Emotion

The Affect Misattribution Procedure: Hot or Not?

Christophe Blaison, Roland Imhoff, Isabell Hühnel, Ursula Hess, and Rainer Banse

Online First Publication, March 5, 2012. doi: 10.1037/a0026907

Emotion

1528-3542/12/$12.00 DOI: 10.1037/a0026907

The Affect Misattribution Procedure: Hot or Not?

Christophe Blaison
Humboldt-Universität zu Berlin, Berlin, Germany

Roland Imhoff
University of Bonn, Bonn, Germany

Isabell Hühnel and Ursula Hess
Humboldt-Universität zu Berlin, Berlin, Germany

Rainer Banse
University of Bonn, Bonn, Germany

The Affect Misattribution Procedure (AMP; Payne, Cheng, Govorun, & Stewart, 2005) is an important tool in implicit social cognition research, but little is known about its underlying mechanisms. This paper investigates whether, as the name implies, affect-based processes really underlie the AMP. We used a modified AMP that enabled us to separate the influence of affective and nonaffective processes. In three studies, evidence for the implication of nonaffective processes was consistently found. In contrast, there was no evidence for affect-based processes. Thus, the AMP rather seems cold than hot. The generalizability of the results obtained with the modified AMP is discussed.

Keywords: implicit measures, AMP, affective priming, affect misattribution, semantic priming, validity

Implicit social cognition research is popular in part because of innovative implicit measures. The Affect Misattribution Procedure (AMP; Payne, Cheng, Govorun, & Stewart, 2005) has become one important player in this regard. Payne et al.'s paper has been cited over 170 times in the 6 years since its publication (Nosek, Hawkins, & Frazier, 2011). The AMP is an affective priming paradigm, but unlike variants of affective priming that are based on response interference (e.g., Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Murphy & Zajonc, 1993), it produces strong effects (average $d = 1.25$; Payne et al., 2005) and has good internal consistency ($.69 < \alpha < .90$; Payne et al., 2005; Payne, Burkley, & Stokes, 2008). Only the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) has a comparable level of internal consistency among all currently used indirect measures. The AMP has thus quickly become popular among social cognition researchers interested in using a second, conceptually different but reliable measure of implicit social cognitions. However, very little is known about the AMP's underlying mechanisms. This is a crucial problem because validation and knowledge about the possible range of application of any indirect measure requires collecting evidence about the relation between construct and outcome measure (De Houwer, Teige-Mocigemba, Spruyt, & Moors, 2009; Nosek et al., 2011). The aim of the current paper is to address the nature of the mental process underlying the AMP measure.

The AMP

The AMP uses a priming procedure inspired by Murphy and Zajonc (1993). In the original version (Payne et al., 2005), the procedure consists of briefly presented primes with positive and negative valence, which are followed by briefly presented, affectively neutral Chinese pictographs. Participants have to judge the visual pleasantness of the pictographs. It is assumed that the affective reaction toward the prime influences the responses without the participants' awareness. If the prime elicits positive affect, then participants make more pleasant than unpleasant evaluations of the following pictograph, and vice versa. The proportion of pleasant versus unpleasant judgments toward the pictographs serves as a proxy for the implicit attitude held toward the primes. For example, participants who had positive opinions of U.S. political candidate John Kerry were more likely to make pleasant ratings of pictographs following a picture of Kerry than of pictographs following a picture of political opponent George W. Bush (Payne et al., 2005; Experiment 5).

In support of the procedure's construct validity and implicitness, a racial attitude AMP correlated above $r = .36$ with self-report attitudes toward blacks as compared with whites (Payne et al., 2005), and motivation to control prejudiced responses moderated the relationship. (For similar results, see Gawronski, Peters, Brochu, & Strack, 2008; Imhoff & Banse, 2009; Payne, Burkley, & Stokes, 2008; Payne, Govorun, & Arbuckle, 2008.) There also exists strong evidence for the measure's predictive validity because it predicts judgment and behavioral outcomes above and beyond self-report measures (Payne et al., 2008, 2009; Payne, McClernon, & Dobbins, 2007).

Christophe Blaison, Isabell Hühnel, and Ursula Hess, Department of Social and Organisation Psychology, Humboldt-Universität zu Berlin, Berlin, Germany; Roland Imhoff and Rainer Banse, Department of Social and Forensic Psychology, University of Bonn, Bonn, Germany.

The authors are grateful to Ottmar Lipp for advice concerning the fear conditioning procedure, Eric Moody for providing mood induction material, and Bruno Dauvier and Mario Gollwitzer for advice concerning the statistical analyses.

Correspondence concerning this article should be addressed to Christophe Blaison, Humboldt-Universität zu Berlin, Math. Nat. Fakultät II, Organisations und Sozialpsychologie, Rudower Chaussee 18, 12489 Berlin. E-mail: blaisoch@staff.hu-berlin.de

The Problem

The mechanisms underlying the AMP effect remain unclear, although affect misattribution is commonly believed to mediate the effect of the primes on the judgments of the pictographs in attitude AMPs (Payne et al., 2005). This view is based on the affect-as-information research tradition (Schwarz & Clore, 1996, 2003; Winkielman, Zajonc, & Schwarz, 1997), which states that individuals faced with an ambiguous stimulus use their current mood as information to answer the question, "How do I feel about this?" This strategy can lead to mistakes. Indeed, the immediacy (Clore, Gasper, & Garvin, 2001) and aboutness (Higgins, 1998) principles cause people to believe that one's subjective experience is caused by whatever one is focusing on at the moment, yet this clearly is not always the case. The argument with regard to the AMP is that, when trying to make sense of the pictographs, participants mistake their affective response to the primes as caused by the Chinese pictographs. The "internal argument" would then be "I feel good, thus the Chinese pictograph must be visually pleasant!"

There is emerging empirical evidence compatible with the claim that the AMP effect is based on affective misattribution. Recently, Oikawa, Aarts, and Oikawa (2011) provided results showing that the AMP effect disappeared when participants had to rate the pleasantness of the prime before rating the pleasantness of the pictograph. According to the authors, this constitutes empirical support for the misattribution account because the affect became bound to the prime and therefore could not be (mis)attributed to the pictograph anymore. Payne, Hall, Cameron, and Bishara (2010) provided similar evidence with multinomial tree modeling of an attitude AMP. Manipulating the duration of the pictograph presentation affected the estimation of a misattribution parameter M of the model. The misattribution rate M was higher when the pictographs were presented quickly than when presented slowly. Payne et al. (2010) attributed this result to the ease participants had to distinguish between their affective reactions toward the prime versus the pictograph when the pictograph was presented slowly, thus preventing any affect misattribution.

Alongside the "affective" AMP variants such as the standard attitude AMP, "semantic" AMP variants have recently appeared. Here, affect misattribution should not play a determinant role. For example, Imhoff, Schmidt, Bernhardt, Dierksmeier, and Banse (2011) designed a sexual preference AMP. Heterosexual and homosexual men and women were asked to guess the meaning of briefly presented Chinese pictographs as "sexual" or "not sexual." The frequency of sexual responses increased after priming with pictures of individuals of the preferred sex and increasing sexual maturity. In another adaptation, Deutsch and Gawronski (2009; Experiment 4) asked participants whether target Chinese pictographs following prime words representing either animate or inanimate objects signified animate or inanimate objects. Participants' responses were consistent with the semantic meaning of the primes: "Animate" decisions were significantly more likely after animate primes than after inanimate primes and vice versa.

What mechanisms could possibly account for these semantic AMP variants? On the basis of Loersch and Payne (2011), we suggest that semantic misattribution takes place. For Loersch and Payne (2011), the effect of primes on higher-order cognitive processes (e.g., judgments) may be indirect. In a first step, priming increases the accessibility of semantically, experientially, or evaluatively related mental content. In a second step, this highly accessible mental content is misattributed to whatever is in the focus of attention to produce distinct effects on judgment, behavior, and motivation. As such, the general principles governing affect misattribution also take place in semantic misattribution (Loersch & Payne, 2011). For example, when judging whether a pictograph depicts something animated (Deutsch & Gawronski, 2009), participants would mistake their accessible mental content as caused by the Chinese pictograph when in fact it was caused by the prime: "Pictures of running basset hounds keep popping into my mind, thus the Chinese pictograph may represent something animated!"

Semantic misattribution could also underlie affective AMP variants. Indeed, affect might generally reinforce the activation of congruent affective or emotional semantic information in working memory (i.e., valence attributes [Greenwald, Banaji, Rudman, Farnham, Nosek, & Mellott, 2002], implicit affect [Quirin, Kazén, & Kuhl, 2009], and emotion concepts [Innes-Ker & Niedenthal, 2002]; see also Bower, 1981; Forgas, 1999; Storbeck & Clore, 2007), as when your puppy makes you feel good and activates affectively congruent cognitive representations. Thus, primes in an affective AMP variant could give raise to both affect and congruent cognitive representations. In consequence affective and semantic misattribution processes could run parallel or in isolation. Affective or emotional cognitive representations could also get activated in the absence of any affect. This kind of semantic priming without affective experience takes place for example when a sentence describing a puppy activates positive cognitive representations without arousing your feelings (e.g., Innes-Ker & Niedenthal, 2002; Niedenthal, Rohmann, & Dalle, 2003). If this happens also in the AMP, only semantic misattribution would underly the AMP effect because there is no affect to misattribute.

In sum, only semantic misattribution can account for semantic AMP variants, whereas both affect misattribution and semantic misattribution might account for affective AMP variants. In what follows, we will provide evidence that affect misattribution is less likely to occur than semantic misattribution in an affective AMP variant and thus all the more perhaps in the AMP in general. In other words, we would like to provide some support for the notion that nonaffective or cold processes rather than affect-based or hot processes underlie the AMP.

Process Dissociation

We have suggested that affect and semantic misattribution could underlie affective AMP variants. However, these two kinds of processes are usually confounded. For example, in attitude AMPs, affect and semantic misattribution predict that valenced primes lead to congruent judgments of the pictograph: The semantic content of a bunch of puppies is "positive," as is the potentially accompanying affective experience. Process dissociation requires primes with semantic content incongruent with the affective experience they produce. In this regard, angry faces are very good candidates. Indeed, the semantic content of an angry face is "anger", but it is likely to elicit fear. In such case, pictographs following angry faces should be judged as related to anger if semantic misattribution takes place but as related to fear if affect misattribution takes place.

Study 1

Angry faces have been shown to activate the brain's fear network in highly socially anxious individuals. For example, compared with individuals low in social anxiety, individuals high in social anxiety show an increase in amygdala activity when presented with threatening faces (Phan, Fitzgerald, Nathan, & Tancer, 2006; Stein, Goldin, Sareen, Zorrilla, & Brown, 2002; Straube, Kolassa, Glauer, Mentzel, & Miltner, 2004; Straube, Mentzel, & Miltner, 2005). For the purposes of the study presented here, it is particularly interesting that the amygdala activity difference between high and low socially anxious individuals is especially apparent when participants do not pay explicit attention to the threatening faces (Straube et al., 2004). We took advantage of the individual differences between high and low socially anxious participants in presenting them with a modified AMP featuring angry-face, fearful-face, and neutral primes.

If affect misattribution underlies the AMP effect, we would expect that highly socially anxious individuals would be more likely than less socially anxious individuals to associate pictographs following angry-face primes with fear. This expectation is based on the idea that individuals with high levels of social anxiety are indeed afraid when faced with the angry-face prime. By contrast, if semantic misattribution underlies the AMP effect, this fear reaction is of no relevance and both groups should associate pictographs following angry-face primes with anger. In addition, the semantic misattribution account predicts more anger responses to pictographs following anger primes than to pictographs following neutral and fear primes as well as more anger responses to pictographs following neutral primes than to pictographs following fear primes. Finally, we were interested in the strategies that participants used to ascribe meaning to the pictographs; we examined self-reports of strategies to assess whether participants responded directly to the prime rather than to the pictographs because such a response strategy would be an alternative explanation of a semantic misattribution effect.

Method

Participants

A total of 151 German undergraduates (42 men) with a mean age of 27 years ($SD = 8$) from the University of Bonn participated in the study in exchange for course credits.

Material

We selected the five angry and five fearful male faces from the Karolinska Directed Emotional Faces photo set (KDEF; Lundqvist, Flykt, & Öhman, 1998). They best represented fear and anger according to a normative study by Goeleven, De Raedt, Leyman, and Verschuere (2008). The faces were cropped to eliminate any interfering features such as hairstyle (Goeleven et al., 2008). The pictures were presented in full frontal view with the gaze directed toward the participant. In addition to the angry-face and fearful-face primes, a gray square was used as a neutral control prime. Ninety different Chinese pictographs and the noise pattern (i.e., a rectangular picture with random shades of gray used to mask the pictographs) were taken from the original set used by Payne et al. (2005).

Instruments

We used a modified AMP. Participants had to decide if a given pictograph either "visually evokes fear" by hitting the left response key or if it "visually evokes anger" by hitting the right response key. For the sake of credibility, we informed participants that, "We know from previous research that the visual aspect of Chinese pictographs induce subtle feelings in observers. This is why we are interested in whether you have the feeling that the visual aspect of the pictographs evokes fear or rather anger." Each trial began with the presentation of the prime (angry face, fearful face, or neutral gray square) for 75 ms followed by a blank screen for 125 ms. The Chinese pictograph appeared for 200 ms and was backward masked with the noise pattern until the participant responded. Labels remained on the screen throughout the task to remind the participants to press the left key if the target pictograph visually evoked fear and the right key if it visually evoked anger. Participants performed six blocks of 15 trials each (for a total of 30 fear trials, 30 anger trials, and 30 neutral trials). Within each block, primes and targets appeared in a fully randomized order without replacement. A difference score (number of "anger-evoking" responses to anger trials − number of "anger-evoking" responses to fear trials) was computed for each block of trials to estimate the internal consistency of the modified AMP ($\alpha = .80$).

After completing the AMP, participants were asked about their strategies when responding to the AMP. ("Please describe briefly how you solved the previous task. We are interested in any thoughts about how you came to a decision regarding the pictographs.")

Participants' level of social anxiety was assessed using the German version (Sosic, Gieler, & Stangier, 2008) of the Social Phobia Inventory (SPIN; Connor et al., 2000). The SPIN features the subscales of fear, avoidance, and physiological symptoms. For each of 17 statements, participants rated on a Likert scale ranging from 0 (*not at all*) to 4 (*extremely*) the degree to which the statement had applied to them in the last few weeks (e.g., "I'm afraid of people in an authority position," and "I would do anything to avoid being criticized."). The internal consistency of the SPIN was $\alpha = .87$.

Procedure

The experiment took place in individual sessions. Participants first completed the modified AMP, then the SPIN questionnaire. Finally they gave information about the strategies they used.

Results

One participant reported knowing the actual meaning of most pictographs and was thus excluded, resulting in a total sample of $N = 150$. The affect misattribution account predicts a significant interaction effect between kind of prime (angry face, fearful face, or neutral gray square) and level of anxiety on the proportion of "anger-evoking" responses, and the slope of the regression line should be negative for anger trials. By contrast, the semantic misattribution account predicts a main effect for kind of prime such that the proportion of "anger-evoking" responses is highest for anger trials, medium for neutral trials, and lowest for fear trials. To test these predictions while avoiding the use of a median split design with the accompanying loss of power (Aiken & West, 1991), we conducted a mixed linear model (i.e., multilevel) analysis on the frequency of "anger-evoking" responses to the pictographs. For this the repeated measures factor prime (angry face, fearful face, or neutral gray square) was nested within participants. Participants' sex and prime were fixed factors, subject was defined as a random factor, and the centered SPIN scores served as a covariate. Results showed a significant main effect of prime, $F(2, 317) = 17.64$, $p < .001$. In line with the semantic misattribution account, individual estimates of the effect of prime showed that overall, participants gave significantly more anger-evoking responses when primed with angry-face primes ($M = .63$, $SD = .17$) than when primed with neutral primes ($M = .58$, $SD = .15$), estimate = .05, $SE = .02$, $t(286) = 2.24$, $p = .03$, or fearful-face primes ($M = .49$, $SD = .18$), estimate = −.14, $SE = .02$, $t(289) = 5.66$, $p < .001$. Participants also gave significantly more "fear-evoking" responses when primed with fearful-face primes than when primed with neutral primes, estimate = −.09, $SE = .02$, $t(278) = 3.90$, $p < .001$ (see Figure 1). No other significant main or interaction effect emerged (all F values < 1.02, all p values > .36)[1].

Two independent judges rated participants' response strategies according to four given alternative categories, $V = .76$, $p < .001$. When the two raters disagreed (13.2% of the cases), a third judge made the decision. The most common answer type (50%) named visual features of the pictographs that were classified as anger or fear-evoking (e.g., spiky signs as anger-evoking). A proportion of 21.3% of the participants reported that they found the task difficult because the signs did not evoke fear or anger in them. Only 14% reported that they based their responses on feelings, intuition, or spontaneous reactions. A proportion of 7.3% made explicit reference to the picture primes presented before, sometimes mentioning that they were unable to ignore the emotion shown in the faces. The remaining 7.3% declined to give any indication of their response strategy. Excluding all participants who explicitly mentioned the influence of the primes did not change the pattern of results because the only significant effect was a main effect of prime, $F(2, 266) = 4.07$, $p < .01$. Lack of statistical power due to the small number of participants who reported that they based their responses on feelings or intuition prevented us from testing whether the affect misattribution effect was stronger among them.

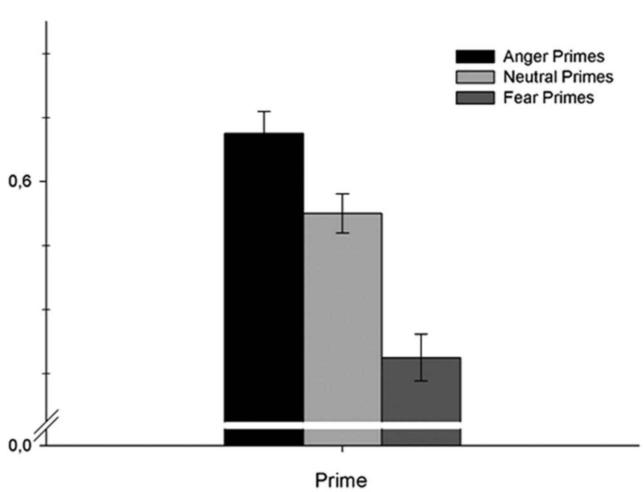

Figure 1. Frequency of "anger-evoking" (vs. "fear-evoking") responses (±*SE*) as a function of kind of prime in Study 1. Error bars show standard errors.

Discussion

The results strongly support the semantic misattribution account. Participants gave significantly more anger-evoking responses when primed with an angry face than when primed with a neutral stimulus or a fearful face. The affect misattribution account was not supported, although we controlled for judgments based directly on the primes rather than the pictographs.

Nevertheless, it may be argued that this first study conducted a somewhat unfair test of the two accounts because the semantic misattribution account (postulating a main effect) is tested with more statistical power than the affect misattribution account (postulating interaction effects). More generally, because Study 1 relied on an interaction with an individual difference measure, its design is open to response idiosyncrasies from socially anxious participants in comparison with other participants. Hence, in Study 2 we used an experimental approach that does not rely on individual differences and we predicted a main effect for semantic and affect misattribution.

Study 2

Recent evidence suggests that not only socially anxious individuals, but anyone perceives angry faces as more threatening while experiencing anxiety (Moody, McIntosh, Mann, & Weisser, 2007). Hence, it is possible to increase the threat perceived in angry faces by inducing anxiety. If the affect misattribution account holds true, participants in an anxious state should associate pictographs following angry face primes more with fear. However, if the semantic misattribution account holds true, then irrespective of the anxiety manipulation, pictographs following angry faces should be more associated with anger.

Method

Participants

Eighty-six French undergraduates (13 men) with a mean age of 21 years ($SD = 7$) from the University of Aix–Marseille participated voluntarily. None of the participants were familiar with the Chinese language or the AMP.

[1] To eliminate the possibility that the interaction was not found because of restricted variance in social anxiety, we ran additional analyses with clinically relevant social anxiety as a categorical variable. According to the cutoff for the German scale proposed by Sosic et al. (2008), 17 participants were identified as suffering from clinically relevant social anxiety. The additional analyses did not show an interaction of prime type and social anxiety, nor did socially anxious participants differ from the rest of the sample on the anger trials. Our results can thus not be explained by reduced variance or too low levels of social anxiety.

Materials

The modified AMP material was the same as in Study 1. Two 5-min video clips from the study of Moody et al. (2007) were used for the fear-induction procedure. The fear-evoking clip showed frightened individuals in various situations (extracts from the movies "Silence of the Lambs" and from "The Shining"). The control clip showed a statue in a public garden with several people seated on the ground next to it reading and talking and an individual occasionally walking past the field of view. There is evidence that this technique provides a strong and specific induction of fear lasting long enough for our purposes (Moody et al., 2007; Weisser, Moody, & McIntosh, 2004).

Instruments

We used the same modified AMP as in Study 1 ($\alpha = .75$ for Study 2). As a manipulation check, participants were asked to rate to what degree they had felt happiness, fear, anger, surprise, sadness, and disgust during the video clip using seven-point Likert scales ranging from 1 (*not at all*) to 7 (*extremely*) (see Moody et al., 2007). Participants also took the state version of the French translation of the State Trait Anxiety Inventory (STAI; Bruchon-Schweitzer & Paulhan, 1993).

Procedure

The experiment took place in individual sessions with laptop computers. Participants were randomly assigned to the experimental ($n = 43$) or the control group ($n = 43$). The experimental group first watched the frightening video clip, then took the modified AMP, then completed the emotion self-report, and finally the STAI. The control group worked through the identical procedure but watched the neutral video clip instead. The manipulation check was placed after the AMP to avoid interrupting the flow of the experiment (Moody et al., 2007).

Results

The manipulation check showed that participants in the experimental group reported more fear ($M = 4.2$, $SD = 1.9$) than participants in the control group ($M = 1.9$, $SD = 1.4$), $t(84) = 6.5$, $p < .001$, $d = 1.41$. With the exception of happiness, which decreased significantly in the experimental group ($M = 1.4$, $SD = 1.0$) in comparison to the control group ($M = 1.9$, $SD = 1.16$), $t(84) = 2.1$, $p < .05$, no other differences emerged between the groups. The STAI results mirrored the effect of the manipulation because the experimental group reported significantly more anxiety ($M = 2.6$, $SD = .64$) than did the control group ($M = 1.9$, $SD = .62$), $t(84) = 5.15$, $p < .001$, $d = 1.13$.

The proportion of anger-evoking responses to the Chinese pictographs was analyzed with a 2 (emotion induction: fear vs. neutral) $\times$ 3 (prime: anger, fear, and neutral) mixed-model ANOVA. A significant main effect of prime emerged, $F(2, 252) = 22.67$, $p < .001$. Consistent with the semantic misattribution account, post hoc tests showed that participants gave more "anger-evoking" responses when primed with angry-face primes ($M = .58$, $SD = .15$) than when primed with neutral primes ($M = .53$, $SD = .17$), $p = .06$, or fearful-face primes ($M = .43$, $SD = .13$), $p < .001$. Participants gave significantly fewer "anger-evoking" when primed with fearful-face primes than when primed with neutral primes, $p < .001$ (see Figure 2). No other main effects or interactions emerged. Finally, when controlling for baseline responses on neutral trials,[2] no emotion-induction effect emerged for corrected anger trials (experimental group: $M = .06$, $SD = .18$; control group: $M = .05$, $SD = .16$), $t(84) = .26$, $p = .80$, or for corrected fear trials (experimental group: $M = -.09$, $SD = .20$; control group: $M = -.10$, $SD = -.19$), $t(84) = .22$, $p = .83$.

Discussion

As in Study 1, results of Study 2 showed strong support for semantic misattribution. Participants responded to the pictographs in a prime-consistent way, regardless of the emotion induction. Despite the stronger power of the design, there was no support for the occurrence of affect misattribution. Nevertheless, two general limitations of Study 2 as well as Study 1 should be taken into consideration.

First, one could argue that there was no direct evidence that the angry faces did indeed elicit more of an automatic fear reaction in socially anxious individuals (Study 1) or in individuals in a diffuse state of anxiety (Study 2). We relied on previously published and established effects instead of including an explicit manipulation check. A second general limitation resides in the fact that participants made a dichotomous categorization in the context of two types of primes that are semantically and affectively related to the categorization response. This may determine how participants represent the task. An obvious way to make sense of the task would be to map the primes onto the dichotomous categorization response. In the present design this would bias responses toward mapping the semantic meaning of the primes rather than the affective reaction to the primes onto the categorization response because the semantic meaning of the primes and the categorization response have a similar distribution: two types of primes, two response options. Mapping the affective reaction to the primes onto the dichotomous categorization response is less straightforward, especially for anxious people, because anger and fear primes can elicit fear. In terms of the affective reaction the primes can elicit, angry and fearful faces thus constitute one category. We are grateful to an anonymous reviewer for making us aware of this interesting possibility. These concerns were addressed in Study 3.

Study 3

In Study 3, the fear reaction toward angry-face primes was experimentally manipulated with a differential fear-conditioning procedure. Reinforced stimuli (conditional stimulus [CS+]) were paired with an aversive unconditioned stimulus (UCS; an electroshock), whereas intermixed unreinforced stimuli (CS−) were not combined with the UCS (Lipp, 2006). In consequence, after the removal of the aversive UCS, subsequent CS+ presentations

[2] In comparison with the control group, the fear induction may have affected the baseline rate of "anger-evoking" responses of the experimental group. Independent of type of prime, participants in a fearful state could have given less "anger-evoking" responses in general. Thus, in both groups, we computed corrected scores for anger and fear trials in subtracting the mean proportion of "anger-evoking" responses to neutral trials from the mean proportion of "anger-evoking" responses to anger and fear trials.

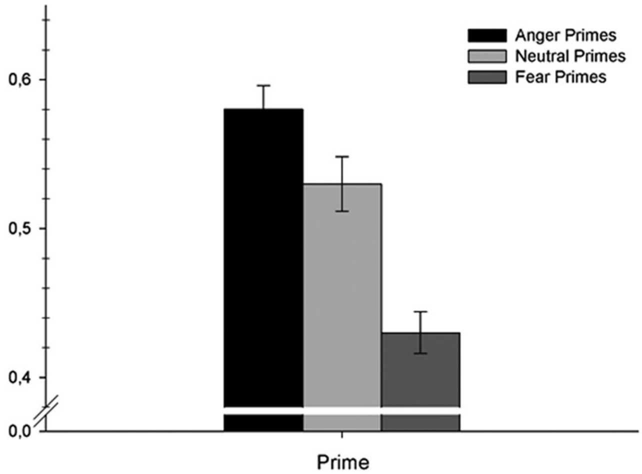

Figure 2. Frequency of "anger-evoking" (vs. "fear-evoking") responses (±*SE*) as a function of kind of prime in Study 2.

should elicit more physiological arousal than CS− presentations. It is well established that fear-conditioned angry faces provoke more fear than nonconditioned angry faces (e.g., Esteves, Parra, Dimberg, & Öhman, 1994; Öhman & Dimberg, 1978). In addition, fear-conditioned angry faces produce persistent fear reactions (e.g., Öhman & Dimberg, 1978; for review see Dimberg & Öhman, 1996). Notably, fear toward a threatening stimulus reliably produces a change in electrodermal activity (Lipp, 2006); the more threatening the stimulus, the greater the skin conductance response (SCR; e.g., Esteves et al., 1994).

Thus, in Study 3, previously conditioned angry faces (referred to as CS+ from here forward) and unreinforced angry faces (referred to as CS− from here forward) were used as primes. We excluded fearful face primes to address the response mapping problem but kept the neutral gray square prime to test for a semantic misattribution effect (more aggression-related responses after angry faces compared with neutral prime). Skin conductance was continuously recorded while participants completed the modified AMP. To assess the success of the conditioning procedure, the resistance to extinction of the differential fear reaction toward CS+ in contrast to the CS− angry faces was assessed via SCR during the taking of the AMP. In particular, because not everyone is sensitive to fear-conditioning procedures, we selected those participants who showed greater SCRs for CS+ than for CS−, as evidence for successful conditioning. Self-reported affective reactions toward the CS+ and CS− were also collected. Irrespective of whether an angry face was a CS+ or a CS−, pictographs following angry faces should be more associated with anger then pictographs following neutral faces if semantic misattribution takes place. However, pictographs following CS+ angry primes should be more associated with fear than pictographs following CS− angry primes if affect misattribution takes place.

Method

Participants

Sixty women (aged 18–51 years, $M = 25.3$, $SD = 5.0$) from the Humboldt-Universität zu Berlin participated in the experiment. They were paid €8 for their participation. All participants were right-handed.

Materials

Visual Stimuli. Four full-frontal male faces with the highest facial anger expression recognition rate (pictures M05AN, M09AN, M29AN, and M11AN; Goeleven et al., 2008) were selected from the KDEF picture set (Lundqvist et al., 1998). The images were converted to grayscale and cropped to eliminate interfering features (Goeleven et al., 2008). Two faces were randomly selected to serve as CS+, and the other two faces served as CS−. To emphasize the difference between CS+ and CS−, a white circle was added to the CS+ to frame the faces and a white square was added to the CS− (see Figure 3). The pairing between kind of geometrical figure and kind of angry face was counterbalanced across participants. A gray square served as the neutral control prime. The Chinese pictographs and the noise pattern were the same as used in Studies 1 and 2. The size of all stimuli was 20 × 20 cm on the screen.

Electrotactile stimulus. The electrotactile stimulus was delivered with a Grass Technologies (West Warwick, RI) SD9k square pulse stimulator via two electrodes attached near the wrist, on the volar surface of the participant's right forearm. The SD9k stimulator is a constant-current research device with a built-in isolation circuit that puts out the voltage necessary to maintain the set current flow up to a maximum of 100 V. The current was set to a maximum of 10 mA, and output voltage was not referred to ground.

Instruments

AMP. Participants were told that Chinese pictographs were able to convey feelings even for non-Chinese speakers. With that

Figure 3. Angry-face stimuli used as primes in Study 3.

in mind, they were asked to guess whether the concept behind the pictograph “rather had to do with flight (e.g., rabbit, to flee)” (abbreviated “flight” in the following) or “rather had to do with aggression (e.g., tiger, to attack)” (abbreviated “aggression” in the following) and to correspondingly press the left or right key. Participants were warned about the influence of the primes; they should prevent their judgment from being biased (Payne et al., 2005). They were explicitly requested to report the first judgment that came to their mind. The modified AMP consisted of 72 trials. There were 12 consecutive blocks of six trials each (2 CS+, 2 CS−, and 2 neutral trials). The trial order was randomized. Block numbers 1, 5, and 9 were not used to compute the AMP score. Instead, a shock followed the CS+ primes in these blocks to maintain the conditioning effect. Each prime was presented for 1,500 ms.[3] At prime offset, a pictograph appeared for 100 ms, followed by the noise-pattern mask. The mask remained on the screen for 6,000 ms to permit SCR recording. Finally, a question mark and response category labels appeared, and participants were allowed to press either the left or right key.

Affective ratings of faces. Self-reported affective reactions toward the angry faces were collected before conditioning and at the end of the study. Participants rated the extent to which each of the four angry faces elicited different kinds of discrete emotions: happiness, anger, fear, sadness, disgust, and surprise. They answered on a six-point Likert scale ranging from 1 (*not at all*) to 6 (*completely*). The face presentation order was counterbalanced across participants.

Apparatus

Skin conductance was measured via a Mindware bioamplifier and Mindware Ag/AgCl standard electrodes (0.8 cm in diameter) filled with isotonic TD-246 skin conductance electrode paste (Mansfield R & D), a 0.5% saline solution in neutral base. The two electrodes were attached to the distal phalanges of the first and second digit of the left (nondominant for all participants) hand. Respiration was monitored using a Mindware respiratory belt transducer attached around the chest, below the sternum. The BioNex skin conductance coupler provided a constant voltage of 0.5 V across the electrodes, processing the signal with a resolution of 0.0015 μS (Fowles, Christie, & Edelberg, 1981). Skin conductance and respiration signals were recorded continuously during the whole experiment with a sampling rate of 1,000 Hz.

Procedure

Upon participants’ arrival, a female experimenter informed the participants about the procedure, including the application of the electric shocks. After giving written informed consent, participants reclined in a comfortable chair and physiological sensors were attached. The experimenter could monitor the experiment via a video camera and communicate with the participant via microphones. The mean temperature of the laboratory was 23.9°C. The mean humidity was 32.7%.

In the habituation phase, each participant was instructed to look repeatedly at the four angry faces and the gray square. The pictures were randomly presented for 1,500 ms in three different presentation blocks. Intertrial intervals (ITIs) varied between 4,000 and 6,000 ms. Participants then reported their affective reactions toward the faces. Following habituation, the experimenter asked whether the participants would consent to continue with the experiment, including the application of electric shocks. After oral consent was given, the shock electrodes were attached and shock intensity was set so that the participant described it as “annoying but not painful.”

In the acquisition phase, participants were told they would see multiple series of pictures sometimes followed by electric shocks. The conditioning consisted of 16 acquisition trials in which the participants watched randomly presented series of angry faces, each presented for 6,000 ms. Two of the faces (CS+) were always paired with an electric shock at stimulus offset, whereas the other two faces (CS−) were not. Electric shocks were delivered for 200 ms. ITIs varied between 8,000 and 12,000 ms. Following conditioning, participants received the AMP instructions, including the information that shocks could still occur from time to time. After the AMP, participants again rated their affective reactions toward the angry faces. Finally, all physiological sensors were removed and participants were carefully debriefed and paid.

Data Preparation

The scores for the two CS+ faces and the two CS− faces were aggregated into mean scores and will be reported simply as CS+ and CS− scores.

SCRs. SCRs in combination with respiration were visually inspected for signal artifacts. Trials with respiratory artifacts were removed from analyses. SCR (in microsiemens, μS) was defined as the largest increase in skin conductance between 1 and 4 s after picture onset. The minimal response criterion was 0.05 μS (Dawson, Schell, & Filion, 2000). SCR magnitude was computed as the mean value across all stimulus presentations, including those without a measurable SCR (“zero response”; Dawson et al., 2000). Zero responses were not excluded; the difference in SCRs between CS+ and CS− would otherwise be underestimated. The raw SCR scores were log transformed to normalize the distributions (Venables & Christie, 1980).

AMP. For each kind of prime, the proportion of “aggression” responses (number of aggression responses divided by the total number of trials for one given prime) was computed to obtain three AMP scores within each AMP block. To assess reliability, we computed difference scores between the proportion of aggression responses to the CS+ trials and to the CS− trials within trios of AMP blocks. We then ran a Cronbach’s α on the three resulting scores. The estimated internal consistency of the modified AMP was $\alpha = .47$.

Results and Discussion

Data from seven participants had to be removed from the analysis. Four were familiar with Chinese pictographs, two showed too many skin conductance artifacts, and the debriefing revealed that one participant felt strongly attracted toward one of the facial stimuli. A prerequisite for testing the affect misattribution account is for participants to actually feel fearful when con-

[3] Pretests showed that shorter presentation of stimuli did not produce reliable fear-conditioning effects when used in the acquisition or extinction phase.

fronted with the CS+ angry faces during the AMP. Thus, to provide the maximum power to test the affect misattribution account, only participants who showed a differential conditioned reaction between the CS+ and CS− ($SCR_{CS+} - SCR_{CS-} > 0$) were selected for further statistical analysis ($n = 34$). For this group, results show that SCRs during the taking of the modified AMP differed significantly across the type of prime, $F(1, 39) = 19.44$, $p < .05$. As expected, CS+ primes ($M = 0.17$, $SD = 0.17$) elicited significantly larger SCRs than CS− primes ($M = 0.06$, $SD = 0.08$), $F(1, 33) = 20.15$, $p < .01$, $r = .62$, whereas SCRs for the CS− prime did not differ significantly from SCRs for the neutral prime ($M = 0.05$, $SD = 0.06$), $F(1, 33) = 1.98$, $p = .17$.

Analyses of the emotional self-report data showed that at the end of the procedure, the participants reported more fear toward CS+ angry faces ($M = 3.63$, $SD = 1.52$) than toward CS− angry faces ($M = 2.46$, $SD = 1.33$), $t(33) = 4.816$, $p < .01$, $r = .38$. Participants also reported stronger anger toward CS+ ($M = 3.87$, $SD = 1.44$) than toward CS− ($M = 3.25$, $SD = 1.52$). An additional paired *t* test showed that the difference between the fear and anger ratings differed significantly between CS− and CS+, $t(33) = -2.26$, $p < .05$, $r = .18$. The CS− fear-anger difference ($M = 0.79$, $SD = 1.46$) was significantly larger than the CS+ fear-anger difference ($M = 0.24$, $SD = 1.59$). Furthermore, self-reported fear toward CS+ correlated positively with SCR intensity in the CS+ trials, $\rho = .43$, $p = .01$, whereas self-reported anger toward the CS+ did not, $\rho = .27$, $p = .12$. Thus, there is converging evidence that SCR intensity in CS+ trials represented physiological arousal related to fear.

AMP Score Analyses

AMP scores for each kind of trial were computed as the proportion of aggression responses (i.e., number of aggression responses/number of trials × 100). If the semantic misattribution account holds, then the proportion of “aggression” responses should be higher for CS+ and CS− primes than for neutral primes. On the other hand, pictographs following CS+ angry primes should elicit more “flight” judgments than pictographs following CS− angry primes if affect misattribution takes place. A one-way repeated-measures ANOVA with type of prime as a within-subject factor was conducted on the proportion of “aggression” responses toward the pictographs. Planned contrasts were conducted to compare (a) neutral trials versus mean CS− and CS+ trials to test the semantic misattribution account, and (b) CS− trials versus CS+ trials to test the affect misattribution account. A significant main effect of prime emerged, $F(2, 66) = 3.71$, $p < .05$, $r = .23$ (see Figure 4). The proportion of “aggression” responses to neutral prime trials ($M = .51$, $SD = .15$) was significantly smaller than the mean proportion of “aggression” responses to CS− and CS+ trials ($M = .59$, $SD = .14$), $F(1, 33) = 6.89$, $p < .05$, $r = .42$. This supports the semantic misattribution account. No significant difference in the proportion of “aggression” responses between the CS− ($M = .57$, $SD = .16$) and CS+ trials ($M = .61$, $SD = .20$) was found, $F(1, 33) = 1.24$, $p = .27$. Because the pictographs preceded by the faces that had been fear conditioned were not associated with more “flight” responses than the pictographs preceded by faces that had not been conditioned, these results provide no support for the affect misattribution account.

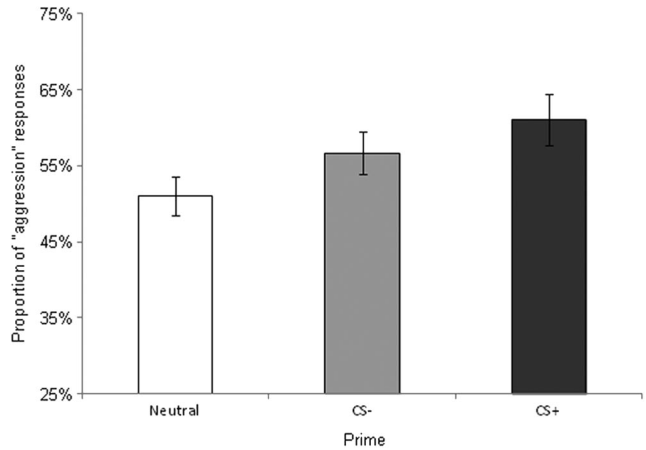

Figure 4. Frequency of “aggression” (vs. “flight”) responses as a function of kind of prime in Study 3.

Study 3 addressed two general concerns that could have potentially affected the results of Studies 1 and 2. In particular, a concern remained that participants may not have experienced fear when fear was expected. However, the SCRs assessed in Study 3 served as confirmation that CS+ indeed elicited fear. Furthermore, the concern that response mapping could explain the results was resolved by presenting only angry faces and neutral primes. However, even after these alternative explanations were controlled for, the results supported the semantic misattribution account but not the affect misattribution account.

General Discussion

The aim of this research was to examine whether affect misattribution or semantic misattribution drove the effect in an affective AMP variant. Three studies pitted the two accounts against each other using different kinds of manipulations. Consistent support for semantic misattribution but no evidence in favor of affect misattribution was found. Whether participants were high in the trait of social anxiety (Study 1), put in an anxious state (Study 2), or confronted with fear-conditioned stimuli (Study 3), the meaning of rather than fearful reactions toward angry-face primes transferred onto subsequent pictographs. Because even in an affective AMP variant no trace of affect-based processes was found, our results are consistent with the notion that the AMP in general is rather cold than hot. Is the “A” in AMP thus problematic? Before any conclusion, we should first discuss whether the predominance of cold processes in our affective AMP variant also applies to standard attitude AMPs.

Indeed, attitude AMPs (e.g., Payne et al., 2005) require participants to make rough evaluative judgments of the pictographs whereas the modified AMP required more specific, emotion-related judgments. Given that emotions have a more clearly identifiable referent (Zajonc, 1998), one could argue that it may be more difficult to misattribute fear than unclearly defined positive or negative affective states (Schwarz & Clore, 1993). This would undermine the detection of affect misattribution in the modified AMP in comparison with standard attitude AMPs. As a result, it is perfectly legitimate to wonder whether the findings obtained with our affective AMP variant also hold for standard attitude AMPs.

In our view, however, there is little reason why participants should be less aware of the source of their affect in an attitude AMP than in the modified AMP. In both, participants are clearly instructed how the primes could influence their judgment. In both, the primes are presented supraliminally. In both, at least when looking at Study 1 and 2, there is a response mapping between features of the prime (e.g., positive vs. negative) and features of the response choice (e.g., pleasant vs. unpleasant). In our opinion, the likelihood of affect misattribution processes is thus as high in the modified AMP as in standard attitude AMPs. Next, it is difficult to explain the lack of affect misattribution in the modified AMP with the semantic misattribution effect consistently showing up. Because a general difficulty for misattribution processes to occur in the modified AMP cannot be put forward, one is tempted to conclude that affect misattribution was absent because affect, albeit present, was not misattributed.

Another issue resides in the fact that our research was dedicated to the hot versus cold nature of the AMP with a focus on affect (hot) versus semantic (cold) misattribution. However, although our data support the notion of a cold process underlying the modified AMP, they do not provide direct evidence for the claim that this cold process is a misattribution process (however, see Oikawa et al., 2011; Payne et al., 2010). It is conceivable that the underlying process is not (or not only) an indirect one in which a reaction to the primes is misattributed to the target but a direct one in which the primes directly influence the response or the perception of the pictograph. That is, a semantic category rendered highly accessible would simply bias the behavioral decision toward the congruent response key through the learned association between semantic category and response key. On the other hand, primes and spreading of activation could influence the visual processing of the ambiguous pictographs' gestalt so that the visual impression is congruent with information rendered highly accessible by the prime (e.g., see Balcetis & Dunning, 2006).

Although our results do not speak to the question of whether indirect misattribution or direct priming or both underlie the AMP, they would suggest that the dominance of cold (vs. hot) processes would also hold for priming processes in the modified AMP. As such, anger information coming from the prime in anger trials would win over the fear information coming from the subjective state of the participant. Future research may further try to disentangle priming from misattribution processes in AMP effects and, more generally, it should explore the issue as to why information coming from the prime but not information coming from the subjective affective state of the participant transfers to the target pictographs. In sum, the generalization of the results obtained here with the modified AMP to other affective AMP variants such as standard attitude AMPs (e.g., Payne et al., 2005) remains open until direct evidence is available. However, at present our results should invite doubts about whether the "A" of the AMP may be a misnomer.

If future research provides further evidence for the cold nature of attitude AMPs, would it mean that the AMP's widespread popularity is unjustified? We would strongly argue against such an interpretation of the results. Quite on the contrary, the important implication of the present work for the future use of the AMP is that it is not restricted to evaluation but could be an "inkblot" for many semantically defined psychological constructs—an almost universal, psychometrically sound, projective task. Broadening the applicability of the AMP beyond the evaluative sphere turns this measure into an exciting alternative to the IAT. Of particular interest, results obtained with both measures could be used according to the general principle of convergence: Diagnostic conclusions about individual differences could be drawn with greater confidence if they were based on several conceptually different, convergent, and valid, indirect measures (De Houwer et al., 2009; Deutsch & Gawronski, 2009). Thus, having two different and effective implicit social cognition measures will provide researchers with the generalization power one necessary lacks when results depend on a unique measurement instrument.

References

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions.* Newbury Park, CA: Sage.

Balcetis, E., & Dunning, D. (2006). See what you want to see: Motivational influences on visual perception. *Journal of Personality and Social Psychology, 91,* 612–625. doi:10.1037/0022-3514.91.4.612

Bower, G. H. (1981). Mood and memory. *American Psychologist, 36,* 129–148. doi:10.1037/0003-066X.36.2.129

Bruchon-Schweitzer, M., & Paulhan, I. (1993). *Manuel de l'inventaire d'anxiété état-trait forme Y (STAI-Y).* Paris: Editions Centre de Psycholgie Appliquée.

Clore, G. L., Gasper, K., & Garvin, E. (2001). Affect as information. In J. P. Forgas (Ed.), *Handbook of affect and social cognition* (pp. 121–144). Mahwah, NJ: Erlbaum.

Connor, K. M., Davidson, J. R. T., Churchill, L. E., Sherwood, A., Foa, E., & Weisler, R. H. (2000). Psychometric properties of the Social Phobia Inventory (SPIN): New self-rating scale. *British Journal of Psychiatry, 176,* 379–386. doi:10.1192/bjp.176.4.379

Dawson, M. E., Schell, A. M., & Filion, D. L., (2000). The electrodermal system. In J. T. Cacioppo, L. G. Tassinary, & G. G. Bernston (Eds.), *Handbook of psychophysiology,* 2nd ed. (pp. 200–223). Boston: Cambridge University Press.

De Houwer, J., Teige-Mocigemba, S., Spruyt, A., & Moors, A. (2009). Implicit measures: A normative analysis and review. *Psychological Bulletin, 135,* 347–368. doi:10.1037/a0014211

Deutsch, R., & Gawronski, B. (2009). When the method makes a difference: Antagonistic effects on "automatic evaluations" as a function of task characteristics of the measure. *Journal of Experimental Social Psychology, 45,* 101–114. doi:10.1016/j.jesp.2008.09.001

Dimberg, U., & Öhman, A. (1996). Behold the wrath: Psychophysiological responses to facial stimuli. *Motivation and Emotion, 20,* 149–182. doi:10.1007/BF02253869

Esteves, F., Parra, C., Dimberg, U., & Öhman, A. (1994). Nonconscious associative learning: Pavlovian conditioning of skin conductance responses to masked fear-relevant facial stimuli. *Psychophysiology, 31,* 375–385. doi:10.1111/j.1469-8986.1994.tb02446.x

Fazio, R. H., Sanbonmatsu, D. M., Powell, M. C., & Kardes, F. R. (1986). On the automatic activation of attitudes. *Journal of Personality and Social Psychology, 50,* 229–238. doi:10.1037/0022-3514.50.2.229

Forgas, J. P. (1999). Network theories and beyond. In T. Dalgleish & M. Power (Eds.), *The handbook of cognition and emotion* (pp. 591–612). Chichester, United Kingdom: Wiley.

Fowles, D. C., Christie, M. J., & Edelberg, R. (1981). Publication recommendations for electrodermal measurements. *Psychophysiology, 18,* 232–239. doi:10.1111/j.1469-8986.1981.tb03024.x

Gawronski, B., Peters, K., Brochu, P., & Strack, F. (2008). Understanding the relations between different forms of racial prejudice: A cognitive consistency perspective. *Personality and Social Psychology Bulletin, 34,* 648–665. doi:10.1177/0146167207313729

Goeleven, E., De Raedt, R., Leyman, L., & Verschuere, B. (2008). The Karolinska Directed Emotional Faces: A validation study. *Cognition and Emotion, 22,* 1094–1018. doi:10.1080/02699930701626582

Greenwald, A. G., Banaji, M. R., Rudman, L. A., Farnham, S. D., Nosek, B. A., & Mellott, D. S. (2002). A unified theory of implicit attitudes, stereotypes, self-esteem, and self-concept. *Psychological Review, 109,* 3–25. doi:10.1037/0033-295X.109.1.3

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The Implicit Association Test. *Journal of Personality and Social Psychology, 74,* 1464–1480. doi:10.1037/0022-3514.74.6.1464

Higgins, E. T. (1998). The aboutness principle: A pervasive influence on human inference. *Social Cognition, 16,* 173–198. doi:10.1521/soco.1998.16.1.173

Imhoff, R., & Banse, R. (2009). Ongoing victim suffering increases prejudice: The case of secondary anti-Semitism. *Psychological Science, 20,* 1443–1447. doi:10.1111/j.1467-9280.2009.02457.x

Imhoff, R., Schmidt, A. F., Bernhardt, J., Dierksmeier, A., & Banse, R. (2011). An inkblot for sexual preference: A semantic variant of the Affect Misattribution Procedure. *Cognition and Emotion, 25,* 676–690. doi:10.1080/02699931.2010.508260

Innes-Ker, Å., & Niedenthal, P. M. (2002). Emotion concepts and emotional states in social judgment and categorization. *Journal of Personality and Social Psychology, 83,* 804–816. doi:10.1037/0022-3514.83.4.804

Lipp, O. V. (2006). Human fear learning: Contemporary procedures and measurement. In M. G. Craske, D. Hermans, & D. Vansteenwegen (Eds.), *Fear and learning* (pp. 37–52). Washington, DC: American Psychological Association.

Loersch, C., & Payne, B. K. (2011). The Situated Inference Model. *Perspectives on Psychological Science, 6,* 234–252. doi:10.1177/1745691611406921

Lundqvist, D., Flykt, A., & Öhman, A. (1998). *The Karolinska Directed Emotional Faces—KDEF* [CD ROM]. Upsala, Sweden: Department of Clinical Neuroscience, Psychology Section, Karolinska Institutet.

Moody, E. J., McIntosh, D. N., Mann, L. J., & Weisser, K. R. (2007). More than mere mimicry? The influence of emotion on rapid facial reactions to faces. *Emotion, 7,* 447–457. doi:10.1037/1528-3542.7.2.447

Murphy, S. T., & Zajonc, R. B. (1993). Affect, cognition, and awareness: Affective priming with optimal and suboptimal stimulus exposures. *Journal of Personality and Social Psychology, 64,* 723–739. doi:10.1037/0022-3514.64.5.723

Niedenthal, P. M., Rohmann, A., & Dalle, N. (2003). What is primed by emotion concepts and emotion words? In J. Musch & K. C. Klauer (Eds.), *The psychology of evaluation: Affective processes in cognition and emotion* (pp. 307–333). Mahwah, NJ: Erlbaum.

Nosek, B. A., Hawkins, C. B., & Frazier, R. S. (2011). Implicit social cognition: From measures to mechanisms. *Trends in Cognitive Sciences, 15,* 152–159. doi:10.1016/j.tics.2011.01.005

Öhman, A., & Dimberg, U. (1978). Facial expressions as conditioned stimuli for electrodermal responses: A case of "preparedness?" *Journal of Personality and Social Psychology, 36,* 1251–1258. doi:10.1037/0022-3514.36.11.1251

Oikawa, M., Aarts, H., & Oikawa, H. (2011). There is a fire burning in my heart: The role of causal attribution in affect transfer. *Cognition and Emotion, 25,* 156–163. doi:10.1080/02699931003680061

Payne, B. K., Burkley, M. A., & Stokes, M. B. (2008). Why do implicit and explicit tests diverge? The role of structural fit. *Journal of Personality and Social Psychology, 94,* 16–31. doi:10.1037/0022-3514.94.1.16

Payne, B. K., Cheng, C. M., Govorun, O., & Stewart, B. D. (2005). An inkblot for attitudes: Affect misattribution as implicit measurement. *Journal of Personality and Social Psychology, 89,* 277–293. doi:10.1037/0022-3514.89.3.277

Payne, B. K., Govorun, O., & Arbuckle, N. L. (2008). Automatic attitudes and alcohol: Does implicit liking predict drinking? *Cognition and Emotion, 22,* 238–271. doi:10.1080/02699930701357394

Payne, B. K., Hall, D. L., Cameron, C. D., & Bishara, A. J. (2010). A process model of affect misattribution. *Personality and Social Psychology Bulletin, 36,* 1397–1408. doi:10.1177/0146167210383440

Payne, B. K., Krosnick, J. A., Pasek, J., Lelkes, Y., Akhtar, O., & Tompson, T. (2009). Implicit and explicit prejudice in the 2008 American presidential election. *Journal of Experimental Social Psychology, 46,* 367–374. doi:10.1016/j.jesp.2009.11.001

Payne, B. K., McClernon, F., & Dobbins, I. (2007). Automatic affective responses to smoking cues. *Experimental and Clinical Psychopharmacology, 15,* 400–409. doi:10.1037/1064-1297.15.4.400

Phan, K. L., Fitzgerald, D. A., Nathan, P. J., & Tancer, M. E. (2006). Association between amygdala hyperactivity to harsh faces and severity of social anxiety in generalized social phobia. *Biological Psychiatry, 59,* 424–429. doi:10.1016/j.biopsych.2005.08.012

Quirin, M., Kazén, M., & Kuhl, J. (2009). When nonsense sounds happy or helpless: The Implicit Positive and Negative Affect Test (IPANAT). *Journal of Personality and Social Psychology, 97,* 500–516. doi:10.1037/a0016063

Schwarz, N., & Clore, G. L. (1996). Feelings and phenomenal experiences. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 433–465). New York: Guilford Press.

Schwarz, N., & Clore, G. L. (2003). Mood as information: 20 years later. *Psychological Inquiry, 14,* 296–303.

Sosic, Z., Gieler, U., & Stangier, U. (2008). Screening for social phobia in medical in- and outpatients with the German version of the Social Phobia Inventory (SPIN). *Journal of Anxiety Disorders, 22,* 849–859. doi:10.1016/j.janxdis.2007.08.011

Stein, M. B., Goldin, P. R., Sareen, J., Zorrilla, L. T. E., & Brown, G. G. (2002). Increased amygdala activation to angry and contemptuous faces in generalized social phobia. *Archive of General Psychiatry, 59,* 1027–1034. doi:10.1001/archpsyc.59.11.1027

Storbeck, J., & Clore, G. L. (2007). On the interdependence of cognition and emotion. *Cognition & Emotion, 21,* 1212–1237. doi:10.1080/02699930701438020

Straube, T., Kolassa, I.-T., Glauer, M., Mentzel, H.-J., & Miltner, W. H. R. (2004). Effect of task conditions on brain responses to threatening faces in social phobics: An event-related functional magnetic resonance imaging study. *Biological Psychiatry, 56,* 921–930. doi:10.1016/j.biopsych.2004.09.024

Straube, T., Mentzel, H.-J., & Miltner, W. H. R. (2005). Common and distinct brain activation to threat and safety signals in social phobia. *Neuropsychobiology, 52,* 163–168. doi:10.1159/000087987

Venables, P. H., & Christie, M. J. (1980). Electrodermal activity. In I. Martin & P. H. Venables (Eds.), *Techniques in psychophysiology* (pp. 3–67). Chichester, United Kingdom: Wiley.

Weisser, K. R., Moody, E. J., & McIntosh, D. (2004, July). *Do audio-visual stimuli generate more fear than audio-only stimuli?* Poster presented at the Annual Meeting of the American Psychological Association, Honolulu, HI.

Winkielman, P., Zajonc, R. B., & Schwarz, N. (1997). Subliminal affective priming resists attributional interventions. *Cognition & Emotion, 11,* 433–465. doi:10.1080/026999397379872

Zajonc, R. B. (1998). Emotions. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (4th ed., Vols. 1 and 2, pp. 591–632). New York: McGraw-Hill.

Received January 7, 2010
Revision received October 20, 2011
Accepted October 21, 2011 ■