Contextual Influences on Implicit Evaluation: A Test of Additive Versus Contrastive Effects of Evaluative Context Stimuli in Affective Priming

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Drawing on two alternative accounts of the affective priming effect (spreading activation vs. response interference), the present research investigated the underlying processes of how evaluative context stimuli influence implicit evaluations in the affective priming task. Employing two sequentially presented prime stimuli (rather than a single prime), two experiments showed that affective priming effects elicited by a given prime stimulus were more pronounced when this stimulus was preceded by a context prime of the opposite valence than when it was preceded by a context prime of the same valence. This effect consistently emerged for pictures (Experiment 1) and words (Experiment 2) as prime stimuli. These results suggest that the impact of evaluative context stimuli on implicit evaluations is mediated by contrast effects in the attention to evaluative information rather than by additive effects in the activation of evaluative information in associative memory.

Keywords: *affective priming; automatic evaluation; implicit attitudes; context effects; contrast effects*

Over the past decade, social psychological research has shown increasing interest in the use of implicit methods to assess spontaneous evaluations of an attitude object (Fazio & Olson, 2003). The most prominent examples for these measures are probably the Implicit Association Test (IAT) developed by Greenwald, McGhee, and Schwartz (1998) and the affective priming task presented by Fazio, Sanbonmatsu, Powell, and Kardes (1986). Originally, these measures were assumed to tap stable evaluative representations stemming from long-term socialization experiences (e.g., Dovidio, Kawakami, & Beach, 2001; Greenwald & Banaji, 1995; Wilson, Lindsey, & Schooler, 2000). Challenging this assumption, however, recent research has shown that spontaneous evaluations assessed with implicit measures are highly sensitive to contextual influences (for a review, see Blair, 2002).

Even though contextual influences have been demonstrated for a large variety of contexts and measures (e.g., Barden, Maddux, Petty, & Brewer, 2004; Dasgupta & Greenwald, 2001; Ferguson & Bargh, 2004; Gawronski & Bodenhausen, 2004; Lowery, Hardin, & Sinclair, 2001; Mitchell, Nosek, & Banaji, 2003; Wittenbrink, Judd, & Park, 2001), the underlying mechanisms of how context stimuli influence implicit evaluations in these measures are not sufficiently well understood. This fact becomes even more apparent considering that the specific processes that determine performance in implicit measures are still controversial (e.g., Brendl, Markman, & Messner, 2001; Conrey, Sherman, Gawronski, Hugenberg, & Groom, in press; De Houwer, 2003; Fazio, 2001;

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Gawronski, 2002; Greenwald, Nosek, Banaji, & Klauer, in press; Klauer & Musch, 2003; Mierke & Klauer, 2003; Rothermund & Wentura, 2004). Hence, investigating context effects from the perspective of competing models of implicit task performance would not only provide deeper insights into the underlying mechanisms of how contextual stimuli influence implicit evaluations but they also could improve our understanding of how exactly implicit measures assess spontaneous evaluations.

The main goal of the present research was to make a step in this direction by investigating the underlying processes of how evaluative context stimuli influence implicit evaluations in the affective priming task (Fazio et al., 1986). In this paradigm, participants are asked to respond to a set of positive and negative target words and to indicate as quickly as possible whether these words have a positive or a negative valence. Spontaneous evaluations of a given stimulus are assessed by briefly presenting this stimulus as a prime shortly before the presentation of the target words. Spontaneous positive evaluations of the prime stimulus are indicated when this prime leads to facilitated responses to positive target words and to inhibited responses to negative target words. Spontaneous negative evaluations, in contrast, are indicated when the prime stimulus leads to inhibited responses to positive target words and to facilitated responses to negative target words (for reviews, see Fazio, 2001; Klauer & Musch, 2003). So far, the affective priming task has been employed to study a large variety of psychological phenomena, such as prejudiced behavior (e.g., Fazio, Jackson, Dunton, & Williams, 1995), interpersonal relations (e.g., Banse, 2001), addiction (e.g., Sherman, Rose, Koch, Presson, & Chassin, 2003), self-handicapping (e.g., Spalding & Hardin, 1999), social categorization (e.g., Fazio & Dunton, 1997), evaluative conditioning (e.g., Hermans, Vansteenwegen, Crombez, Baeyens, & Eelen, 2002), cognitive balance (e.g., Gawronski, Walther, & Blank, in press), and the processing of negations (e.g., Deutsch, Gawronski, & Strack, 2004).

Two Accounts of the Affective Priming Effect

Previous research has addressed two alternative mechanisms that may be responsible for affective priming effects: (a) spreading activation and (b) response interference (for a review, see Klauer & Musch, 2003).[1] The first account explains affective priming effects in terms of spreading activation processes similar to those obtained in semantic priming (cf. Neely, 1977). In a typical semantic priming task, participants are presented meaningful and meaningless target words and their task is to indicate as quickly as possible whether the target word is meaningful or meaningless. Briefly before the presentation of the target words, participants are presented meaningful prime words. The well-replicated finding in this paradigm is that participants are faster in responding to meaningful target words when the prime word is semantically related to the target word (e.g., *bread-butter*) than when the prime word is unrelated to the target word (e.g., *car-butter*). Drawing on associative network models (e.g., Collins & Loftus, 1975), this finding is often explained by processes of spreading activation, such that the activation of a particular node in associative memory spreads to semantically related nodes, thereby facilitating the processing of semantically related stimuli. This reasoning also can be applied to affective priming, such that the activation of a particular node may spread to evaluatively congruent nodes, thereby facilitating the processing of evaluatively congruent stimuli and inhibiting the processing of evaluatively incongruent stimuli (e.g., De Houwer & Randell, 2004; Fazio et al., 1986; Hermans, De Houwer, & Eelen, 1994).

In contrast to spreading activation models, the second account explains affective priming effects in terms of response interference processes similar to those obtained in the Stroop task (Stroop, 1935; for a review, see MacLeod, 1991). In the Stroop task, participants are presented color words (e.g., the word *RED*) in different ink colors and are asked to name the ink color of each word. The typical finding in this task is that participants show better performance when the ink color of the word corresponds to the color label depicted by the word (e.g., the word *RED* printed in red ink). However, participants usually show impaired performance when ink color and color label do not correspond to one another (e.g., the word *RED* printed in blue ink). Drawing on the general notion of response compatibility (cf. Kornblum, Hasbroucq, & Osman, 1990), these differences in performance are often explained by the influence of two independent response tendencies elicited by the color label and the ink color. Whereas the first case results in two response tendencies that have synergistic effects on participants' responses, the latter case results in two response tendencies that have antagonistic effects. As such, performance in the Stroop task depends on the relative strength of the two competing response tendencies, which can be compatible or incompatible (see also Lindsay & Jacoby, 1994). This reasoning also can be applied to the affective priming task. Specifically, one could argue that the valence of the prime stimulus triggers a particular response tendency that can be compatible or incompatible with the response tendency triggered by the valence of the target word. If the prime stimulus and the target word share the same valence, the two response tendencies have synergistic effects on participants' responses. If, however, the prime stimulus and the target word have a different valence, the two response tendencies have antagonistic effects. From this perspective, affective priming effects should depend on the relative strength of the two response tendencies, thus implying response interference processes similar to those in the Stroop task (De Houwer, Hermans, Rothermund, & Wentura, 2002; Klauer, Roßnagel, & Musch, 1997; Klinger, Burton, & Pitts, 2000; Wentura, 1999). Most important, the relative strength of the response tendency elicited by the prime should strongly depend on whether participants are able to ignore the valence of the prime word, such as the Stroop effect depends on whether participants are able to ignore the semantics of the color word (e.g., Besner & Stolz, 1999; Besner, Stolz, & Boutilier, 1997).

Affective Priming With Multiple Primes

In the present research, we employed the two accounts to investigate the underlying processes of how evaluative context stimuli influence implicit evaluations in the affective priming task. For this purpose, we used a variant of the affective priming task that included two sequentially presented prime stimuli rather than a single one (cf. Balota & Paul, 1996). Specifically, participants were presented two prime stimuli that either corresponded or differed with regard to their valence and then had to indicate the valence of a subsequently presented target word. In this double-priming task, the first prime stimulus was interpreted as the evaluative context for the second prime stimulus, which in turn was assumed to either facilitate or inhibit responses to positive or negative target words. From the perspective of the two models outlined above, evaluative context primes could influence affective priming effects either (a) by directly activating evaluative information in associative memory or (b) by influencing participants' attention to the valence of the second prime.

With regard to the first process—direct activation of evaluative information in associative memory—one could argue that evaluative context stimuli should activate a particular evaluation, and this evaluation should simply add to the one elicited by a subsequently presented prime stimulus. Thus, the preceding presentation of a context prime should lead to stronger affective priming effects when the first and the second prime have the same valence than when they have the opposite valence. Such additive effects could be derived from the spreading activation account, which implies that the overall activation level of positivity or negativity in associative memory should increase as a function of increasing stimulation. Moreover, additive effects in affective priming also would be consistent with previous research by Balota and Paul (1996), who found that two sequentially presented prime stimuli lead to additive effects on lexical responses to semantically related target words in semantic priming.

With regard to the second process—attention to the valence of the second prime—one could argue that sequential changes in the valence of encountered stimuli enhance attention to their valence (e.g., Cacioppo, Crites, Berntson, & Coles, 1993). As such, the valence of the second prime may be more salient, and thus more difficult to ignore, when it is evaluatively inconsistent with the valence of the first prime. However, the valence of the second prime may be less salient, and thus easier to ignore, when it is evaluatively consistent with the valence of the first prime (cf. Gawronski, Deutsch, & Strack, in press). This assumption implies that the preceding presentation of a context prime should lead to stronger affective priming effects elicited by the second prime when the two primes have the opposite valence than when they have the same valence. Such contrastive effects could be derived from the response interference account, which implies that the relative size of affective priming effects should depend on whether participants are able to ignore the valence of the prime.

To summarize, evaluative context stimuli may influence implicit evaluations in the affective priming task either (a) by directly activating evaluative information in associative memory or (b) by influencing participants' attention to the valence of the second prime. Whereas the first process implies a mere associative mechanism that should lead to additive effects, the second process implies an attentional mechanism that should lead to contrastive effects. In the following sections, we present two studies that tested these competing predictions.

EXPERIMENT 1

The main goal of Experiment 1 was to provide a first test of the two competing predictions using positive and negative pictures as prime stimuli. Participants were presented a first picture prime for 133 ms, which was immediately followed by a second picture prime for 133 ms. After a brief delay of 34 ms, participants were presented a positive or a negative target word that had to be categorized as positive or negative as quickly as possible. The main dependent measure was the overall affective priming effect elicited by the second prime, such as implied by the mean response latencies to positive and negative target words as a function of positive or negative second primes.

Method

Participants and design. A total of 33 undergraduates (22 women, 11 men) participated in a study on "attention and performance" for course credit. The experiment consisted of a 2 (first prime valence: positive vs. negative) × 2 (second prime valence: positive vs. negative) × 2 (target valence: positive vs. negative) within-subjects design.

Stimulus material. As prime stimuli, we selected 20 positive and 20 negative pictures from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2001). These pictures were divided into four sets, resulting in two sets of 10 positive pictures and two sets of 10 negative pictures. The picture sets were counterbalanced across the four experimental conditions implied by the manipulation of first prime valence and second prime valence. In addition to the prime pictures, we selected 10 positive and 10 negative target words from Greenwald et al. (1998). Special care was taken that the pictures in the different sets did not depict identical objects (e.g., both pictures showing a spider) and that the target words did not denote any of the objects depicted in the prime pictures (e.g., a picture of a spider followed by the target word *spider*).

Procedure. The priming task consisted of a total of 200 priming trials. In these trials, each of the four possible prime combinations (i.e., positive-positive, negative-positive, positive-negative, negative-negative) was presented 25 times with each of the two kinds of target words (i.e., positive, negative). Prime pictures and target words were randomly selected from corresponding stimulus lists. Each trial began with the presentation of a blank screen for 700 ms, followed by a fixation cross (+) for 700 ms. Following the procedure employed by Balota and Paul (1996), the fixation cross was then replaced by the first prime for 133 ms, which was followed by the second prime for 133 ms. The second prime was then replaced by a blank screen for 34 ms, followed by the target word, which had to be categorized as positive or negative as quickly as possible.

Results and Discussion

Before we tested our hypotheses, we discarded all latencies stemming from incorrect responses (5.0%). Following recommendations by Ratcliff (1993), all of the subsequent analyses were conducted twice: once with a predetermined cutoff value (in this case, 1000 ms) and once with inverse-transformed latencies. The two data sets revealed corresponding patterns of means. For ease of interpretation, we report data with a cutoff of 1,000 ms.

To test the influence of first primes on affective reactions elicited by second primes, we first recoded the manipulation of first prime valence to reflect its evaluative (in)consistency with the valence of the second prime. Response latencies were then submitted to a 2 (first prime valence: consistent vs. inconsistent with second prime valence) × 2 (second prime valence: positive vs. negative) × 2 (target valence: positive vs. negative) analysis of variance (ANOVA) for repeated measures.

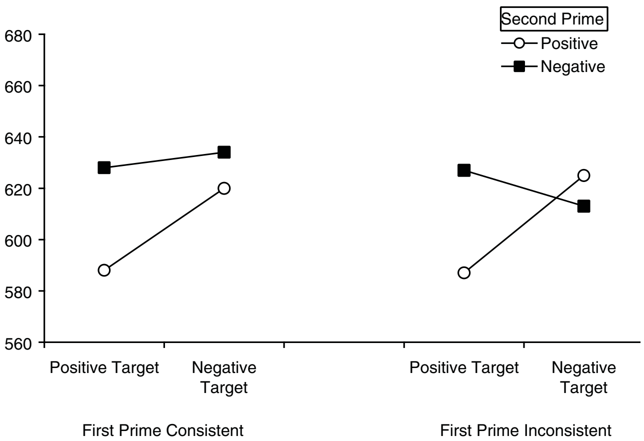

Figure 1 Mean response latencies to target words (positive vs. negative) as a function of second prime valence (positive vs. negative) and first prime valence (consistent vs. inconsistent with second prime valence), Experiment 1.

This analysis revealed a main effect of target valence, $F(1, 32) = 8.76$, $p = .006$, $\eta^2 = .215$, indicating that responses to positive target words were generally faster than responses to negative target words. In addition, there was a significant main effect of second prime valence, $F(1, 32) = 41.75$, $p < .001$, $\eta^2 = .566$, indicating that responses to target words were generally faster after positive second primes than after negative second primes. These main effects were qualified by a highly significant two-way interaction between second prime valence and target valence, $F(1, 32) = 22.10$, $p < .001$, $\eta^2 = .408$, reflecting the standard affective priming effect. Specifically, participants were faster in responding to positive targets when the second prime was positive than when it was negative. In contrast, participants were faster in responding to negative targets when the second prime was negative than when it was positive. Most important, this two-way interaction was further qualified by a significant three-way interaction between first prime valence, second prime valence, and target valence, $F(1, 32) = 4.26$, $p < .05$, $\eta^2 = .117$ (see Figure 1). To specify this interaction in terms of the present hypotheses, we conducted separate 2 (second prime valence) × 2 (target valence) ANOVAs for the two context conditions.

For evaluatively inconsistent context primes, analyses revealed a highly significant two-way interaction, $F(1, 32) = 27.84$, $p < .001$, $\eta^2 = .465$, reflecting the standard affective priming effect. Specifically, participants were faster in responding to positive targets when the second prime was positive than when it was negative, $t(32) = 5.64$, $p < .001$. In contrast, participants were faster in responding to negative targets when the second prime was negative than when it was positive, $t(32) = -2.04$, $p = .05$. The same analysis for evaluatively consistent context primes also revealed a significant two-way interaction, $F(1, 32) =$

5.97, $p = .02$, $\eta^2 = .157$. However, this interaction was significantly weaker as compared to the interaction obtained for evaluatively inconsistent context primes, $t(32) = 2.06$, $p < .05$. Even though participants were still faster in responding to positive targets when the second prime was positive than when it was negative, $t(32) = 4.95$, $p < .001$, responses to negative targets were also faster when the second prime was positive than when it was negative, $t(32) = 2.12$, $p = .04$, thus implying a reversal of the standard affective priming effect.

To further specify the obtained effects, we also conducted separate 2 (first prime valence) × 2 (second prime valence) ANOVAs for the two target valence conditions. These analyses revealed that the obtained context effects were primarily driven by responses to negative target words. Specifically, responses to negative target words showed a significant two-way interaction of first prime valence and second prime valence, $F(1, 32) = 9.25$, $p = .005$, $\eta^2 = .224$, indicating that negative second primes led to faster responses to negative target words when the valence of the first prime was inconsistent than when it was consistent with the valence of the second prime, $t(32) = 3.12$, $p = .004$. However, the influence of positive second primes on negative target words was unaffected by first prime valence, $t(32) = -.99$, $p = .33$. Moreover, responses to negative target words were faster for negative as compared to positive second primes only when the first prime was evaluatively inconsistent with the valence of the second prime, $t(32) = 2.04$, $p = .05$. However, when the first prime was evaluatively consistent with the valence of the second prime, this effect was reversed such that responses to negative target words were faster for positive as compared to negative second primes, $t(32) = -2.12$, $p = .04$. The same ANOVA on responses to positive target words showed only a significant main effect of second prime valence, $F(1, 32) = 45.48$, $p < .001$, $\eta^2 = .587$, indicating that responses to positive target words were generally faster when the second prime was positive than when it was negative.

Finally, we conducted separate 2 (first prime valence) × 2 (target valence) ANOVAs for the two second prime valence conditions. For positive second primes, analyses revealed only a significant main effect of target valence, $F(1, 32) = 19.30$, $p < .001$, $\eta^2 = .376$, indicating that responses to positive target words were generally faster than responses to negative words. For negative second primes, the same ANOVA showed a significant main effect of first prime valence, indicating that responses to negative target words were faster when the valence of the first prime was inconsistent than when it was consistent with the valence of the second prime. More important, a marginally significant two-way interaction, $F(1, 32) = 3.71$, $p = .06$, $\eta^2 = .104$, indicated that responses to negative target words after negative second primes were faster when the valence of the first prime was inconsistent than when it was consistent with the valence of the second prime, $t(32) = 3.12$, $p = .004$. However, responses to positive target words after negative second primes were unaffected by first prime valence, $t(32) = .01$, $p = .99$.

Taken together, these results indicate that evaluative context primes influence affective priming effects in a contrastive rather than in an additive manner. Specifically, affective priming effects elicited by the second primes were more pronounced when they were preceded by a context prime of the opposite valence than when they were preceded by a context prime of the same valence. These results are consistent with the assumption that the influence of evaluative context stimuli in affective priming is mediated by attentional processes. However, they are inconsistent with the assumption that the impact of evaluative context stimuli is mediated by direct activation of evaluative information in associative memory.

EXPERIMENT 2

Because contrast effects in implicit evaluation are a relatively rare finding (Glaser & Banaji, 1999), the main goal of Experiment 2 was to replicate the effects obtained in Experiment 1 with a different set of stimuli. Specifically, Experiment 2 used words rather than pictures as prime stimuli. In addition, we included baseline conditions in which second primes of positive or negative valence were preceded by neutral first primes or neutral second primes were preceded by first primes of positive or negative valence. These baseline conditions were included to test whether the obtained effects are due to (a) a decrease of affective priming effects for evaluatively consistent context primes, (b) an increase of affective priming effects for evaluatively inconsistent context primes, or (c) a combination of the two effects.

Method

Participants and design. A total of 42 psychology undergraduates (32 women, 10 men) participated in a study on "attention and performance" for course credit. Due to a computer error, data from 1 participant were only partially recorded and had to be excluded from analyses. Another participant revealed a mean response latency of more than two standard deviations higher than the sample mean. Data from this participant also were excluded from analyses. As with Experiment 1, the experiment consisted of a 2 (first prime valence: positive vs. negative) × 2 (second prime valence: positive vs. negative) × 2 (target valence: positive vs. negative) within-subjects design. In addition, we included baseline conditions in which first primes of positive or negative valence were followed by a neutral second prime or neutral first primes were followed by a second prime of positive or negative valence.

Stimulus material. Two lists of prime stimuli were generated from a standardized sample of positive and negative German words (Schwibbe, Räder, Schwibbe, Borchardt, & Geiken-Pophanken, 1994). Specifically, we selected 24 positive and 24 negative nouns and divided them into four sets, matched for valence and word length. This resulted in two sets of 12 positive words and two sets of 12 negative words, which were counterbalanced across the experimental conditions. Special care was taken that the words in the different sets had no semantic relation. In addition to the prime words, we selected 12 positive and 12 negative adjectives from Klauer and Musch (1999) to be used as target stimuli. For the neutral control stimuli, we chose a meaningless letter string ("XXXXXX").

Procedure. The procedure was almost identical to Experiment 1. The priming task consisted of a total of 384 priming trials, which were divided into four blocks of 96 trials. In these blocks, each of the eight possible prime combinations (i.e., positive-positive, neutral-positive, negative-positive, positive-negative, neutral-negative, negative-negative, positive-neutral, negative-neutral) was presented six times with each of the two kinds of target words (i.e., positive, negative). Prime and target words were randomly selected from corresponding stimulus lists.

Results and Discussion

As with Experiment 1, we discarded all latencies stemming from incorrect responses (4.1%). All of the subsequent analyses were conducted twice: once with a predetermined cutoff-value of 1,000 ms and once with inverse-transformed latencies (Ratcliff, 1993). The two data sets revealed corresponding patterns of means. For ease of interpretation, we report data with a cutoff of 1,000 ms.

Context effects. To test the influence of first primes on affective reactions elicited by second primes, we again recoded the manipulation of first prime valence to reflect its evaluative (in)consistency with the valence of the second prime. Response latencies were then submitted to a 2 (first prime valence: consistent vs. inconsistent with second prime valence) × 2 (second prime valence: positive vs. negative) × 2 (target valence: positive vs. negative) ANOVA for repeated measures. This analysis revealed a significant main effect of target valence, $F(1, 39) = 10.39$, $p = .003$, $\eta^2 = .210$, indicating that responses to positive target words were generally faster than responses to negative target words. This main effect was qualified by a highly significant two-way interaction

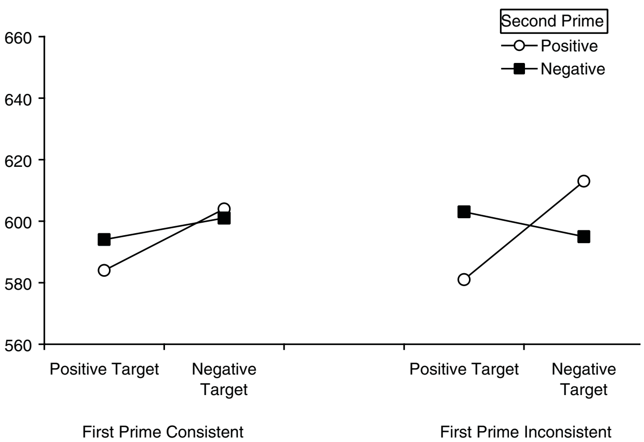

Figure 2 **Mean response latencies to target words (positive vs. negative) as a function of second prime valence (positive vs. negative) and first prime valence (consistent vs. inconsistent with second prime valence), Experiment 2.**

between second prime valence and target valence, $F(1, 39) = 14.50$, $p < .001$, $\eta^2 = .271$, reflecting the standard affective priming effect. Specifically, participants were faster in responding to positive targets when the second prime was positive than when it was negative. In contrast, participants were faster in responding to negative targets when the second prime was negative than when it was positive. Most important, this two-way interaction was qualified by the expected three-way interaction between first prime valence, second prime valence, and target valence, $F(1, 39) = 5.93$, $p = .02$, $\eta^2 = .132$ (see Figure 2). To specify this interaction in terms of the present hypotheses, we conducted separate 2 (second prime valence) × 2 (target valence) ANOVAs for the two context conditions.

For evaluatively inconsistent context primes, this analysis revealed a highly significant two-way interaction, $F(1, 39) = 20.24$, $p < .001$, $\eta^2 = .342$, reflecting the standard affective priming effect. Specifically, participants were faster in responding to positive targets when the second prime was positive than when it was negative, $t(39) = 4.03$, $p < .001$. In contrast, participants were faster in responding to negative targets when the second prime was negative than when it was positive, $t(39) = 3.33$, $p = .002$. For evaluatively consistent context primes, however, the Prime × Target interaction reflecting the standard affective priming effect failed to reach the conventional level of statistical significance, $F(1, 39) = 2.23$, $p = .14$, $\eta^2 = .054$. The difference in affective priming effects was statistically significant, $t(39) = 2.44$, $p = .02$. These results corroborate the assumption that evaluative context stimuli influence affective priming in a contrastive manner. However, they are clearly inconsistent with the assumption that evaluative context stimuli influence affective priming in an additive manner.

To further specify the obtained effects, we again conducted separate 2 (first prime valence) × 2 (second prime valence) ANOVAs for the two target valence conditions. These analyses replicated the finding of Experiment 1, such that the obtained context effects were primarily driven by responses to negative target words. Specifically, analyses for negative target words revealed a significant main effect of second prime valence, $F(1, 39) = 6.22$, $p = .02$, $\eta^2 = .138$, and a significant two-way interaction of first prime valence and second prime valence, $F(1, 39) = 4.75$, $p = .04$, $\eta^2 = .109$. This interaction indicated that responses to negative target words differed as a function of second prime valence only when the second prime was evaluatively inconsistent with the valence of the first prime, $t(39) = 3.33$, $p = .002$, but not when the second prime was evaluatively consistent with the valence of the first prime, $t(39) = .50$, $p = .62$. Moreover, positive second primes tended to lead to slower responses to negative target words when the first prime was evaluatively inconsistent than when it was evaluatively consistent with the second prime, $t(39) = -1.88$, $p = .06$. However, the influence of negative second primes on negative target words was unaffected by first prime valence, $t(39) = 1.45$, $p = .16$. The same ANOVA on responses to positive target words again showed only a significant main effect of second prime valence, $F(1, 39) = 15.56$, $p < .001$, $\eta^2 = .285$, such that responses to positive target words were generally faster when the second prime was positive than when it was negative.

Finally, we conducted separate 2 (first prime valence) × 2 (target valence) ANOVAs for the two second prime valence conditions. For positive second primes, this analysis again revealed only a significant main effect of target valence, $F(1, 39) = 27.38$, $p < .001$, $\eta^2 = .413$, indicating that responses to positive target words were generally faster than responses to negative words. For negative second primes, however, the same ANOVA showed a significant two-way interaction, $F(1, 39) = 4.59$, $p = .04$, $\eta^2 = .105$. Specifically, responses to positive target words after negative second primes tended to be faster when the valence of the first prime was consistent than when it was inconsistent with the valence of the second prime, $t(39) = 1.78$, $p = .08$. However, responses to negative target words after negative second primes were unaffected by first prime valence, $t(39) = 1.45$, $p = .16$.

Baseline comparisons. To compare the direct influence of first and second primes on responses to target words in the respective baseline conditions, we conducted a 2 (prime position: first vs. second) × 2 (prime valence: positive vs. negative) × 2 (target valence: positive vs. negative) ANOVA for repeated measures. Consistent with previous research, this analysis revealed a significant two-way interaction of prime valence and target valence, $F(1, 39) = 7.12$, $p = .01$, $\eta^2 = .154$, reflecting the standard affective priming effect. Specifically, participants were faster in responding to positive target words when the prime was positive than when it was negative. In contrast, participants were faster in responding to negative target words when the prime was negative than when it was positive. Of interest, however, this effect was qualified by a significant three-way interaction between prime valence, prime position, and target valence, $F(1, 39) = 5.81$, $p = .02$, $\eta^2 = .130$ (see Figure 3). Whereas second primes produced a highly significant Prime × Target interaction reflecting the standard affective priming effect, $F(1, 39) = 12.09$, $p = .001$, $\eta^2 = .237$, there was virtually no affective priming effect for first primes, $F(1, 39) = .15$, $p = .70$, $\eta^2 = .004$. In other words, even though first primes had a clear, indirect impact on affective priming effects by influencing spontaneous affective reactions elicited by the second primes, there was no evidence for a direct influence of the first primes on responses to positive and negative target words.

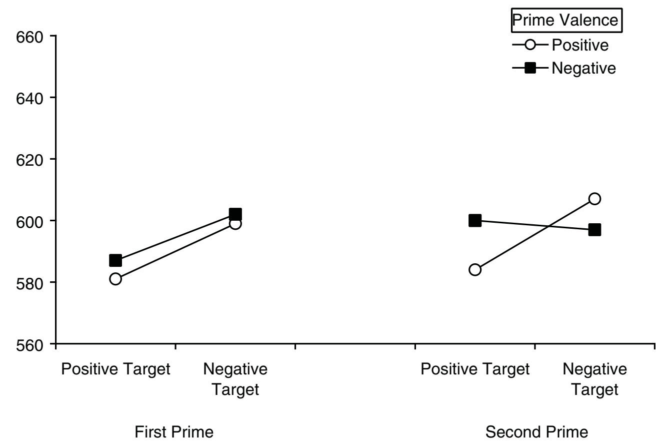

Figure 3 **Mean baseline response latencies to target words (positive vs. negative) as a function of prime valence (positive vs. negative) and prime position (first prime valence), Experiment 2.**

To test whether the obtained effects of evaluative context stimuli are due to (a) a decrease of affective priming effects for evaluatively consistent context primes, (b) an increase of affective priming effects for evaluatively inconsistent context primes, or (c) a combination of the two effects, we compared the interaction effects of second primes and target words obtained for evaluatively consistent and evaluatively inconsistent contexts to baseline conditions of evaluatively neutral contexts. Even though neither the baseline comparison for evaluatively consistent context primes, $t(39) = -1.28$, $p = .21$, nor the baseline comparison for evaluatively inconsistent context primes, $t(39) = 1.50$, $p = .14$, reached statistical significance, a comparison of the respective effect sizes revealed a linear trend from evaluatively consistent context primes (η^2 = .054) over baseline conditions (η^2 = .237) to evaluatively inconsistent context primes (η^2 = .342). Hence, even though these data do not allow a strong conclusion, it seems that the obtained effects are due to a combined effect, such that evaluative consistent context primes decrease and evaluative inconsistent context primes increase affective priming effects.

GENERAL DISCUSSION

The main goal of the present research was to investigate the underlying processes of how evaluative context stimuli influence implicit evaluations in the affective priming task (Fazio et al., 1986, 1995). Drawing on two alternative accounts of the affective priming effect, spreading activation versus response interference (see Klauer & Musch, 2003), we were particularly interested in whether evaluative context primes influence affective priming effects either (a) by directly activating evaluative information in associative memory or (b) by influencing attention to valence information. Whereas the first process implies a mere associative mechanism that should lead to additive effects, the second process implies an attentional mechanism that should lead to contrastive effects. The present findings provide clear evidence for an attentional influence of evaluative context stimuli. Specifically, our results showed that affective priming effects elicited by a given stimulus are stronger when this stimulus is preceded by an evaluative context stimulus of the opposite valence than when it is preceded by an evaluative context stimulus of the same valence. This finding was replicated in two studies for pictures (Experiment 1) and words (Experiment 2) as evaluative prime stimuli.

Of interest, affective priming effects elicited by the second prime were influenced by the prior presentation of a first prime even though the first primes alone showed no evidence for affective priming (Experiment 2). From a general perspective, there are at least two possible explanations for this finding. First, the increased stimulus onset asynchrony (SOA) implied by the sequential presentation of the two primes could have undermined a direct influence of the first primes on evaluative responses to the target words. Consistent with this assumption, several researchers found that affective priming effects decrease as a function of increasing intervals between prime onset and target onset (e.g., Hermans, De Houwer, & Eelen, 2001; Klauer et al., 1997). Thus, even though the first primes might have influenced affective reactions to the second primes, a direct influence on responses to target words could have been undermined by the longer interval between prime onset and target onset. It has to be noted, however, that other research employing an SOA of the same length as the one implied in the present study (i.e., 300 ms) did find reliable affective priming effects (e.g., Hermans, Spruyt, & Eelen, 2003). Hence, the longer interval between first prime onset and target onset cannot account for the lacking influence of first primes on responses to target words. A second possible interpretation is that affective priming effects elicited by the first primes could have been attenuated by the subsequent presentation of a neutral letter string. Specifically, one could argue that the letter string may have neutralized affective reactions elicited by the first primes. This interpretation would be consistent with the assumption that evaluative context stimuli enhance affective reactions to prime stimuli of the opposite valence but decrease affective reactions to prime stimuli of the same valence. Because neutral letter strings can be assumed to elicit no (or neutral) affective reactions, there is obviously no affective priming effect that could be increased or decreased by the context. In any case, future research may help to clarify the particular role of neutral primes and different SOAs in affective priming tasks with multiple primes.

Even though the present findings are not genuinely inconsistent with a spreading activation account of affective priming effects (given that the activation of evaluative information in associative memory may depend on attention to evaluative information), they nevertheless provide indirect evidence for an important difference in the underlying mechanisms of affective and semantic priming. Using a similar manipulation as the one employed in the present study, Balota and Paul (1996) found that two sequentially presented prime stimuli lead to additive effects on lexical responses to semantically related target words in semantic priming. These results are in contrast to the present findings showing that two sequentially presented prime stimuli lead to contrast effects in affective priming. Given that semantic priming effects are indeed due to processes of spreading activation in an associative network (cf. Collins & Loftus, 1975), this difference provides at least indirect evidence against a spreading activation account of affective priming. Moreover, the present results highlight the importance of attentional mechanisms in affective priming, which is consistent with a response interference account of the affective priming effect. Future research may help to further clarify the particular role of spreading activation and response interference processes in affective priming.

A major goal of the present research was to investigate contextual influences on implicit evaluations from the perspective of competing models of implicit task performance. This approach also may prove useful for investigations of context effects on other measures. For example, Rothermund and Wentura (2004) presented evidence for attentional influences on performance in the Implicit Association Test (but see Greenwald et al., in press). As such, context effects on the IAT also could be due to either (a) direct activation of evaluative information in associative memory or (b) influences on the attention to evaluative information. In a similar vein, Conrey et al. (2004) recently argued that performance in the IAT is influenced by at least four different processes: the automatic activation of associations, the ability to discriminate a target stimulus, the ability to overcome automatically activated associations, and general guessing biases. Hence, different kinds of contextual influences may be driven by very different processes. Future research investigating contextual influences from the perspective of competing models of implicit task performance may help to clarify how exactly implicit evaluations are influenced by different kinds of context stimuli.

At first glance, the present findings seem to challenge the assumption that implicit evaluations reflect stable evaluative representations in memory. Rather, the fact that implicit evaluations are highly context dependent has led some researchers to conclude that even implicit evaluations are constructed on the spot (Ferguson & Bargh, 2003; Mitchell et al., 2003; Schwarz & Bohner, 2001; see also Wilson & Hodges, 1992). However, even though the present findings clearly demonstrate a high level of context sensitivity for implicit evaluations, they nevertheless presuppose the existence of enduring evaluative representations in memory. Specifically, it seems that the obtained effects of evaluative context stimuli on implicit evaluations result from the evaluative contrast between the context and a given stimulus. As such, the valence of both the context and the following stimulus has to be processed before they can produce the contrast effect obtained in the present studies. In other words, even contrast effects implicitly presuppose a stored representation of positivity or negativity in memory. It has to be noted, however, that this assumption does not imply that affective priming tasks directly tap these stored representations. In contrast, affective priming effects seem to reflect implicit evaluations resulting from these representations, and such implicit evaluations can differ as a function of the evaluative context in which a given stimulus is encountered.

In sum, the main goal of the present research was to investigate contextual influences from the perspective of competing models of implicit task performance, in this case spreading activation versus response interference accounts of affective priming. Our findings indicate that the impact of evaluative context stimuli on implicit evaluations is mediated by contrast effects in the attention to evaluative information rather than by additive effects in the activation of evaluative information in associative memory. As such, the present studies provide first evidence for the underlying processes that mediate contextual influences on spontaneous evaluations assessed with implicit measures. We believe that similar investigations employing other measures and different context manipulations may help to provide a better understanding of both implicit evaluations and contextual influences on implicit evaluations.

NOTE

1. Klauer and Musch (2003) also discussed a third mechanism that may account for affective priming effects: affective matching. This account, however, is applicable only to tasks that imply affirmation versus negation responses (i.e., yes vs. no). As such, the affective matching model is limited in its ability to account for affective priming effects in evaluative decision tasks (i.e., positive vs. negative).

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