and negative motivational substrates, each with unique activation functions that are automatically adjusted to fit the affective stimuli encountered within a ecological niche. Consistent with this hypothesis, our findings in these two studies demonstrate a positivity offset and negativity bias at the mean level. More importantly, however, they show evidence of individual differences in these affective asymmetries.

Study 1 developed a method for quantifying individual differences in positivity offset and negativity bias that relied on on-line evaluative responding. The results revealed individual differences that were stable across time, internally consistent, and distinct from other aspects of self-reported affect and mood. Study 2 revealed that individual differences in positivity offset and negativity bias predict cross-situational evaluative outcomes. Individuals with a stronger positivity offset formed even more positive impressions of a target person after the first phase of information presentation in which only neutral information was presented. In phase 2, strength of negativity bias predicted negative impressions among participants presented with negative behavioural information. Stronger negativity biases were associated with more negative impressions. These results help to explain the not uncommon experience of meeting someone new and forming a different impression than someone involved in the exact same interaction. How is it, we wonder, that our friend or spouse arrived at such a different opinion when privy to the same information? The results of Study 2 suggest that such variations can be at least partly explained by stable differences in the operation of the underlying evaluative systems.

The correlation obtained between individuals' positivity offset and negativity biases in Study 2 indicates a slight tendency for the two forms of evaluative extremity to coexist. However, the correlation in Study 2 was not large in absolute size and the corresponding correlations in Study 1 were not significant, together suggesting that while the factors may tend to covary, the degree to which an individual demonstrates a positivity offset is largely independent of the degree to which a negativity bias is demonstrated. This is consistent with the assumption that positive and negative evaluations are derived from partially separate substrates, that each substrate has its own activation function, and that each activation function has its own operating characteristics.

In Study 2, reactions to the pictures and to Sam were assessed on similar measures, but we do not think the relations obtained between the positivity offset and negativity bias and impressions are based solely on this similarity. First, the impressions of Sam assessed after the second phase of information presentation were measured with a different BEAMs form than the one used to assess reactions to the pictures. Thus, while both asked participants to describe their reactions in terms of a series of adjectives, the adjectives used were different. Second, while impressions of Sam assessed after the first phase of information presentation were made with the same BEAMs version as the reactions to the pictures, supplemental analyses indicate that the common adjectives were not responsible for the observed effects. We computed attitudes toward Sam in phase 1 based only on responses to the five adjectives not common to the picture rating task. Consistent with the main analyses, positive impressions of Sam calculated in this way were significantly predicted by the strength of the positivity offset.

Comparisons to other measures

The generally weak correlations between the positivity offset and negativity bias measures and the wide range of questionnaires we administered suggest that our indices reflect unique aspects of evaluative processing not currently represented by extant questionnaires. Of the significant correlations obtained, only one, the positive correlation of the positivity offset with PA, was obtained in both studies. As we have noted, assessments of affective and evaluative experience can differ on at least two important dimensions: Whether general response tendencies versus reactions to a concrete situation/stimulus are assessed, and whether the former are based on actual affective/evaluative responses or on retrospective recollections. The generally weak relations of our indices to the questionnaires may reflect differences along these dimensions. Our positivity offset and negativity bias measures were estimated from on-line reactions to specific stimuli whereas the questionnaires tended to assess recollections of general response tendencies. Of course, it is interesting that increases in positivity offset were

associated with increases in PA given that the PA scale asked for ratings of the extent to which various positive states had been experienced over the past week. Thus, it assessed recollections of general responses. The underlying source of this coherence despite the differences in measurement is of interest, especially given that this was the only such instance that replicated across both studies.

Gender differences

Women showed a significantly larger positivity offset than men in both studies, and a marginally larger negativity bias in Study 2. These effects are consistent with other differences in evaluation and affective responses that have been obtained between men and women. Women, for instance, sometimes form more extremely positive impressions and experience and express more positive emotions than men (Allen & Haccoun, 1976; Kohn & Fielder, 1961; Warr, 1971; Wood, Rhodes, & Whelan, 1989). Our results might therefore suggest that these previously observed gender differences are driven by gender-related differences in positivity offset and perhaps negativity bias. However, impressions of Sam in Study 2 did not differ as a function of gender, nor were there gender differences on the questionnaires that most closely assess affective state, such as the PANAS and POMS in either Study 1 or 2. Moreover, women also often exceed men in self-reported negative emotions, such as sadness and anxiety (Feingold, 1994; Nolen-Hoeksema & Rusting, 1999) but the negativity bias of women did not consistently exceed that of men. The implication of gender differences in positivity offset and negativity bias are therefore unclear, especially with respect to how they relate to gender differences in other forms of evaluative and affective reactions.

Future directions

Given that individuals vary in the strength of their positivity offset and negativity bias, and that these differences vary systematically as a function of gender in the case of the positivity offset, the source of these differences is of interest. Biological factors are one potential source of the variation we observed. The presence of the positivity offset and negativity bias at the species level has been described as evolving to benefit survival (Cacioppo & Berntson, 1994; Cacioppo et al., 1997). To the extent that these species-level benefits are transmitted genetically, it is not unreasonable to expect the introduction of variation in the relevant genetic mechanisms, which could subsequently contribute to the variability observed here.

The influence of socialisation and other aspects of the social context could also contribute to stable evaluative differences. For example, a child whose parents encourage approaching new people and experiences may develop a stronger positivity offset than a child for whom watchfulness is encouraged. Similarly, reinforcement for extreme reactions to frustration, threat, or loss may encourage a more reactive negative evaluative system that contributes to a

stronger negativity bias. The role of social factors is especially intriguing in light of our observed gender difference in positivity offset and the popularity of socialisation-based explanations in the literature on gender differences in emotionality (Nolen-Hoeksema & Rusting, 1999). Of course, it is very likely that the effects observed here result from an interplay between biological and social factors. The search for these causal mechanisms will be relevant to a broad range of affective and emotional processes.

The same operationalisations were used in the two studies reported here because the studies represented initial investigations of these individual differences. It will also be important to investigate converging operationalisations in future research. Alternative operationalisations of constructs, such as evaluative input, might be assessed, including things such as participants' own arousal ratings, or some type of physiological response such as sympathetic nervous system activation.

Evaluative responding can be broken down into a number of identifiable component processes that might include aspects of perception, categorisation, and response generation. The self-reported responses we assessed here reflect the final output of the entire evaluative process. One could ask where in the process the positivity offset and negativity bias are introduced. Because we view the positivity offset and negativity bias as features of the underlying positive and negative evaluative systems themselves, we expect these individual differences to be introduced relatively early in evaluative processing. This is not to say that evaluative bias could not also be introduced at later stages, such as response generation, only that we expect these differences to also be present at earlier stages of evaluative activation. Electrophysiological studies investigating the operation of the negativity bias at the nomothetic level suggest that it manifests in early evaluative categorisation processes (Ito & Cacioppo, 2000; Ito et al., 1998b; Smith et al., 2002), but direct tests of whether *individual differences* in both the positivity offset and negativity bias are seen at similarly early stages are needed.

In sum, the studies reported here suggest that evaluations are performed by separable positive and negative motivational systems, each with a unique activation function. Across individuals, the activation functions take the form of a positivity offset and a negativity bias. These two features may have evolved in tandem, with the positivity offset ensuring recognition of relatively scarce positive experiences and the negativity bias ensuring intense responses to potentially harmful stimuli (Cacioppo & Berntson, 1994; Cacioppo et al., 1999, Ito & Cacioppo, 2001; Peeters & Czapinski, 1990). Whereas these aspects of evaluative responding may describe evaluative experiences in general, the studies reported here suggest individual variability in these features. Across situations, we expect individuals with stronger positivity offsets to respond with even more positivity in relatively neutral situations than individuals with weaker positivity offsets. They may begin to like a new song on the radio after fewer

listenings than an individual with a weaker positivity offset. Likewise, across situations, individuals with a stronger negativity bias are expected to respond more intensely to negative input than those with a weaker negativity bias. These individuals may be even more dejected following their \$100 loss in Las Vegas than individuals with a weaker negativity bias.

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