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Linking Automatic Evaluation to Mood and Information Processing Style: Consequences for Experienced Affect, Impression Formation, and Stereotyping

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Abstract

According to the feelings-as-information account, a person's mood state signals to him or her the valence of the current environment (N. Schwarz & G. Clore, 1983). However, the ways in which the environment automatically influences mood in the first place remain to be explored. The authors propose that one mechanism by which the environment influences affect is automatic evaluation, the nonconscious evaluation of environmental stimuli as good or bad. A first experiment demonstrated that repeated brief exposure to positive or negative stimuli (which leads to automatic evaluation) induces a corresponding mood in participants. In 3 additional studies, the authors showed that automatic evaluation affects information processing style. Experiment 4 showed that participants' mood mediates the effect of valenced brief primes on information processing.

Keywords

automatic evaluation; mood; stereotyping; affect; impression formation

The 1990s provided a substantial literature describing the ways in which affect influences information processing (Bless, Mackie, & Schwarz, 1992; Bodenhausen, Kramer, & Süsser, 1994; Schwarz & Bless, 1991; Schwarz & Clore, 1996). Although there are several competing accounts for the effects of mood on processing (see Forgas, 2002, for a review), a functional explanation for the phenomenon that mood influences processing style is the feelings-as-information account by Schwarz and colleagues (Schwarz, 1990; Schwarz & Bohner, 1996; Schwarz & Clore, 1996). The premise of this idea is that a person's current affective state informs him or her about the goodness or badness of the environment—is it safe or problematic? Subsequently, this information has implications for the way in which people interact with their environment. In the feelings-as-information account, an experience of mood serves as input for further information processing. The logic behind the signaling function of mood is that people usually feel good when things are going okay and usually feel bad when they run into difficulties. When people are in a positive mood, their environment seems to pose no threat, and they are more likely to rely on heuristic and creative processing (Bless, Bohner, Schwarz,

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& Strack, 1990; Bodenhausen et al., 1994). In contrast, a negative mood signals that the environment is problematic and that appropriate action needs to be taken, resulting in an information processing style that is relatively analytical, effortful, and cautious.

The question remains, however, how the environment alters moods and emotions. In the present article, we propose that one mechanism by which the environment influences affect is automatic evaluation. People automatically evaluate the objects they encounter on a positive–negative dimension both within and outside of their conscious awareness (Bargh, Chaiken, Raymond, & Hymes, 1996; Cacioppo, Priester, & Berntson, 1993; Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Zajonc, 1980), and these evaluations automatically evoke either an approach or an avoidance tendency toward each entity (Chen & Bargh, 1999). On the basis of the assumed global signaling function of moods, in the present studies, we investigated whether automatic evaluation has consequences that go beyond the direct reaction toward a specific stimulus. We hypothesized that repeated evaluations of the same valence affect mood state and subsequent information processing. Through automatic evaluation, then, people's moods signal the valence of their environment: Is it dangerous or safe? By investigating the role of automatic evaluation in the origin of moods, we expand the feelings-as-information theory and gain additional insight into the signaling function of moods.

In the literature on the effect of mood on information processing and behavior, the assumption is that people must have some conscious experience of their affective state for it to have consequences, which implies that people have to be aware of their current mood. However, when people are aware of what caused their mood, no effects of mood on subsequent information processing will occur. Schwarz and Clore (1983) illustrated this point in a study on the impact of mood on judgments of life satisfaction, wherein participants reported a better mood and higher life satisfaction on a sunny day compared with their reports on a rainy day. However, when the experimenter mentioned the weather to the participants beforehand, no differences in mood or life satisfaction were found. When the origin or cause of affect is unknown, there is a greater chance that a person will transfer the valence of that feeling to his or her further thinking and doing (see also Chartrand & Bargh, 2002). When there is an apparent cause to which mood can be attributed, people tend to discount it, and no influence of mood on information processing is likely to occur. In sum, a person has to be aware of his or her mood but not of its cause for mood to have an effect on information processing.

For this phenomenon to be truly adaptive, the ongoing monitoring of a person's environment should not have to rely on that person's scarce conscious cognitive capacity but should also occur on a more automatic level. It has traditionally been assumed that conscious choice and consideration play a major role in the evaluation of whether an event or object is good or bad. Many theories of attitude formation and of the evaluative process hold that people weigh the positive and negative features of the object or event and then, on the basis of this rational process, make a decision about how they feel about it (Ajzen & Fishbein, 1980). However, prodded by Zajonc's (1980) famous challenge to this position—that "preferences need no inferences"—a substantial body of evidence has now accumulated that supports the theory that evaluations often become activated without a person's needing to think about them or even being aware that they have become active (Dijksterhuis & Aarts, 2003; Fazio et al., 1986). This automatic evaluation, in turn, has consequences for further processing of and reactions toward the stimulus.

One of the consequences of automatic evaluation occurs at the behavioral level. Providing empirical support for this notion, Chen and Bargh (1999) asked participants to pull or push a handle each time a word appeared on the screen. The words were either positive or negative. In two studies, it was found that positive words automatically activated an approach tendency, facilitating pulling the lever and inhibiting pushing it. In contrast, negative words automatically

activated an avoidance tendency, which led to the opposite effect. These studies show that automatic evaluation of stimuli leads to a rudimentary behavioral tendency to either approach or avoid, thereby highlighting the functional quality of this process. Through automatic evaluation, people continuously scan objects in their environment and are able to respond immediately without the necessity of conscious thought.

In addition to these short-term behavioral consequences, we propose that automatic evaluation also has longer term affective consequences. Whereas the automatic activation of an object's valence is an immediate reaction to one specific entity and prepares the organism for appropriate action concerning that entity, moods are slower and more diffuse reactions to the situation as a whole and influence one's information processing style in general. It is therefore unlikely that a single exposure to one stimulus will dramatically alter the mood a person is in, but when that person is exposed to only positive or only negative stimuli for a relatively prolonged period of time, the continuous activation of these objects' valence may result in a diffuse affective reaction, which reflects the safety or danger of the person's present situation. Thus, the automatic evaluation of objects results in a signal, which influences a person's mood state and tells that person whether he or she has to scrutinize the environment in preparation for taking appropriate action.

In the present studies, we tested these hypothesized consequences of automatic evaluation. In the first experiment, we examined whether repeated exposure to positive or negative stimuli can alter the moods that participants experience. To ensure that participants are unaware of the origin of their moods and that the evaluation is automatic, the stimuli were presented briefly. Although some researchers would consider our priming stimuli subliminal, we avoid using the term *subliminal* throughout this article. There still is a debate about the nature of subliminal perception (notably, about whether a subjective or objective threshold should be used; Cheeseman & Merikle, 1984; Holender, 1986), and we do not have the evidence that our priming procedure indeed is technically subliminal (but see Bargh, 1992, for an argument that our procedure is subliminal enough for our purposes). That is, participants may still have some form of fleeting awareness of the primes, even if they fail to report it on explicit measures (although see Bargh & Chartrand, 2000, for a review of evidence suggesting they are not). After the priming procedure, two self-report mood measures were administered. We predicted that repeated exposure to positive stimuli would result in a positive mood and repeated exposure to negative stimuli would result in a negative mood.

In two additional studies, we tested whether the automatic and nonconscious evaluation of stimuli also affects processing style. As previously mentioned, recent research supporting the feelings-as-information theory has demonstrated that a positive mood is associated with a heuristic processing style, whereas a negative mood is associated with an analytic processing style (Bodenhausen et al., 1994; Park & Banaji, 2000). Therefore, if automatic evaluation alters mood, it should also affect processing style. To test this assumption, we briefly exposed participants to positive, neutral, or negative words and afterward administered an impression formation (Study 2) or stereotyping (Study 3) task that measured the use of heuristic and systematic processing. We predicted that repeated exposure to positive stimuli would lead to more heuristic processing than would repeated exposure to negative stimuli.

Finally, in Study 4, we directly tested the mediating role of mood in the effect of automatic evaluation on processing style. Participants were again briefly exposed to positive, neutral, or negative words. After measuring their mood state, we administered the stereotyping task used in Study 3 and conducted a path analysis.

Experiment 1

Method

Participants—Sixty-three male and female students enrolled in an introductory psychology course at an eastern university participated in the experiment in partial fulfillment of a course requirement. Two participants reported that they did not have 20/20 vision and did not have corrective lenses with them, so their data were not analyzed. This left responses from 61 participants in the analysis, with 21 in the negative prime condition, 20 in the neutral prime condition, and 20 in the positive prime condition.

Procedure—Participants were randomly assigned to one of the three priming conditions and informed that they would be taking part in several separate, unrelated tasks. The experimenter explained that the first task investigated attention and visual acuity. The procedure for and details of the vigilance task were taken from Chartrand and Bargh (1996, Experiment 2). Participants were told that the task measured reaction times to see how quickly and accurately people could respond to visual stimuli. Very brief flashes would appear on the screen at unpredictable places and times, and the participants' task was to respond by pressing one of two keys to indicate whether the flash appeared on the left or right side of the screen.

Participants were primed 75 times with four stimulus words that were either positive (e.g., *music*, *friends*), negative (e.g., *war*, *cancer*), or neutral (e.g., *building*, *plant*). Prime words were matched on length, consensus, and frequency using the data reported in the appendix from Bargh, Chaiken, et al. (1996). For each condition, one presentation order was constructed using a random number generator, and this order was used for all participants in a given condition.

After the vigilance task, participants were given two dependent measures to assess their current mood state. First, they completed the Depression subscale of the Multiple Affect Adjective Check List (MAACL, Zuckerman & Lubin, 1965). The MAACL was designed to provide a valid measure of state (as opposed to trait) affect and has been found to be sensitive to transient changes in mood (Metalsky, Abramson, Seligman, Semmel, & Peterson, 1982; Miller & Seligman, 1975). Second, participants completed a bipolar mood scale used by Bargh, Chen, and Burrows (1996, Experiment 2C). This measure requires participants to rate themselves on eight bipolar items (with a response scale for each item of −5 to +5). Sample dimensions include *bad–good*, *sad–happy*, *displeased–pleased*, and *down–elated*.[1]

After completing these scales, participants received a verbal funnel debriefing similar to that used in Chartrand and Bargh (1996). Specifically, participants were asked general suspicion probes, including "What do you think the purpose of this study was?" "Did any of the tasks affect what you did on any other task?" and "Did any aspect of this study seem strange or suspicious to you?" Analyses of the funneled debriefings indicated that no participant guessed the true purpose of the study. After the funnel debriefing, participants were fully debriefed and thanked.

Results

We predicted a main effect for prime valence, such that those primed with positive words would be in a better mood than those primed with negative words. An analysis of variance (ANOVA) was first conducted on the bipolar mood scale scores with prime valence as the between-subjects variable. A significant linear trend was uncovered, $F(1, 59) = 9.15$, $p.= 004$, $R^2 = .134$. Figure 1 displays the means. Directionally, mood scores were highest in a positive mood

[1]One individual completed the MAACL but not the bipolar mood scale.

and lowest in a negative mood, with the neutral condition falling in between. Contrasts indicated a significant difference between the negative and positive prime conditions, $F(1, 39) = 8.98$, $p = .005$, $\eta^2 = .16$, a marginally significant difference between the negative and neutral prime conditions, $F(1, 39) = 2.65$, $p = .11$, $\eta^2 = .06$, and no significant difference between the positive and neutral prime conditions, $F(1, 39) = 1.83$, $p = .18$, $\eta^2 = .06$.

Next, MAACL scores were subjected to an ANOVA, again with prime valence as the between-subjects variable. A linear trend test was conducted, which indicated a significant linear trend, $F(1, 60) = 8.46$, $p = .005$, $R^2 = .124$, indicating that those in the negative prime condition had the most negative affect, followed by those in the neutral prime condition, followed by those in the positive prime condition (see Figure 2). Contrasts strongly supported our most important prediction that individuals in the negative prime condition were in a significantly worse mood than those in the positive prime condition, $F(1, 42) = 21.84$, $p < .0001$, $\eta^2 = .17$. Auxiliary analyses suggested that although the negative and neutral prime conditions were not significantly different from each other, $F < 1.0$, the positive prime condition was different from the neutral prime condition, $F(1, 38) = 3.64$, $p = .05$, $\eta^2 = .07$.

Discussion

The first experiment confirmed the hypothesis that prolonged yet brief and masked exposure to positive or negative stimuli can alter the mood people are experiencing. When participants were briefly primed with masked presentations of negative words, they reported a more negative mood than did participants briefly exposed to positive words. These results suggest that the automatic evaluation of stimuli can alter one's current affective state, thereby reflecting the general goodness or badness of one's environment. This expands the feelings-as-information model by identifying a nonconscious process—automatic evaluation—that can affect the mood state that is used to gauge the friendliness of the current environment.

If automatic evaluation is capable of changing affective experience, then, according to the mood-as-information account, it should also affect information processing style. Accumulating evidence now exists showing that a happy mood is associated with a heuristic processing style and a sad mood is associated with a relatively analytic, effortful, and cautious processing style (Bless, Hamilton, & Mackie, 1992; Bodenhausen, 1993; Bodenhausen et al., 1994; Gasper & Clore, 2002). These differential processing styles play an important role in the impression formation process. We tested these implications of automatic evaluation for the impression formation process in Experiment 2. In this experiment, participants were presented with several pieces of information about a target. Because people in a negative mood engage in more bottom-up processing with attention to detail, their impressions of the target should better reflect the information given, whereas a positive mood should elicit a less bottom-up and accurate impression. Specifically, individuals who are using systematic processing should pay closer attention to individuating information about a target and subsequently use that information to form a more accurate and polarized impression. In contrast, those who are using heuristic processing should be more likely to form quick, simplistic impressions of targets that are not a direct function of the target information.

Experiment 2

Method

Participants—One hundred fourteen students enrolled in an introduction to psychology class at an eastern university participated in the study in partial fulfillment of a course requirement. One student was dropped because of computer malfunction, leaving a total of 113 participants in the analysis.

Materials and procedure—The procedure for the vigilance task was identical to that used in Experiment 1. The same positive, neutral, and negative words were also used.

The target information was presented in paragraph format. Each participant was presented with two paragraphs, on two separate pieces of paper, describing two targets. One target, Jim, was described as engaging in 15 honest behaviors interspersed with 5 dishonest behaviors (see Chartrand & Bargh, 1996, Experiment 2, for the honest and dishonest behaviors used). A second target, Joe, was described as engaging in 5 honest and 15 dishonest behaviors. Previous research has shown that compared with participants with no active goal, those with a goal to form an impression of a target form more polarized impressions of the mostly honest versus the mostly dishonest target (Chartrand & Bargh, 1996). The order in which the targets were presented was counterbalanced. The order variable was entered into the analyses and did not moderate any of the effects found (all Fs < 1.0) and therefore is not discussed further.

Participants then rated the targets and were asked about their overall impressions of Jim and Joe. Specifically, they were asked to rate how likable Jim and Joe were on 11-point scales ranging from 0 (*not at all*) to 10 (*extremely*).

Participants were randomly assigned to one of the three priming conditions and informed that they would be taking part in several separate, unrelated tasks. The experimenter explained that the first task investigated attention and visual acuity. The procedure for and details of the vigilance task were identical to those in Experiment 1. After the vigilance task, participants were given the two behavioral descriptions of Jim and Joe, one after the other. They were then given two impression rating forms, one for Jim and one for Joe.

After completing these scales, participants received the same verbal funnel debriefing used in Experiment 1. Again, analyses of the funneled debriefings indicated that no participant guessed the true purpose of the study. After the funnel debriefing, participants were fully debriefed and thanked.

Results

Liking ratings for the targets were subjected to a mixed ANOVA, with prime valence (positive vs. neutral vs. negative) as the between-subjects variable and majority type (honest vs. dishonest) as the repeated within-subjects variable. As expected, there was a significant main effect for target, $F(1, 110) = 397.87$, $p < .00001$, $\eta^2 = .78$. Participants rated the honest target as more likable than the dishonest target. More important, however, the predicted two-way interaction between prime valence and majority type was also uncovered, $F(2, 110) = 11.89$, $p < .0001$, $\eta^2 = .18$. Figure 3 displays the means. Participants who were briefly primed with negative words did indeed form the most polarized impressions of the target. Those primed with positive words formed the least polarized impressions, and those primed with neutral words fell in the middle.

Discussion

Experiment 1 demonstrated that automatically evaluating positive and negative words leads to corresponding mood states. Given this finding, we expected, on the basis of the mood-as-information theory, that the automatic evaluation of briefly presented positive and negative stimuli should affect information processing style. This is what Experiment 2 demonstrated: Those participants who repeatedly and briefly evaluated negative stimuli used more systematic processing of target information (i.e., formed more accurate and polarized impressions of two targets) than did those who were presented with positive stimuli.

Experiment 3

We next wanted to examine the consequences of automatic evaluation for stereotype use. When one is in a positive mood, stereotypes influence judgments to a greater extent than when one is in a negative mood (Bodenhausen et al., 1994; Park & Banaji, 2000). In the third experiment, we tested whether prolonged brief exposure to positive or negative stimuli can influence reliance on stereotypes. Those in a good mood (primed with positive words) were expected to rely more on stereotypes than were those in a bad mood (primed with negative words).

Method

Participants—Fifty students enrolled in an introduction to psychology course at an eastern university participated in the study in partial fulfillment of a course requirement.

Materials and procedure—The procedure and materials for the vigilance task were the same as those used in Experiments 1 and 2. Participants were given an implicit gender stereotyping scale that was based on the Stereotypic Explanatory Bias (SEB) Scale developed by von Hippel, Sekaquaptewa, and Vargas (1997). The scale consisted of 24 sentence stems, and the participant's task was to complete each sentence. There were three types of behavioral predicates: (a) those that described female-stereotypic behaviors (e.g., bottle-fed the baby), (b) those that described male-stereotypic behaviors (e.g., changed the oil in the car), and (c) those that described gender-neutral behaviors (e.g., remembered the telephone number). Each behavioral predicate was preceded by a female or male name. Half of the female-stereotypic behaviors were preceded by a female name (stereotype consistent), and the other half were preceded by a male name (stereotype inconsistent). The same was true for the male-stereotypic behaviors.

The dependent measure is the way in which individuals choose to complete the sentence stems. To the extent that an individual is stereotyping others, he or she may feel the need to explain away stereotype-inconsistent behaviors. This implicitly helps the individuals understand why a man would do a female-stereotypic behavior or why a woman would do a male-stereotypic behavior. There is no need to explain away stereotype-consistent behaviors. An individual who is relying less on gender stereotypes should not show the same difference between providing explanations for stereotype-consistent versus-inconsistent behaviors. We expected happy participants to rely more on stereotypes than sad participants did. Therefore, stereotype-inconsistent behaviors would be more salient to those in a happy mood and subsequently elicit more explanations, compared with the number offered by those in a sad mood.

The stereotype-consistent behaviors (both male and female) and stereotype-inconsistent behaviors were coded by two independent judges for whether they explained why the individual in the sentence did what he or she did (interjudge reliability = .87). Discrepancies were resolved through discussion. The number of causal explanations provided for stereotype-inconsistent behaviors and stereotype-consistent behaviors was counted, and then the latter was subtracted from the former. These difference scores reflect the extent to which an individual was more likely to explain why the characters engaged in gender-stereotype–inconsistent behaviors relative to gender-stereotype–consistent behaviors. Higher scores therefore reflect greater stereotyping.

Participants were randomly assigned to one of the three priming conditions and informed that they would be taking part in several separate, unrelated tasks. The experimenter explained that the first task investigated attention and visual acuity. The procedure for and details of the vigilance task were identical to those in Experiments 1 and 2. After the vigilance task, participants were given the SEB task. After completing these scales, participants received the

same verbal funnel debriefing used in Experiments 1 and 2. No participant was aware of the research hypotheses. After the funnel debriefing, participants were fully debriefed and thanked.

Results

SEB scores were subjected to a one-way ANOVA, with prime valence (positive vs. neutral vs. negative) as the between-subjects variable. As predicted, a linear trend analysis suggested a significant linear trend, $F(1, 48) = 5.17$, $p = .027$, $R^2 = .097$. Figure 4 displays the results. Directionally, relative to participants who were briefly primed with neutral words, those who were primed with positive words stereotyped more, and those primed with negative words stereotyped less. Thus, individuals primed with positive words showed signs of increased use of heuristics via a heavier reliance on gender stereotypes. Individuals primed with negative words showed signs of increased systematic, deliberate processing through a lower level of reliance on gender stereotypes. Post hoc analyses indicated that although the positive and neutral prime conditions did not differ, $F < 1.0$, the negative prime condition differed significantly from both the neutral prime condition, $F(1, 32) = 4.43$, $p = .04$, $\eta^2 = .12$, and the positive prime condition, $F(1, 32) = 6.81$, $p = .01$, $\eta^2 = .18$.

Experiment 4

Experiments 2 and 3 support the hypothesis that automatic evaluation affects information processing. However, because no mood measures were administered in these experiments, it is not possible to see whether mood is actually mediating these effects, as would be expected on the basis of the feeling-as-information theory. Therefore, in our fourth study, we directly tested the hypothesized mediating role of mood in the effect of automatic evaluation on information processing.

Furthermore, there is also some uncertainty as to which aspect of mood is driving the effects in Experiment 3. The bipolar mood scale used in that experiment includes items tapping pure affect (e.g., *happiness*, *pleased*) as well as items tapping affect-plus-arousal (e.g., *elated*, *excited*). One could argue that it is unclear which is causing the differences in processing style: affect, arousal, or some combination of the two. That is, although we are arguing for an affect explanation, it is nevertheless possible that arousal is driving the increased reliance on stereotypes. Thus, affect and arousal were measured independently in Experiment 4 so that we could determine which played a greater role in implicit stereotype usage.

Finally, when individuals automatically evaluate stimuli as good or bad, is the resulting mood understood to them or mysterious to them? That is, are they aware of the source of their mood (attributing it accurately to the experiment)? If not, do they come up with another explanation for their mood state, or do they remain uncertain as to its source? In Experiment 4, we included additional questions on the funneled debriefing to address this issue.

Method

Overview—Experiment 4 was a replication of Experiment 3, with the following change: Immediately after the priming task, individuals were asked to complete an affect scale and an arousal scale (in a counterbalanced order). The arousal scale consisted of a 9-point scale ranging from 1= *not at all aroused* to 9 = *very aroused*. We used a subjective measure of arousal because it has been shown to be a valid measure that correlates well with physiological measures (e.g., Husain, Thompson, & Schellenberg, 2002; Thayer, 1970). Participants then were given the SEB task, followed by a funneled debriefing.

Participants—Thirty-three male and female students at a southeastern university participated for course credit. Six participants reported suspicion that the computer task was supposed to

influence their responses on the SEB task, and their data were dropped from subsequent analyses, leaving 27 participants remaining in the analyses.

Results

Implicit stereotyping—SEB scores were computed by two separate coders blind to experimental condition (interjudge reliability = .92). Discrepancies were resolved through discussion. The scores were then subjected to a one-way ANOVA, with prime valence (positive vs. neutral vs. negative) as the between-subjects variable. As predicted, a linear trend test suggested a strong linear trend, $F(1, 25) = 8.10$, $p = .01$, $R^2 = .245$. Directionally, implicit stereotyping was greater in the positive prime condition than in the neutral prime condition and greater in the neutral prime condition than in the negative prime condition. Planned contrasts showed that although the positive and neutral prime conditions did not differ, $F < 1.0$, the negative prime condition differed significantly from both the neutral prime condition, $F(1, 18) = 4.49$, $p = .05$, $\eta^2 = .20$, and the positive prime condition, $F(1, 18) = 7.08$, $p = .02$, $\eta^2 = .34$. Figure 5 displays the results. Thus, in a replication of the results from Experiment 3, individuals primed with positive words relied on implicit stereotypes more than did those primed with negative words. This suggests that automatic evaluation influences processing style.

Mood—We also analyzed the extent to which mood was influenced by prime valence. First, an ANOVA was conducted with affect scores as the dependent variable and prime valence as the between-subjects variable. As in Experiment 1, there was an effect of prime valence, $F(2, 24) = 3.09$, $p = .06$, $\eta^2 = .21$. Directionally, those primed with positive words were in a better mood ($M = 7.71$, $SE = 0.89$) than were those primed with negative words ($M = 4.78$, $SE = 0.79$), with those primed with neutral words falling in between ($M = 6.27$, $SE = 0.71$). Contrasts indicated that the positive prime condition was significantly different from the negative prime condition, $F(1, 14) = 5.23$, $p = .04$, $\eta^2 = .27$, but the neutral prime condition was only marginally different from the negative prime condition, $F(1, 18) = 1.69$, $p = .21$, $\eta^2 = .09$, and from the positive prime condition, $F(1, 16) = 2.47$, $p < .15$, $\eta^2 = .13$. Because the most important contrast for the purposes of this article is that between positive and negative prime conditions, the results are supportive of our prediction that individuals primed with positive words are in a much better mood than individuals primed with negative words. We next analyzed the self-report arousal scores. There was no effect of prime valence on arousal, $F < 1.0$. Those in the positive prime condition were only slightly more aroused ($M = 5.29$, $SE = 0.71$) than those in the negative ($M = 4.33$, $SE = 0.63$) or neutral ($M = 4.73$, $SE = 0.57$) prime conditions ($\varphi = .123$). Thus, affect was significantly influenced by automatic evaluation, but arousal per se in this study was not.

Path analysis—A test of mediation (Baron & Kenny, 1986) was next conducted to see whether mood mediated the relationship between prime valence (automatic evaluation) and processing style (implicit stereotyping). Figure 6 shows the complete results from this path analysis. It is important to note that the beta for the direct path (i.e., the effect of the prime valence on SEB scores) is $\beta = -.50$, $p = .009$. However, when mood is included as an additional predictor of SEB scores, the effect of prime valence on SEB scores is reduced to $\beta = -.28$, $p = .12$. A Sobel test suggested that the reduction in beta when the mediator was included versus not included was significant, Sobel test = 2.53, $p = .01$. Thus, there was evidence for significant mediation by mood.

Other dependent variables—During the funnel debriefing, participants were asked what was causing their mood state. One individual reported that the experiment was somehow responsible for his or her mood state (we reran all analyses without this individual and no results changed), 14 gave an explanation for their mood that was completely unrelated to the

experiment, and 12 reported that they did not know what was causing their mood. Thus, with the exception of one participant, individuals did not report that their mood was being affected by the experiment in any way and certainly not by the brief priming manipulation.

We also asked participants what they thought the flashes were during the vigilance task to assess the extent of their awareness of the words. We reasoned that if they had awareness of the words at the time of the priming task, they would likely guess that the flashes had, in fact, been words. We could then further press them as to what words (or content) they thought they had seen. However, none of the participants reported that the flashes were words. Eleven reported that the flashes had been jumbled-up characters (most likely a result of the lingering image of the masking string on iconic memory), and the remaining 16 participants said they had no guesses as to what the flashes were. These data suggest that participants did not see the words that were briefly flashed during the priming task (for an even more conservative test using the identical priming procedure, see Bargh, Bond, Lombardi, & Tota, 1986, and Bargh & Pietromonaco, 1982).

General Discussion

Taken together, these studies indicate that, through automatic evaluation, prolonged exposure to negative or positive stimuli has an effect on people's affective state and processing style. These findings suggest that people's moods serve as a signal of the general valence of their environment. The present data illustrate how automatic evaluation alters moods and subsequent information processing, thereby expanding the mood-as-information theory. When one is confronted with predominantly negative stimuli, the continuous automatic activation of this negative valence is reflected in a generalized negative mood, signaling that one's environment is problematic and that appropriate action needs to be taken (e.g., through avoidant behaviors, Chen & Bargh, 1999). This results in a processing style that is relatively more analytic, effortful, and cautious. In contrast, when one's environment is filled with positive and happy things, the continuous automatic activation of this positive valence signals that one's environment is safe and friendly. This results in a positive mood and a relatively heuristic and effortless processing style.

By showing that repeated exposure to valenced words leads to a global mood and subsequently affects processing, these data go beyond the well-known immediate effects of stimuli on processing, such as semantic and affective priming effects (e.g., De Houwer & Hermans, 2001) and immediate behavioral tendencies on automatic evaluation (Chen & Bargh, 1999). The number of objects that bombard the senses at any given moment is far more that a person can consciously process at that moment. It is quite conceivable that people automatically and unconsciously process most of the stimuli they encounter and that their mood, in most cases, is caused by stimuli of which they are not aware. In those cases where there is an obvious origin, people even tend to discount its effect on their mood (Schwarz & Clore, 1983). Therefore, the present studies identify a powerful and pervasive way in which moods are affected in daily life.

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References

Ajzen, I.; Fishbein, M. Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice Hall; 1980.

Bargh, JA. Being unaware of the stimulus versus unaware of its interpretation: Why subliminality per se does not matter to social psychology. In: Bornstein, R.; Pittman, T., editors. Perception without awareness. New York: Guilford Press; 1992. p. 236-255.

Bargh JA, Bond R, Lombardi W, Tota M. The additive nature of chronic and temporary sources of construct accessibility. Journal of Personality and Social Psychology 1986;50:869–878.

Bargh JA, Chaiken S, Raymond P, Hymes C. The automatic evaluation effect: Unconditional automatic attitude activation with a pronunciation task. Journal of Experimental Social Psychology 1996;32:104–128.

Bargh, JA.; Chartrand, TL. The mind in the middle: A practical guide to priming and automaticity research. In: Reis, HT.; Judd, CM., editors. Handbook of research methods in social and personality psychology. New York: Cambridge University Press; 2000. p. 253-285.

Bargh JA, Chen M, Burrows L. Automaticity of social behavior: Direct effects of trait construct and stereotype activation on action. Journal of Personality and Social Psychology 1996;71:230–244. [PubMed: 8765481]

Bargh JA, Pietromonaco P. Automatic information processing and social perception: The influence of trait information presented outside of conscious awareness on impression formation. Journal of Personality and Social Psychology 1982;43:437–449.

Baron RM, Kenny DA. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. Journal of Personality and Social Psychology 1986;51:1173–1182. [PubMed: 3806354]

Bless H, Bohner G, Schwarz N, Strack F. Mood and persuasion: A cognitive response analysis. Personality and Social Psychology Bulletin 1990;16:331–345.

Bless H, Hamilton DL, Mackie DM. Mood effects on the organization of person information. European Journal of Social Psychology 1992;22:497–509.

Bless H, Mackie D, Schwarz N. Mood effects on encoding and judgmental processes in persuasion. Journal of Personality and Social Psychology 1992;63:585–595. [PubMed: 1447687]

Bodenhausen, G. Emotions, arousal, and stereotypic judgments: A heuristic model of affect and stereotyping. In: Mackie, DM.; Hamilton, DL., editors. Affect, cognition, and stereotyping: Interactive processes in group perception. San Diego, CA: Academic Press; 1993. p. 13-37.

Bodenhausen G, Kramer G, Süsser K. Happiness and stereotypic thinking in social judgment. Journal of Personality and Social Psychology 1994;66:621–632.

Cacioppo JT, Priester JR, Berntson GG. Rudimentary determinants of attitudes: II. Arm flexion and extension have differential effects on attitudes. Journal of Personality and Social Psychology 1993;65:5–17. [PubMed: 8355142]

Chartrand TL, Bargh JA. Automatic activation of impression formation and memorization goals: Nonconscious goal priming reproduces effects of explicit task instructions. Journal of Personality and Social Psychology 1996;71:464–478.

Chartrand, TL.; Bargh, JA. Nonconscious motivations: Their activation, operation, and consequences. In: Tesser, A.; Stapel, D.; Wood, J., editors. Self and motivation: Emerging psychological perspectives. Washington, DC: American Psychological Association; 2002. p. 13-41.

Cheeseman J, Merikle PM. Priming with and without awareness. Perception & Psychophysics 1984;36:387–395. [PubMed: 6522236]

Chen M, Bargh JA. Consequences of automatic evaluation: Immediate behavioral predispositions to approach or avoid the stimulus. Personality and Social Psychology Bulletin 1999;25:215–225.

De Houwer, J.; Hermans, D. Cognition and Emotion. Vol. 15. 2001. Automatic affective processing [Special issue].

Dijksterhuis A, Aarts H. On wildebeests and humans: The preferential detection of negative stimuli. Psychological Science 2003;14:14–18. [PubMed: 12564748]

Fazio RH, Sanbonmatsu DM, Powell MC, Kardes FR. On the automatic activation of attitudes. Journal of Personality and Social Psychology 1986;50:229–238. [PubMed: 3701576]

Forgas JP. Feeling and doing: Affective influences on interpersonal behavior. Psychological Inquiry 2002;13:1–28.

Gasper K, Clore GL. Attending to the big picture: Mood and global versus local processing of visual information. Psychological Science 2002;13:34–40. [PubMed: 11892776]

Holender D. Semantic activation without conscious identification in dichotic listening, parafoveal vision, and visual masking: A survey. Behavioral and Brain Sciences 1986;9:1–66.

Husain G, Thompson W, Schellenberg E. Effects of musical tempo and mode on arousal, mood, and spatial abilities. Music Perception 2002;20:151–171.

Metalsky GI, Abramson LY, Seligman MEP, Semmel A, Peterson CR. Attributional styles and life events in the classroom: Vulnerability and invulnerability to depressive mood reactions. Journal of Personality and Social Psychology 1982;43:612–617. [PubMed: 7131244]

Miller WR, Seligman MEP. Depression and learned helplessness in man. Journal of Abnormal Psychology 1975;84:228–238. [PubMed: 1169264]

Park J, Banaji MR. Mood and heuristics: The influence of happy and sad states on sensitivity and bias in stereotyping. Journal of Personality and Social Psychology 2000;78:1005–1023. [PubMed: 10870905]

Schwarz, N. Feelings as information: Informational and motivational functions of affective states. In: Higgins, ET.; Sorentino, R., editors. Handbook of motivation and cognition: Foundations of social behavior. Vol. 2. New York: Guilford Press; 1990. p. 527-561.

Schwarz, N.; Bless, H. Happy and mindless, but sad and smart? The impact of affective states on analytic reasoning. In: Forgas, J., editor. Emotion and social judgments. Oxford, England: Pergamon Press; 1991. p. 55-71.

Schwarz, N.; Bohner, G. Feelings and their motivational implications: Moods and the action sequence. In: Bargh, JA.; Gollwitzer, P., editors. The psychology of action: Linking thought and motivation to behavior. New York: Guilford Press; 1996. p. 119-145.

Schwarz N, Clore G. Mood, misattribution, and judgments of well-being: Informative and directive influences of affective states. Journal of Personality and Social Psychology 1983;45:513–523.

Schwarz, N.; Clore, G. Feelings and phenomenal experiences. In: Higgins, ET.; Kruglanski, AW., editors. Social psychology: Handbook of basic principles. New York: Guilford Press; 1996. p. 433-465.

Thayer R. Activation states as assessed by verbal report and four physiological variables. Psychophysiology 1970;7:86–94. [PubMed: 5492738]

von Hippel W, Sekaquaptewa D, Vargas P. The linguistic intergroup bias as an implicit indicator of prejudice. Journal of Experimental Social Psychology 1997;33:490–509.

Zajonc RB. Feeling and thinking: Preferences need no inferences. American Psychologist 1980;35:151–175.

Zuckerman, M.; Lubin, B. Manual for the Multiple Affect Adjective Check List. San Diego, CA: Educational and Industrial Testing Service; 1965.

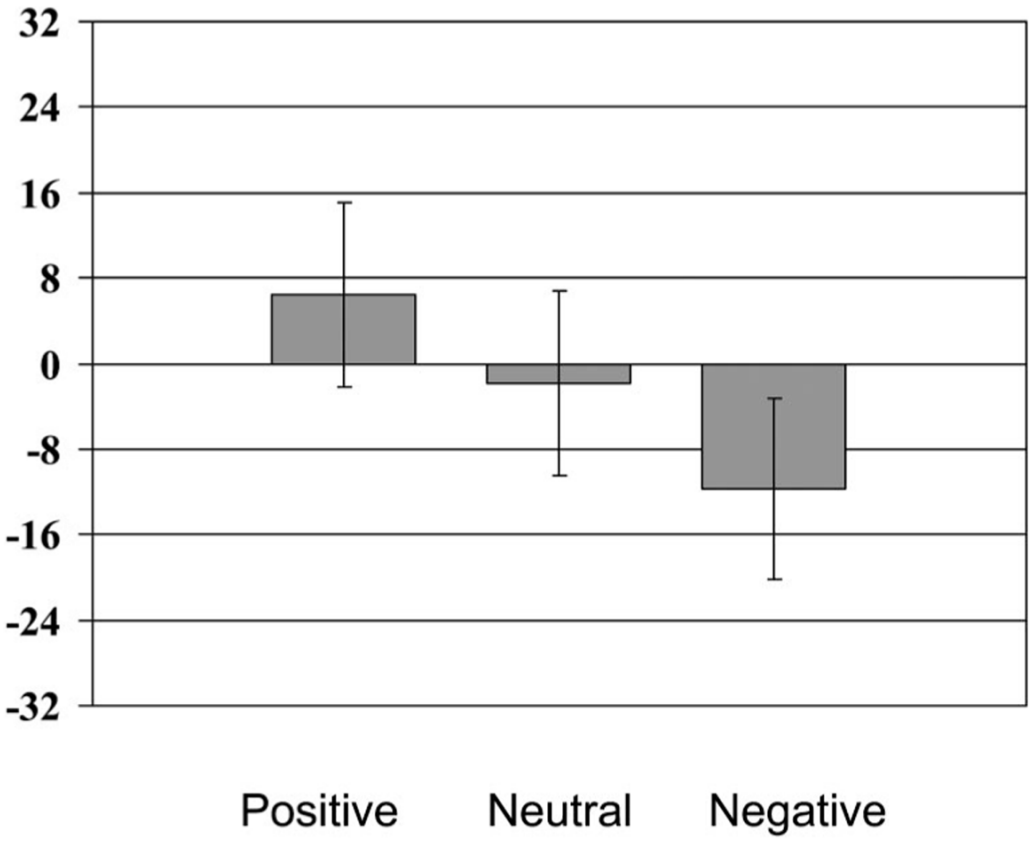

Figure 1.
Bipolar mood scale scores and 95% confidence intervals (indicated by vertical lines) for Experiment 1 as a function of prime valence and prime strength.

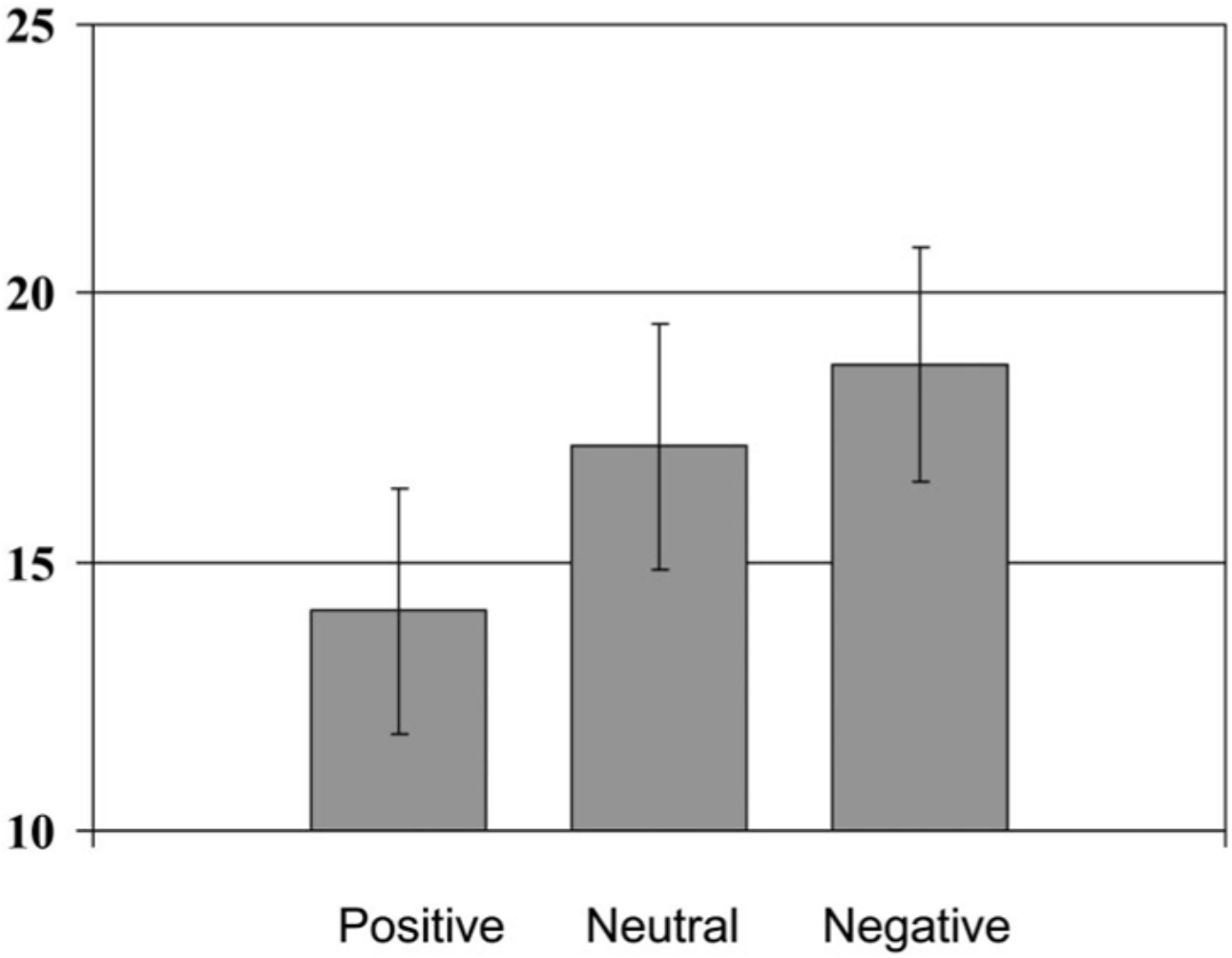

Figure 2.
Multiple Affect Adjective Check List depression subscale scores with 95% confidence intervals (indicated by vertical lines) for Experiment 1 as a function of prime valence and prime strength.

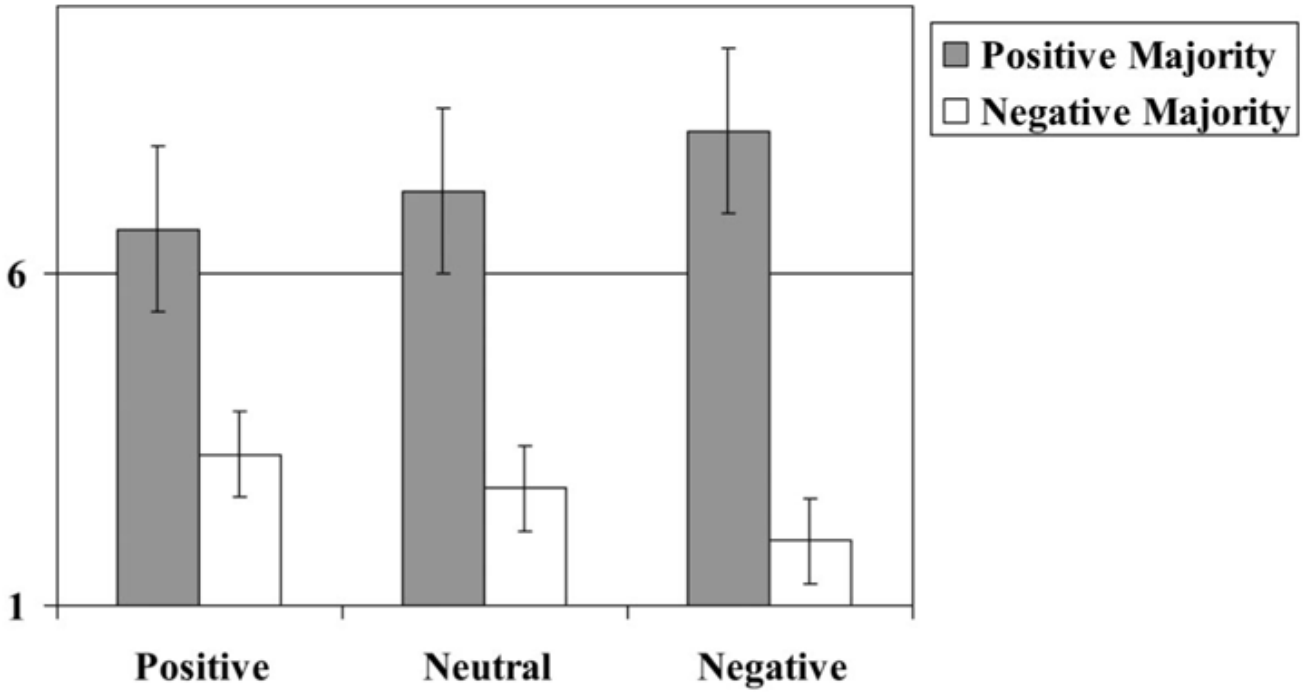

Figure 3.
Likability ratings of target with 95% confidence intervals (indicated by vertical lines) for Experiment 2 as a function of prime valence and majority type.

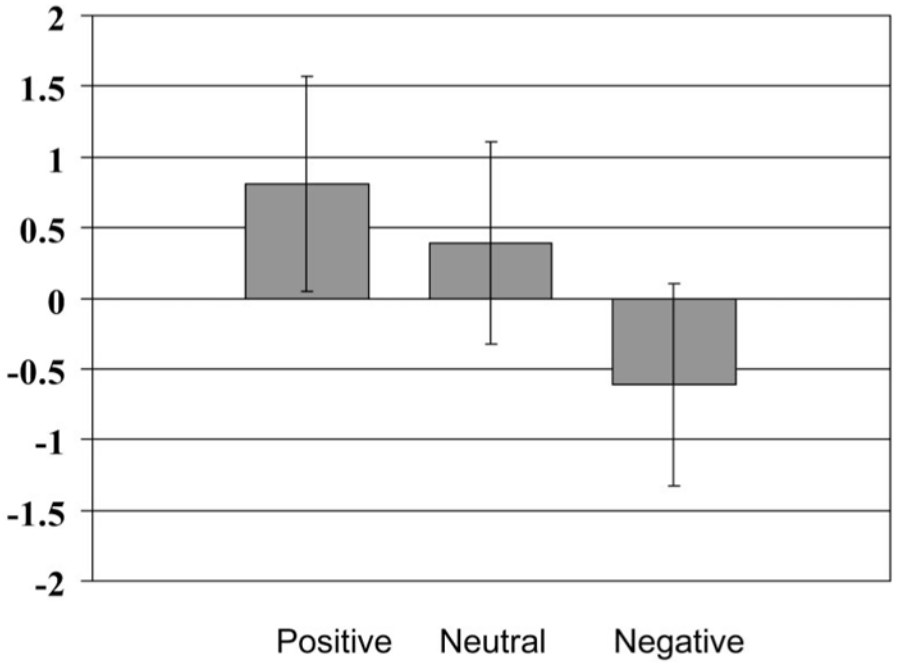

Figure 4.
Implicit stereotyping scores with 95% confidence intervals (indicated by vertical lines) for Experiment 3 as a function of prime valence.

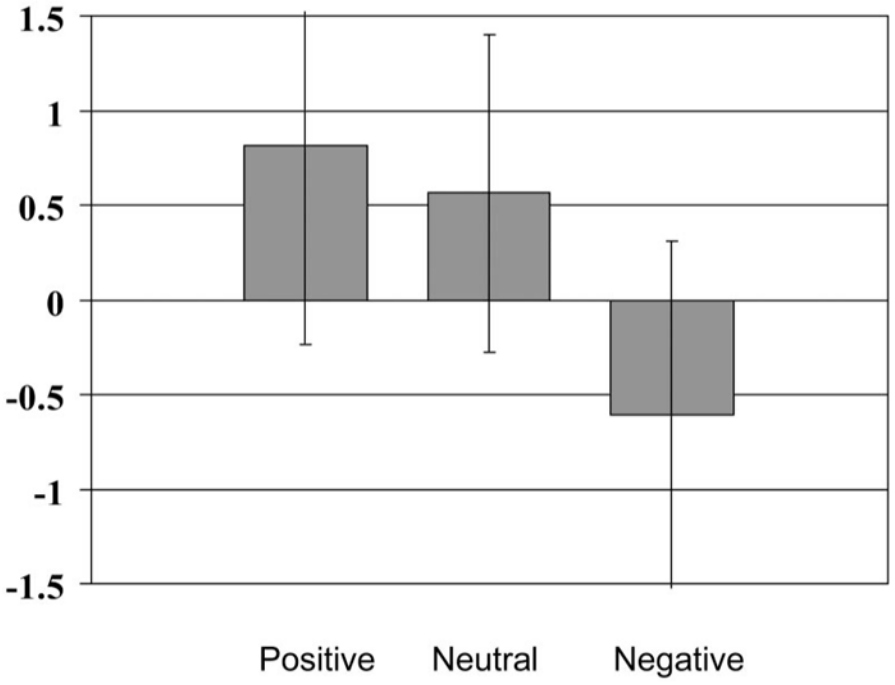

Figure 5.
Implicit stereotyping scores with 95% confidence intervals (indicated by vertical lines) for Experiment 4 as a function of prime valence.

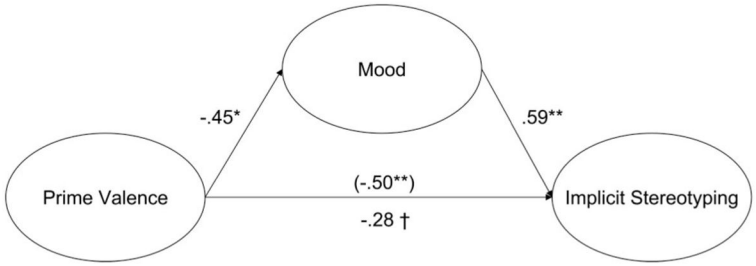

Figure 6.
Path analysis demonstrating mediating role of mood in the effect of prime valence on implicit stereotyping in Experiment 4. Sobel test = 2.53, $p = .01$. All weights represent standardized betas. †$p > .10$. *$p < .05$. **$p < .01$.