Affective Influences on Evaluative Processing

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The past three decades have seen considerable debate about affect's influence on judgment. In three experiments, following manipulations of incidental, integral, and cognitively based affect, positive affect results in more efficient processing while negative affect appears to make judgments both less efficient and more effortful. Affect's influence is inferred from the consistency of participants' responses and the pattern of the positive-negative response latency asymmetry reported by Herr and Page, in which positive judgments appear to be relatively effortless and automatic while negative judgments require effortful and controlled processing. Positive affect reduced or eliminated the asymmetry while negative affect exacerbated it. Affect's influence appears consistent with a view of positive affect-induced processing efficiency.

Affective evaluations are fundamental to everyday experience. Initial affective appraisals play a significant motivational role in guiding how we interact with our environment, helping to determine what we should approach or avoid. Moreover, these affective judgments have considerable influence on people's ensuing decisions and information processing. As Zajonc (1980, 155) provocatively argues, all decisions contain some affect. As an example, he notes that, "Quite often 'I decided in favor of X' is no more than 'I liked X.'" He further adds, "We buy the cars we 'like,' choose the jobs and houses that we find 'attractive,' and then justify those choices by various reasons" (155). During this justification process, a confirmatory search for information is performed to help support individuals' initial affective judgments, in turn increasing the subjective value of their judgments (Pham 2007; Pham et al. 2001; Yeung and Wyer 2004). Consequently, affective appraisals have a powerful impact on reactions to, decisions about, and cognitive processing of people and objects in our environment.

While affect is argued to have widespread effects on evaluative processing, the precise nature of its influence has been the subject of much debate. For instance, one view holds that positive affect is more closely associated with heuristic processing and negative affect with systematic processing (Forgas 1992, 1998, 2001; Schwarz and Bless 1991; Schwarz and Clore 1983). Accordingly, individuals have been characterized as "happy and mindless" or "sad and smart" (Schwarz and Bless 1991). The decreased processing associated with positive affect is argued to diminish reasoning and decision making, while negative affect, associated with enhanced information processing, is believed to lead to better or "smarter" judgments: a negative affect processing quality effect. Likewise, the affect-as-information hypothesis suggests that positive affect signals a benign environment, requiring little action by the individual, and thus minimal processing. Negative affect, though, may signify a

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problem in the environment. Facing a problem, the individual may be motivated to exert identification and remedial effort.

In contrast, work by Isen (2004) and others suggests that positive affect actually improves processing efficiency and quality. They demonstrate that positive affect enables people to generate more unusual and diverse first associates to neutral words (Isen et al. 1985; Kahn and Isen 1993), to categorize objects more flexibly (Isen and Daubman 1984; Murray, Sujan, and Hirt 1990), to form broader consideration sets (Kahn and Isen 1993), to understand metaphors (Roehm and Sternthal 2001), to process systematically (Bless et al. 1996), and to be better able to solve a wide range of problems (Amabile, Bersade, and Mueller 2005; Aspinwall 1998; Carnevale and Isen 1986; Erez and Isen 2002; Estrada, Isen, and Young 1997; Fredrickson 2001; Isen, Daubman, and Nowicki 1987; Isen, Rosenzweig, and Young 1991; Staw and Barsade 1993). Isen (2001, 77) summarizes a sizable literature by noting, "What the literature in the field now shows is that increased thinking, cognitive elaboration, is characteristic of positive affect, and that it does not, in fact, lead to depletion in cognitive capacity or depletion in motivation to process systematically." Thus, this evidence suggests an enhancing effect of positive affect on processing efficiency and quality.

A third perspective, mood (affect) congruence, suggests that while pleasant information is more readily and efficiently processed under positive affect, unpleasant material has a relative advantage under negative affect (Bower 1981; Clore, Schwarz, and Conway 1994; Forgas and Bower 1987). These effects are commonly explained by Bower's (1981) network theory. Briefly, distinct moods have specific nodes in memory that vary on the basis of the content of information linked to the nodes. When a specific affective state is activated, the activation spreads to all other information acquired in the same state, making such information more accessible.

A potential aid in clarifying affect's influence on evaluative processing may be the positive-negative judgment asymmetry identified by Herr and Page (2004). Participants' response latencies to attitudinal queries about extremely positive (e.g., puppy), extremely negative (e.g., python), and neutral (e.g., stapler) stimuli were faster to positive (e.g., "Like?", "Good?") queries than negative (e.g., "Dislike?", "Bad?") queries across all stimuli. The authors suggested that the process of making positive judgments may be relatively spontaneous and the default value for affective processing. Further, the authors suggested that positive and negative judgments are asymmetrically linked in memory, whereby the link from, for instance, dislike to like appears to be stronger than the link from like to dislike. Due to this bidirectional asymmetry, an individual considering her disliking for an object cannot complete that task without also considering her liking for the object. Consequently, positive judgments appear to be relatively effortless and automatic, while negative judgments require effortful and controlled processing. What makes the asymmetry well suited as a diagnostic tool for affect's influence on processing is that any change in the asymmetry, as a function of affect, may reveal differences in the effort and efficiency of making positive and negative judgments. Thus, a disruption of the asymmetry may indicate an impact of affect on evaluative processing.

We employ the asymmetry to identify which of the available theoretical routes above may best describe evaluative affective processing. For instance, sufficiently negative affect may eliminate the asymmetry by slowing participants' latency of responses to all queries (Schwarz and Bless 1991). Thus, participants may process even positive queries (e.g., "Like?") slowly, eliminating the asymmetry. Alternatively, sufficiently positive affect may also eliminate the asymmetry by increasing participants' efficiency of responding to all queries (Isen and Labroo 2003). That is, participants may process even the negative queries quickly. Finally, per affect congruence, the asymmetry may be eliminated or even reversed. Specifically, if the asymmetry depends on the participant's affect and the pleasantness of the stimuli being considered, a reversal of the asymmetry may be expected for persons evaluating extremely dislikable stimuli in the presence of negative affect. That is, evaluations of extremely negative stimuli framed in negative terms may be processed faster than evaluations framed in positive terms.

We investigate affect's influence on the asymmetry in three experiments. We adopt Forgas's (2001) representative definition of affect (see also Schwarz and Clore 2007; Zanna and Rempel 1988) as an inclusive construct including both moods and emotions. "Moods can be defined as relatively low-intensity, diffuse, and enduring affective states that have no salient antecedent cause and therefore little cognitive content (such as feeling good or feeling bad, being in a good or a bad mood). In contrast, distinct emotions are more short-lived, intense phenomena and usually have a highly accessible and salient cause, as well as clear, prototypical cognitive content (e.g., disgust, anger, or fear)" (Forgas 2001, 6). Hence, moods may be construed as being relatively feeling-based while emotions, having cognitive content, may be construed as being relatively thought-based.

In experiments 1 and 2, we examine the influence of two feeling-based sources of affect, integral and incidental, argued to be particularly relevant to evaluative processing (Bodenhausen 1993; Cohen, Pham, Andrade 2008). Integral affect refers to affect directly linked to the object (or its representation) being evaluated. This type of affect is examined in experiment 1, where we assess affect's influence on the positive-negative judgment asymmetry, inducing positive and negative affect with the extremely likable and extremely dislikable stimuli employed by Herr and Page (2004). Incidental affect refers to affect whose source is unrelated to the object being evaluated. Affect of this type is generally experimentally induced, or, outside the lab, is a function of environmental influences or the individual's chronic affective states. This type of affect is examined in experiment 2, where we manipulate positive and negative incidental affect through a between-subjects affect induc-

TABLE 1

PRETEST DATA FOR EXPERIMENTS 1 AND 3: AFFECTIVE JUDGMENTS

	Extremely negative stimuli	Neutral stimuli	Extremely positive stimuli
Mean	1.33	5.54	8.82
SD	1.46	2.59	1.64
Skew	2.56	−.283	−2.45
Kurtosis	7.34	−.291	7.67

tion. In experiment 3, we examine a more thinking-loaded type of affect (optimism) and find results that parallel those of experiments 1 and 2.

In all three experiments, to evaluate processing efficiency, we assess not only speed of response but also consistency of responding. With respect to the latter, if, for example, a participant responds "yes" to a positive query (e.g., "Like?") for a stimulus (e.g., puppy), does that participant also respond "no" to negative queries (e.g., "Dislike?") for the same stimulus? Consistency scores, coupled with response latencies, illuminate participants' processing efficiency and shed more light on the nature of affect-influenced processing.

EXPERIMENT 1

We examine integral affect in experiment 1—the capacity of briefly presented stimuli to induce transitory affective states, and the processing consequences of any such induction on the positive-negative judgment response latency asymmetry. One of three affect-based processing patterns may be expected. If negative affect effects dominate, negative affect (induced by negative stimuli) should slow the speed yet increase the efficiency of responding to all adjectives (e.g., like, dislike), relative to responses under positive affect. Alternatively, if positive affect effects rule, positive affect (induced by positive stimuli) should increase the efficiency of responding to both positive and negative adjectives (e.g., like, dislike); either the overall speed of responding will increase or the overall consistency of responses will increase (or both) relative to responses under negative affect. Finally, if affect congruence dominates, given positive affect, latencies for positive adjectives (e.g., like) should be faster than latencies for negative adjectives (e.g., dislike). Similarly, negative affect should produce shorter latencies for negative than positive adjectives.

Method

Pretests. Target stimuli were pretested for their affective valence and extremity, and their ability to produce positive and negative affect. Participants were sampled from the same population as the experimental participants. In this and the remaining experiments, we deliberately relied on pretesting rather than manipulation checks (particularly for the affect-creating qualities of the stimuli) because of widespread concerns about the interpretation of manipulation checks (Quattrone 1985; Sigall and Mills 1998). Specifically, the presence of an affect check prior to dependent measure collection may create the very affect the stimuli were purported to create, contaminating responses and giving us the false belief that the stimuli created the affect in question. A manipulation check at the conclusion of the experiment may fail to measure transitory affect whose existence did in fact depend on the stimuli and influenced processing, but had passed by the time the manipulation check was collected. Pretests, coming from the same population of participants, show unequivocally the capacity of the stimuli to produce an intended effect, without contaminating, or being contaminated by the dependent measures.

Eighty-two undergraduates took part in the first pretest to determine the valence and extremity of experimental stimuli. Table 1 shows the mean affective evaluation statistics (based on judgments on an 11-point scale) for the 12 stimuli selected for this experiment. Four extremely positive pictures (a beach, money, a BMW Z4, and a puppy), four neutral pictures (a camera, stapler, teapot, and espresso machine), and four extremely negative pictures (a cockroach, a diseased foot, severe acne, and Adolf Hitler) were chosen.

The ability of the stimuli to evoke positive or negative affect was assessed in a second pretest using the PANAS-X scale (Watson, Clark, and Tellegen 1988), with instructions reworded to measure state (rather than trait) affect. Specifically, participants were instructed to "Read each item and then mark the appropriate answer on the scale. Indicate to what extent you feel this way right now, that is, at the present moment." Forty-eight undergraduate students (different from pretest 1) took part in this second pretest in exchange for extra class credit. Exposure to the negative stimuli resulted in significantly more negative affect than exposure to positive stimuli. Specifically, participants exposed to the negative stimuli indicated more negative statements as describing their affective state ($M = 17.8$) than did participants exposed to positive stimuli ($M = 14.0$; $F(1, 46) = 4.11$, $p < .05$). In addition, participants exposed to negative stimuli indicated fewer positive statements ($M = 18.42$) than those exposed to positive stimuli ($M = 22.14$; $F(1, 46) = 4.42$, $p < .05$).

For the main study, 111 undergraduate business students participated as part of a course requirement. Stimulus exposure was a between-subjects factor. Roughly half (54) of the participants were randomly assigned to a stimulus presentation condition in which they saw only extremely positive and neutral stimuli, and the remaining participants (57)

were randomly assigned to a condition in which only extremely negative and neutral stimuli were presented. Upon entering the lab, participants were seated at separate personal computers, told the purpose of the experiment was to assess their responses to a variety of objects, and given brief instructions on how to navigate through the experiment using the computer keyboard and mouse.

In the first phase of the experiment, participants were shown 13 pictures (the eight targets and five additional affectively neutral fillers) based on their assigned condition for seven seconds each, in random order. Participants then engaged in a warm-up task to familiarize them with the second phase of the experiment, the response latency task. During the subsequent response latency task, each picture was displayed on the monitor for 750 milliseconds and then immediately replaced with an evaluative adjective (like, dislike, good, bad, favorable, unfavorable, appealing, repulsive; the last two pairs were used to increase generalizability of the asymmetry). Each evaluative adjective was paired with each picture and presented in random order. Participants were instructed to press the key labeled "yes" if the adjective matched their feeling about the object, or the key marked "no" if it did not, as quickly and accurately as possible. Responses were recorded in milliseconds from the time the adjective was presented until a response key was pressed. After completing the experiment, participants were debriefed, thanked, and released.

Results and Discussion

Although response latency data are often subjected to a transformation to reduce the skew of the distribution (Fazio 1990), a skewness analysis revealed that the raw response latencies were normally distributed and did not require transformation. Consequently, the raw latencies were used in the analyses.

The data were analyzed via a 2 (stimulus extremity; extreme vs. neutral) × 2 (judgment valence; positive vs. negative adjective) × 4 (judgment replicate; like/dislike, good/bad, favorable/unfavorable, appealing/repulsive) × 2 (between-subjects stimulus condition; exposure to extremely positive and neutral vs. extremely negative and neutral stimuli) mixed repeated measures ANOVA.

Replicating Herr and Page (2004), we found a main effect for judgment valence $F(1, 109) = 45.24$, $p < .001$). Across all stimuli, responses to positive adjectives were faster than responses to negative adjectives ($M = 870$ vs. 931 milliseconds, respectively). A main effect for stimulus condition was also found ($F(1, 109) = 33.88$, $p < .001$). Participants exposed to extremely positive and neutral stimuli responded faster to all queries than did those exposed to extremely negative and neutral stimuli ($M = 813$ vs. 988 milliseconds, respectively). A main effect for stimulus extremity was found as well ($F(1, 109) = 108.51$, $p < .001$). Responses to extreme stimuli were faster than responses to neutral stimuli ($M = 842$ vs. 959 milliseconds, respectively).

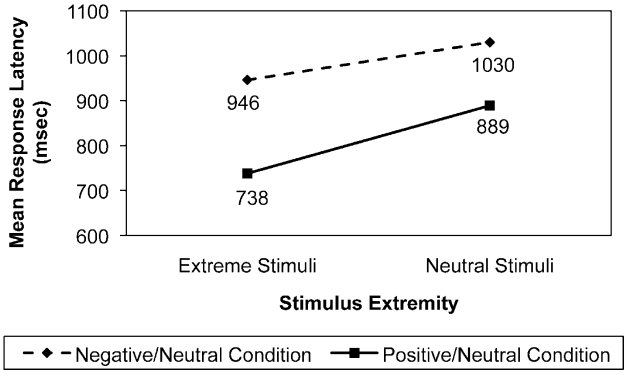
These main effects are qualified by two 2-way interactions. First, a stimulus extremity × stimulus condition interaction ($F(1, 109) = 8.98$, $p < .01$) was found. This interaction does not pertain directly to the asymmetry hypotheses, as responses are collapsed over judgment valence. It does, however, implicate the influence of affect on speed of responding in general. The interaction takes the form of faster responding by participants in the extremely positive/neutral condition, with responses to extremely positive stimuli being especially fast. The means for this interaction are presented in figure 1.

Contrasts revealed that responses were faster to extremely positive than to extremely negative stimuli ($M = 738$ vs. 946 milliseconds, respectively; $t(109) = 7.71$, $p < .001$). For neutral stimuli, responses in the extreme positive/neutral condition were also faster than responses in the extreme negative/neutral condition ($M = 889$ vs. 1,030 milliseconds, respectively; $t(109) = 3.87$, $p < .001$). This is the pattern one might expect if positive affect facilitates responding. The precise nature of the influence, however, is better examined in the second 2-way interaction, judgment valence × stimulus condition ($F(1, 109) = 13.14$, $p < .001$), which directly involves the asymmetry. As shown in figure 2, responses to positive adjectives were faster than responses to negative adjectives in the extreme positive/neutral condition ($M_{diff} = 28$ milliseconds; $t(53) = 2.15$, $p < .05$), but this difference was far greater in the extreme negative/neutral condition ($M_{diff} = 95$ milliseconds; $t(56) = 7.45$, $p < .001$). Thus, the asymmetry was greater in the presence of negative affect induced by the extremely negative stimuli, and lessened in the presence of positive affect induced by the extremely positive stimuli. The most compelling result lies in a comparison of participants' response latencies to the neutral stimuli, shown in figure 3.

Since all participants viewed the same neutral stimuli,

FIGURE 1

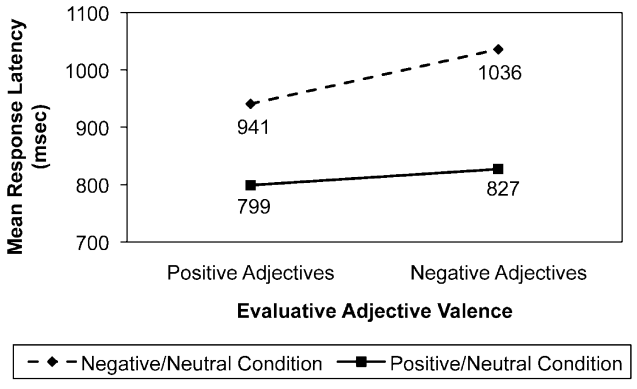
EXPERIMENT 1: MEAN RESPONSE LATENCIES TO EXTREME AND NEUTRAL STIMULI BY STIMULUS CONDITION IN MILLISECONDS



NOTE.—Means differing by at least 67 milliseconds differ at $p = .05$, Bonferroni *t*.

FIGURE 2

EXPERIMENT 1: MEAN RESPONSE LATENCIES TO POSITIVE AND NEGATIVE EVALUATIVE ADJECTIVE QUERIES BY STIMULUS CONDITION IN MILLISECONDS



NOTE.—Means differing by at least 25 milliseconds differ at $p = .05$, Bonferroni *t*.

any differences in response latency by condition must be a function of the valence of the extreme stimuli paired with the neutral stimuli. In the extreme negative/neutral stimulus condition, responses to positive adjectives paired with neutral stimuli were significantly faster than responses to negative adjectives ($M = 1{,}007$ milliseconds vs. $M = 1{,}052$ milliseconds, respectively; $t(56) = 2.22$, $p < .05$). In contrast, no differences in response latencies in the extreme positive/neutral stimulus condition were found ($M = 895$ milliseconds vs. $M = 883$ milliseconds, respectively; $t(53) = 0.55$, NS). That is, the asymmetry was present when the neutral stimuli were presented with negative stimuli, but vanished when paired with positive stimuli. These response differences are consistent with the positive affect influence on evaluative processing discussed above (e.g., Isen 2001). Positive affect, induced by the positive stimuli, renders relatively effortless affective judgments, regardless if judgments were positive or negative. Negative affect renders more effortful (or at least longer) processing, again irrespective of judgment valence.

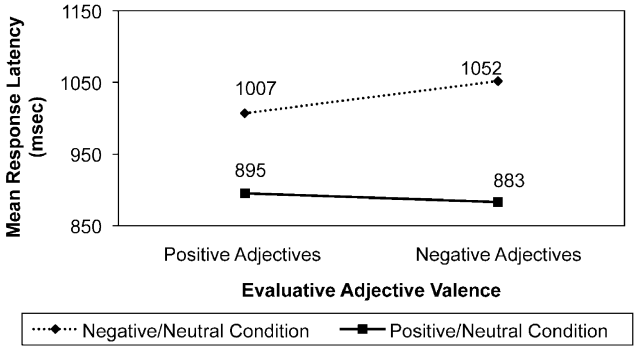
To determine the relative efficiency of responses, an analysis was performed assessing the consistency of participants' yes/no responses to the stimuli. For example, if a participant responded "yes" to the puppy/like pairing, did they also respond "no" to the puppy/dislike pairing? The number of consistent responses (e.g., "yes" to "Like?" and "no" to "Dislike?") were summed across stimuli and judgment replicate responses. Since the four judged stimuli (within each stimulus extremity condition) were paired with four judgment replicates, consistency scores could range from 0 (perfectly inconsistent, if the same response was given to all stimulus-adjective pairs) to 16 (perfectly consistent, if, for instance, for each stimulus, each negative adjective was responded to with "yes" and each corresponding positive adjective was responded to with "no"). Results revealed that participants in the extreme positive/neutral stimuli condition were more consistent in responding to positive stimuli than participants in the extreme negative/neutral stimuli condition were in responding to negative stimuli ($M = 15.26$ vs. 14.02, respectively, $t(109) = 3.39$, $p < .01$). Consequently, more support is provided for the position that positive affect produces more efficient information processing (Isen and Labroo 2003; Mantel et al. 2008); the faster responses to the positive/neutral stimuli were more efficient than were the slower responses to the negative/neutral stimuli.

In addition, participants' responses to the four neutral stimuli were equally consistent, irrespective of whether the neutral stimuli were presented with extremely positive or extremely negative stimuli ($t(109) = .69$, NS). Although there is no difference in consistency, recall that a difference in speed of response to neutral stimuli does exist; participants responded faster to neutral stimuli when presented with positive than negative stimuli. Hence, the positive affect associated with the extremely positive stimuli appears to increase the efficiency with which neutral stimuli are processed.

These results appear inconsistent with both the negative affect processing quality view (Schwarz 1990; Schwarz and Bless 1991) and the affect congruency model (Bower 1981), but support Isen's perspective on positive affect-induced processing efficiency. Per the negative affect processing quality view, slower responding to the negative stimuli should have been more consistent than the faster responding to the positive stimuli. In fact, responses (to all queries about negative stimuli) were both slower and less consistent, indicating overall lower quality processing. The results are

FIGURE 3

EXPERIMENT 1: MEAN RESPONSE LATENCIES TO POSITIVE AND NEGATIVE EVALUATIVE ADJECTIVE QUERIES ABOUT NEUTRAL STIMULI BY STIMULUS CONDITION IN MILLISECONDS



NOTE.—Means differing by at least 37 milliseconds differ at $p = .05$, Bonferroni *t*.

also not consistent with the affect congruence model. A positivity effect would be expected when faced with extremely positive stimuli and a negativity effect for extremely negative stimuli. Thus, responses to the positive adjectives should have been faster than responses to the negative adjectives for the extremely positive stimuli, and responses to the negative adjectives should have been faster than responses to positive adjectives for the extremely negative stimuli. Instead, we find participants' responses to positive adjectives faster than responses to negative adjectives for both extremely positive and extremely negative stimuli. These results support the asymmetry identified by Herr and Page (2004); positivity appears to be more dominant than negativity in reporting affective judgments. Moreover, the efficiency results support Isen's position on the ameliorative effects of positive affect.

Most importantly, however, we also found that the affect effects from the extreme stimuli influence the magnitude of the asymmetry (fig. 2). Responses to positive adjectives were faster than responses to negative adjectives for both the extreme positive/neutral condition and the extreme negative/neutral condition, but the asymmetry was greater in the extreme negative/neutral condition. Moreover, the faster responses in the positive/neutral condition were more consistent than were the slower responses to the negative/neutral stimuli. These findings suggest that positive affect, induced by extremely positive stimuli, results in more efficient processing for responses to negative evaluative adjectives. When participants are exposed only to negative and neutral stimuli, the relatively automatic response to positive queries appears to be slowed. Hence, negative affect (induced by the negative stimuli) seems to make all judgments more effortful.

The nature of this influence appears to be related to the basic difference between responding to positive and negative queries, proposed by Herr and Page (2004). They found evidence that responses to positive queries are relatively automatic and responses to negative queries are relatively controlled. An automatic process cannot be made faster, but if resources are focused on a controlled process, it may indeed be made faster. This is exactly what we believe the positive affect associated with the extremely positive stimuli accomplishes. That is, the influence of positive affect associated with positive stimuli appears to facilitate the controlled process of responding to negative queries. Responses to negative adjectives were significantly faster when responding to positive stimuli than to negative stimuli.

To confirm that affect has an impact on overall judgment processing as well as on the asymmetry, it should be helpful to separate the affect induction from the judgment task itself. If the stimuli elicit affective states and these states influence processing as this study suggests, we should observe similar results by manipulating incidental affect prior to the response latency task and observing responses to only neutral stimuli. This is tested in experiment 2.

EXPERIMENT 2

Method

Pretests. The incidental affect manipulation, in which participants wrote about either an extremely positive or extremely negative event in their lives, was pretested using a sample of 19 participants. This manipulation has been used extensively and successfully (see Adaval 2003; Murray et al. 1990; Schwarz and Clore 1983). After writing the assigned essay, pretest participants completed the PANAS-X scale as in experiment 1. Those who wrote about negative events indicated more negative statements as describing their affective state ($M = 20.29$) than did participants whose essay described a positive event ($M = 13.33$; $F(1, 17) = 9.41$, $p < .05$). Participants writing about negative events also indicated fewer positive statements ($M = 23.71$) than those writing about positive events ($M = 31.58$; $F(1, 17) = 4.66$, $p < .05$). The neutral stimulus objects to be used in the response latency task were also pretested in a similar fashion as those in experiment 1. Based on judgments of a sample of 44 undergraduates, pictures of a ball, can opener, clothes iron, laptop bag, saucepan, paper clip, pen, stapler, table, and tea kettle were selected. Across stimuli, the $M = 5.22$, SD $= 1.38$, skew $= .14$, and kurtosis $= .80$.

In the main experiment, 82 undergraduate students participated in exchange for extra course credit. Upon arrival at the lab, each subject was randomly assigned to one of three conditions, constituting the incidental affect-induction manipulation. Roughly one-third of the participants wrote an essay describing an extremely negative event in their lives, roughly one-third wrote about an extremely positive event in their lives, and the rest wrote nothing. Following this induction, all experimental participants engaged in the response latency task. While seated at individual personal computers, participants were instructed to watch their monitors as pictures of 10 neutral objects were presented for 5 seconds each. After the stimuli were presented, the response latency instructions were given (identical to experiment 1), three warm-up trials were given, and the response latency task began. Each picture was displayed on the monitor for 750 milliseconds and then immediately replaced with an evaluative adjective (like, dislike, good, bad). Each evaluative adjective was paired with each picture and presented in random order. Participants were instructed to press the key labeled "yes" if the adjective matched their feeling about the object, or the key marked "no" if it did not, as quickly and accurately as possible. Responses were recorded in milliseconds from the time the adjective was presented until a response key was pressed. After completing the experiment, participants were debriefed, thanked, and released.

Results and Discussion

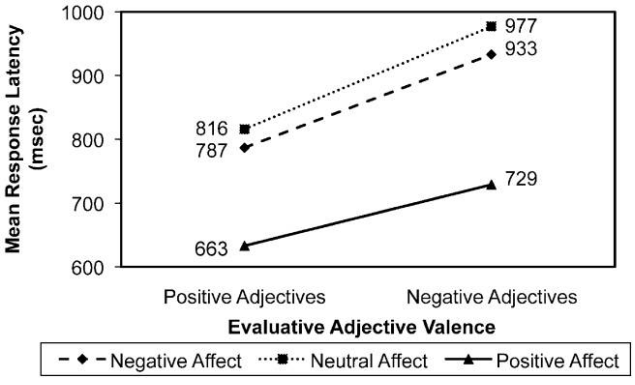
To correct for the skewness of the latency data (see Fazio 1990), response latencies were subjected to a log transformation. The transformed latencies were then analyzed in a 2 (judgment valence; positive vs. negative) × 2 (judgment

replicate; like-dislike vs. good-bad) × 3 (affect induction; positive, negative, none) mixed ANOVA. The last factor is between subject.

A main effect for affect induction was found ($F(2, 79) = 6.70$, $p < .01$) in which the positive affect induction led to faster responses to all queries than both the negative and no affect inductions ($M = 695$, 861, and 897 milliseconds, respectively). In addition, a main effect for judgment valence was found ($F(1, 79) = 122.0$, $p < .001$). Participants responded faster to positive than to negative adjectives ($M = 755$ vs. 880 milliseconds, respectively). Both of these main effects are qualified, however, by an affect induction × judgment valence interaction ($F(2, 79) = 5.40$, $p = .006$). The means for this interaction are presented in figure 4.

FIGURE 4

EXPERIMENT 2: MEAN RESPONSE LATENCIES TO POSITIVE AND NEGATIVE EVALUATIVE ADJECTIVE QUERIES BY AFFECT INDUCTION IN MILLISECONDS



NOTE.—Means differing by at least 82 milliseconds differ at $p = .05$, Bonferroni *t*.

In experiment 1, positive affect induced by extremely likable stimuli significantly reduced the asymmetry. In this experiment, when positive affect was induced prior to the latency task, the asymmetry was completely eliminated. The asymmetry remained significant, however, in the presence of negative and neutral affect. Participants with more positive affect responded faster to both positive and negative adjectives ($M_{diff} = 65.7$ milliseconds, NS) than did participants in the negative and no affect induction conditions ($M_{diff} = 146.6$ and 161.8 milliseconds, $p < .05$, respectively). As in experiment 1, the locus of the asymmetry's elimination is in participants' responses to the negative adjective queries. Specifically, those responses were sped up as a function of positive affect, relative to the no affect and negative affect induction conditions ($M = 729$ vs. 977 and 933 milliseconds, respectively, p's $< .05$).

A consistency analysis of the 10 judged stimuli paired with two judgment replicates yielded a consistency score for each participant that could range from 0 (perfectly inconsistent) to 20 (perfectly consistent). Analyses revealed no differences in consistency of responding as a function of induced affect ($M = 17.3$, 18.1, and 17.0 for positive, no, and negative affect induction, respectively, $t(79) = 1.21$, NS). Hence, the faster responses in the positive affect induction condition indicate that those participants are responding more efficiently. This result provides more support for positive affect's influence on processing described by Isen (2001).

In sum, a between-subjects incidental affect manipulation prior to a response latency task revealed additional support for positive affect increasing processing efficiency, relative to negative or no affect induction. Positive affect eliminated the asymmetry. Only participants in the negative and no affect induction conditions displayed the asymmetry identified by Herr and Page (2004).

The results of experiments 1 and 2 indicate that positive affect, induced either incidentally or integrally, leads to more efficient evaluative processing. We now explore the potential for other types of positive affect to increase processing efficiency. Indeed, recent findings suggest that various types of positive affect facilitate approach behavior in general (Cacioppo, Gardner, and Berntson 1999; Davidson 1993; Watson et al. 1999). Fredrickson (1998, 2001) built upon this notion with her broaden-and-build theory of positive emotions. She argues that positive affect serves to broaden people's momentary thought-action repertoires, widening the array of the thoughts and actions that come to mind. This process results in greater enduring intellectual (among other) resources, available for subsequent behavior. This process is contrasted with the narrowing of focus on specific avoidance actions precipitated by negative affect.

A construct of special interest to positive psychologists —that epitomizes the ability of positive affect to influence cognitive processing—is optimism. Optimism has been defined variously, but most definitions converge on a positive expectancy for future outcomes (Chang 2001). Here we refer to Segerstrom's (2001, 1334) definition as "positive outcome expectancies, either of a generalized, dispositional nature or with regard to a specific situation" (see also Peterson 2000). It should be noted that this definition loads heavily on positive thought (positive expectancies) as opposed to the more feeling-loaded affect explored in experiments 1 and 2. Note also that this definition of optimism is entirely consistent with Forgas's (2001) definition of affect consisting of thoughts in addition to feelings. (See also Keltner and Lerner's [2010] appraisal theory of emotion in which affect influences appraisal and action tendencies.)

Segerstrom (2001) provides compelling evidence that optimism increases automatic attention to both positive and negative stimuli. Aspinwall and Brunhart (2000) also find that optimists pay greater attention to negative information, and remember more of it than do pessimists. It is interesting that these results parallel similar influences of positive and negative affect inductions (e.g., Reed and Aspinwall 1998; Trope and Pomerantz 1998). Optimists' more balanced attention is consistent with the expected broadening and build-

ing qualities of positive affect and is also suggestive of the more efficient processing precipitated by positive affect.

Recent work has revealed that optimism is also capable of increasing processing efficiency and facilitating creativity and problem solving (Aspinwall and Staudinger 2003). Moreover, Seligman (e.g., 1998) shows that optimism influences decision making and divergent thinking in much the same way that positive affect in general influences these processes. In the consumer domain, Zhang, Fishbach, and Dhar (2007) demonstrate that optimism influences goal pursuit by affecting immediate actions to a greater extent than lesser optimism. Geers and Lassiter (2002) provide evidence that optimism plays a central role in how affective evaluations are formed.

In sum, optimism has been identified as a positive, thought-based emotion (Aspinwall and Leaf 2002; Fernández-Ballesteros 2003) that produces positive outcomes across a range of measures. In experiment 3, we examine the possibility that optimism may influence evaluative processing in a manner similar to the findings of experiments 1 and 2.

EXPERIMENT 3

Method

Pretest. The optimism/pessimism manipulation consisted of a paper-and-pencil task asking participants to think of a recent time in their life that they felt hopeful and optimistic (hopeless and pessimistic) about the future and to try to relive and vividly recall this time. Participants then were asked to describe the time in as much detail as possible and told that they would have 10 minutes to complete the writing task. (See Cohen et al. [2008] for a discussion of the relative advantages of personal experience-based affect inductions of this type.) Thirty-two individuals participated in the pretest of the optimism/pessimism manipulation. After receiving the manipulation, participants completed the Life Orientation Test-R (LOT-R; Scheier, Carver, and Bridges 1994) followed by the PANAS-X Scale. The LOT-R scale consists of 10 items (including four fillers) measuring expectancies (thoughts) related to optimism and pessimism. Higher scores indicate greater optimism. Participants who described an optimistic time in their life scored significantly higher than did participants who described a pessimistic time ($M = 18.79$ vs. 15.89, respectively, $F(1, 30) = 4.53$, $p < .05$). Importantly, the manipulation did not influence relatively feeling-based state affect, as no differences emerged as measured by the PANAS-X Scale. Those who wrote about a pessimistic time in their lives indicated no more negative feeling statements as describing their current affect than did participants whose essay described an optimistic time ($M = 17.61$ and 16.86, respectively; $F(1, 30) = 0.89$, NS). Participants writing about a pessimistic time also indicated no fewer positive feeling statements than those writing about an optimistic time ($M = 25.67$ and 29.29, respectively; $F(1, 30) = 1.78$, NS). Hence, we have confidence that we are examining a less feeling-based, more thought-based type of affect than in experiments 1 and 2. Participants appear to have correctly attributed any arousal elicited by the manipulation to their expectancy state (measured on the LOT-R) rather than their feelings (measured on the PANAS-X). This confidence is further bolstered by Segerstrom's (2001) similar finding of no correlation between LOT-R and PANAS.

In the main study, 95 undergraduate business students participated as part of a course requirement. The method is similar to experiment 2, with only neutral stimuli used in the response latency task. The same four neutral stimuli used in experiment 1 were used (camera, stapler, teapot, espresso machine; refer to table 1 for pretest results), plus six other neutral fillers to reduce salience of the target objects. Upon entering the lab, participants were seated at a personal computer. As a cover story, the participants were told that they would be participating in two separate experiments. The first would be a short writing task (the optimism/pessimism manipulation), and the second would take place entirely on the computer (the response latency task). Participants were randomly assigned to the optimism or pessimism induction condition and were informed that the first experiment was being administered for another researcher who was interested in students' adjustment to college and that their experiences would be used to develop a questionnaire to assess college adjustment. They were told to read the writing task assignment carefully and that they would be given 10 minutes to complete the task. After 10 minutes, the writing task would be collected, and they would be given instructions for the second experiment.

The method for the response latency task was similar to experiment 2. After the initial viewing of the neutral objects, participants proceeded to a short warm-up to familiarize them with the method, after which the primary response latency task took place. As before, pictures were displayed on the monitor for 750 milliseconds and immediately replaced with an evaluative adjective. The evaluative adjectives were like, dislike, good, bad, favorable, unfavorable, appealing, and repulsive. Participants were told to press the key labeled "yes" if the adjective described how they felt about the picture or press the key labeled "no" if the adjective did not described the picture, as quickly and accurately as possible. Responses were recorded in milliseconds from the time the adjective was presented until the participant responded. After completing the task, participants were debriefed, thanked, and released.

Results and Discussion

A skewness analysis revealed that the raw response latencies were normally distributed. Hence, the raw data were used in the analyses. The data were analyzed by via a 2 (judgment valence; positive vs. negative) × 4 (judgment replicate; like/dislike, good/bad, favorable/unfavorable, appealing/repulsive) × 2 (between-subjects optimism/pessimism induction) mixed repeated measures ANOVA.

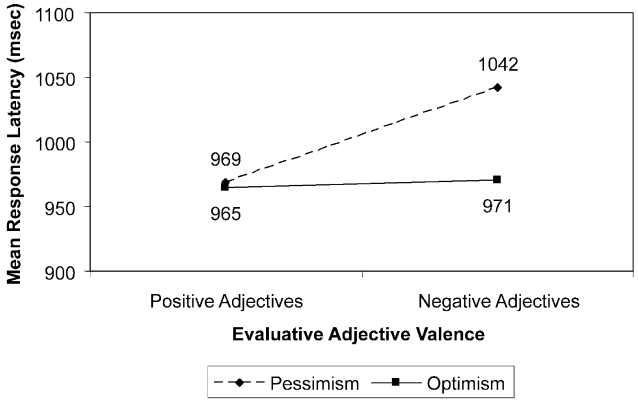
A main effect for judgment valence was found ($F(1, 93) = 8.12$, $p < .01$). Responses to positive adjectives were faster than responses to negative adjectives ($M = 967$ vs. 1,007 milliseconds, respectively). This effect again repli-

cates the asymmetry reported by Herr and Page (2004). The effect, however, is qualified by an interaction of judgment valence × optimism/pessimism induction ($F(1, 93) = 5.76$, $p < .02$). In the pessimism condition, responses to positive adjectives were faster than responses to negative adjectives ($M = 969$ vs. 1,042 milliseconds, respectively). Moreover, similar to experiment 2 in which positive affect eliminated the asymmetry, in the optimism condition, the asymmetry was also eliminated ($M = 965$ vs. 971 milliseconds, respectively; see fig. 5). Again, the elimination of the asymmetry appears due to the facilitation of responses to negative queries (a relatively controlled response) as in experiment 2.

A comparison of consistency of responses revealed that participants in the optimism condition were marginally more consistent in their responses than participants in the pessimism condition, $t(93) = 1.70$, $p = .09$. Hence, differences in speed of responding did not occur at the expense of errors. This provides still more support for the position that positive affect produces more efficient information processing (Isen and Labroo 2003; Mantel et al. 2008). Consequently, the optimism induction appears to have produced results similar to the positive affect manipulations in experiments 1 and 2: more efficient processing.

FIGURE 5

EXPERIMENT 3: MEAN RESPONSE LATENCIES TO POSITIVE AND NEGATIVE EVALUATIVE ADJECTIVE QUERIES BY STIMULUS CONDITION IN MILLISECONDS



NOTE.—Means differing by at least 68 milliseconds differ at $p = .05$, Bonferroni *t*.

GENERAL DISCUSSION

In three experiments, we investigated the influence of affect on the response asymmetry found by Herr and Page (2004) and inferred from the asymmetry pattern and consistency of responses the influence of affect on evaluative processing. Experiment 1 demonstrates the presence of an integral affect effect elicited by the valence of the judged stimuli in a between-subjects design. The asymmetry was attenuated when participants saw only extremely positive and neutral stimuli and exacerbated when participants saw only extremely negative and neutral stimuli. A similar effect is demonstrated in experiment 2 using an induction of positive and negative incidental affect prior to judgments of neutral stimuli, as well as in experiment 3 with a manipulation of optimism and pessimism, again prior to judging neutral stimuli. In these experiments, the asymmetry was eliminated in the positive affect and optimism conditions and exacerbated in the negative affect and pessimism conditions (experiments 2 and 3, respectively).

Importantly, in all three experiments, positive affect (induced by liked stimuli, a positive affect induction, and an optimism induction) created more efficient responses than did more negative affect (induced by disliked stimuli, negative affect induction, or a pessimism induction). Moreover, the pattern in which the asymmetry was attenuated or eliminated was consistent across experiments, irrespective of the manner of affect induction. In each case, participants' responses to negative adjective queries (a controlled process) were sped up and were more efficient in the presence of positive affect. Hence, our evidence supports Isen's contention that positive affect increases processing efficiency (Isen 2001). The increased processing efficiency demonstrated here mirrors the myriad beneficial cognitive effects (e.g., increased decision-making flexibility and efficiency) documented by Isen and her colleagues (Estrada et al. 1997; Isen et al. 1987; Kahn and Isen 1993) as well as others (Amabile et al. 2005; Aspinwall 1998; Fredrickson 2001; Staw and Bersade 1993). Our results show that positive affect appears to facilitate even the fairly narrow and micro-level process of making a speeded forced-choice decision, which may serve as the basis for the more macro-level, relatively complex and slower decision making generally reported in the literature. This is an especially interesting finding, given the nature of the ongoing discussion of the effects of affect in general, and speaks to the contention that positive affect leads to decrements in quality of decision making (e.g., heuristic processing, erroneously conflating one's affect with the object to be evaluated). Far from the characterization of "happy but mindless" individuals portrayed in the literature (e.g., Schwarz and Bless 1991), our results appear to provide support for Isen's perspective (and positive psychology's, in general); positive affect may energize and produce happy efficient decision makers.

Our findings are not well accounted for by either the affect as information or affect congruence perspectives. Isen (1984) reports that affect congruence effects are much more pronounced for positive affect and positive stimuli than for negative affect and negative stimuli, noting that the effect may even be reversed in the latter case. Reversals are sometimes attributed to mood repair or to the unusual nature of the task (Fiedler 1991).

Overall, our findings regarding the response asymmetry in general and affect's impact on it hold interesting implications for a range of phenomena involving positivity ef-

fects. The "Pollyanna effect" (Boucher and Osgood 1969) is one such phenomenon. Per this effect, individuals tend to form positive impressions of unknown others rather than neutral or negative impressions (e.g., Adams-Weber 1979; Matlin and Stang 1978). In general, the asymmetry extends the Pollyanna effect beyond a focus on the valence of the object to the valence of the question about the object. Our present findings suggest, however, that the Pollyanna effect may be tempered by positive affect, yielding more balanced processing of positive and negative information.

From an evolutionary psychology perspective, the presence of the asymmetry supports conjecture about the value of a positivity offset. Cacioppo et al. (1999) describe positivity offset, in which the motivation to approach a novel stimulus is slightly greater than the motivation to avoid it, at very low levels of evaluative activation (see also Cacioppo 2004). Fredrickson (2001) further argues that the positivity offset has evolutionary significance and the experience of affect-induced positivity offset may be a universal part of human nature. She notes that "individuals exhibit the adaptive bias to approach and explore novel objects, persons, or situations" (219). Such an approach should lead to increased awareness of the environment, with survival implications. Herr and Page (2004, 599) speculate, "Assuming that individuals are motivated to look for the good, the asymmetry may represent a confirmation bias of sorts, in which at a basic level, individuals frame responses in terms of the outcome they hope to find, rather than the logically equivalent absence of the outcome they wish to avoid." Our work suggests that the positivity offset may be qualified in the presence of positive affect, even facilitating responses to negative objects. Perhaps our happy ancestors were far more likely than their unhappy counterparts not only to approach and slaughter woolly mammoths but also to detect and flee from saber-tooth tigers.

The response asymmetry is consistent with a knowledge activation view of decision making, in which the associative strength of an item's representation in memory determines its accessibility and use. Favorable stimuli are encountered and judged more frequently than negative stimuli, so favorable judgments should be made faster than negative judgments (Forster and Liberman 2007; Wyer 2007). A Bayesian perspective, however, suggests that rare events are more informative than are common events, and hence should be responded to more rapidly (McKenzie and Mikkelsen 2007). While rare events may be more informative, they are not as strongly linked in memory (i.e., they are relatively inaccessible) owing precisely to their rareness. There simply have not been enough pairings for the representation to be activated in a speeded response task, driven completely by associative strength. Perhaps a dependent measure other than response latency (e.g., one involving careful, consequential deliberation) would reveal an outcome more friendly to the Bayesian view. Our work suggests that positive affect may reduce this discrepancy between a Bayesian and knowledge activation analysis. Positive affect appears to increase capacity to process information, resulting in generally faster and more efficient responding in a latency task.

Related to these perspectives, Unkelbach et al. (2008; 2010) propose that the asymmetry between positive and negative responses owes to differences in similarity between positive and negative information. For example, they argue that negative adjectives are, on average, less similar to each other than are positive adjectives, and this difference in similarity leads to a higher density of positive than negative information in memory, in turn resulting in faster retrieval for positive than negative information. This perspective provides a reasonable basis for the general finding of faster responses to positive than negative stimuli and for faster responding to positive than negative adjectives. If positive information tends to be both more similar and more closely positioned in long-term memory than negative information, processing advantages for positive information seem especially likely to accrue. The influence of positive affect on speed of responding to negative adjectives also may be accounted for by this perspective, if we assume that positive affect increases the perceived similarity of negative adjectives. This position is entirely consistent with Isen's findings that positive affect enables individuals to generate more unusual and diverse first associates to words as well as to increase the flexibility of categorization of material (Dovidio et al. 1995; Isen et al. 1985; Kahn and Isen 1983). All of these processing effects may serve to increase similarity among negative adjectives, which in turn may increase their accessibility.

Also consistent with the density hypothesis are Gershoff, Mukherjee, and Mukhopadhyay's (2007) findings of a positivity effect with respect to an agent's recommendations for individuals' loved or hated alternatives. Specifically, individuals agreeing with an agent's recommendation for a loved alternative judged the agent's suitability as more diagnostic than when agreement occurred on previously hated alternatives. The authors suggest that this positivity effect occurs due to greater ambiguity of attribute ratings of hated versus loved alternatives. Moreover, Gershoff, Mukherjee, and Mukhopadhyay (2008) demonstrate (in a study of false consensus effects) participants' relative ease in thinking about liked attributes of disliked alternatives (relative to thinking about disliked attributes of liked alternatives).

Future research should examine the extent to which our findings may hold for other types of affect. Indeed, research on affect has increasingly focused on creating various taxonomies of affect. Both within affective valence types (positive and negative) and between affective states (moods and emotions), different affect has been demonstrated to have differing effects on cognitive processing (e.g., Bodenhausen 1993; Raghunathan and Pham 1999; see Cohen et al. [2008] for an excellent review). In our experiments, we examined a relatively narrow slice of the taxonomic pie, finding that the type of positive affect manipulated (incidental vs. integral, and relatively feeling vs. thinking based) appears to make little difference on processing effects, relative to the influence of affect valence. This, however, may not be sur-

prising given individuals' inability to accurately detect the source of their affective states (e.g., Cantor, Zillmann, and Bryant 1975; Dutton and Aron 1974; Schwarz and Clore 1983). Individuals are especially likely to be unaware (and misattribute) the source of their affective arousal when the arousal source is not salient and when the arousal itself is relatively moderate (Gorn, Pham, and Sin 2001; Payne et al. 2010; Vosgerau 2010). This seems especially likely in the present context. Hence, future research may want to fruitfully examine whether this distinction between types of positive affect becomes more important when its associated arousal is greater (as in strong emotion).

Future work may also consider these findings in a consumer domain. For instance, further examination of the Pollyanna principle may reveal differences in processing person versus product information. It may be functionally adaptive for individuals to hold positive expectations in anticipation of future interactions with unknown others. Normative pressure and social desirability may also drive an individual's positive judgments and expectations of unknown others. For consumer products, however, skepticism may be more functionally adaptive, especially when product quality is unknown or difficult to judge. Moreover, evidence suggests that even consumer experience with products does not always result in veridical learning with respect to objective levels of product quality (e.g., Hoch and Deighton 1989). Hence, examining boundary conditions of the Pollyanna effect in a consumer domain may prove interesting.

With specific reference to the influence of affect on product judgments, Adaval's affect-confirmation hypothesis (2001, 2003) suggests that consumers may misattribute their affective state to characteristics of products, in turn giving more weight to affect-consistent product information. An important distinction between our approaches rests in the stage of decision making at which responses are examined. In Adaval's work, consumers' integration and use of product attribute information are considered. Our work is silent with respect to the specific process of information integration, but instead addresses the end-state of integration: how the strength of association between the object and its overall evaluation varies as a function of affective state. We may infer the effort and efficiency of one process relative to another but can say nothing about the weighting of or attention paid to specific pieces of information that yield the overall evaluation. Future efforts might further examine the information-integration process as it pertains to the positive-negative response latency asymmetry and efficient processing.

Finally, our findings may have relevance to consumer welfare issues. It isn't at all clear if a marketer should or should not want efficient responses to their product. It is clear, however, that from a consumer welfare perspective, consumers' lot should improve to the extent they make good, efficient decisions. To that point, future research might address the welfare implications of consumer affective states. Are happy consumers more prone to be "good" consumers, with better decision-making and consumption skills, and less likely to avoid the ills of duplicitous marketing schemes than their relatively unhappy counterparts? And, more germane to the present discussion, can the response asymmetry be used as a diagnostic tool to unobtrusively identify consumers at risk?

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CORRECTION.—Since this article was published online on June 13, 2011, a correction has been made. In figure 4, the mean response latency of positive affect has been changed from 633 to 663. Corrected on November 8, 2011.