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Implicit Motives Modulate Attentional Orienting to Facial Expressions of Emotion

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Abstract We conducted two studies (*N*s = 52 and 60) to test the notion that the incentive salience of facial expressions of emotion (FEE) is a joint function of perceivers' implicit needs for power and affiliation and the FEE's meaning as a dominance or affiliation signal. We used a variant of the dot-probe task (Mogg & Bradley, 1999a) to measure attentional orienting. Joy, anger, surprise, and neutral FEEs were presented for 12, 116, and 231 ms with backward masking. Implicit motives were assessed with a Picture Story Exercise. We found that power-motivated individuals orient their attention towards faces signaling low dominance, but away from faces that signal high dominance, and (b) that affiliation-motivated individuals show vigilance for faces signaling low affiliation (rejection) and, to a lesser extent, orient attention towards faces signaling high affiliation (acceptance).

Keywords Implicit motives · Attentional orienting · Emotional expressions · Incentives · Awareness

An implicit motive represents a capacity to experience the attainment of a certain type of incentive as rewarding; as a consequence, it orients the individual towards cues related to the incentive and energizes and selects behavior aimed at incentive attainment (Atkinson, 1957; McClelland, 1987). Implicit motives operate outside of a person's conscious awareness, as documented by the pervasive lack of variance overlap between implicit motive measures and questionnaire measures designed to tap the same motivational needs (e.g., McClelland, Koestner, & Weinberger, 1989; Pang & Schultheiss, 2005; Spangler, 1992).

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Implicit motives influence an individual's fantasies and behavior if aroused by motive-relevant cues. Therefore, the strength of a person's motives can be determined by analyzing the content of fantasies he or she reports in response to picture cues (McClelland, 1987). The Picture Story Exercise (PSE; McClelland et al., 1989), which McClelland and colleagues derived from the Thematic Apperception Test, is typically used for this purpose (cf. Smith, 1992). For the past 50 years, researchers have validated the implicit motive construct with thousands of studies documenting effects of motives on, for instance, psychophysiological processes, psychological adjustment, risk taking, leadership, and societal and historical developments (McClelland, 1987; Schultheiss, in press).

Despite the well-documented validity of the implicit motive construct, comparatively little is known about the role of implicit motives in many basic cognitive processes associated with motivation. This is particularly true of motives' orienting function, that is, their effects on the allocation of attention to motivational cues. Some scattered studies have examined the effects of implicit motives on perceptual thresholds (Atkinson & Walker, 1958; McClelland & Liberman, 1949), suggesting that a strong implicit motive is associated with heightened sensitivity to motive-relevant cues. However, so far not a single published study has directly tested the idea that implicit motives orient a person's attention towards motive-relevant cues. This gap in our knowledge is all the more surprising as a directing function of motivation is common to most definitions of motivation, modulation of attentional orienting has been demonstrated for many other motivational constructs (e.g., Derryberry & Reed, 1994; Mogg & Bradley, 1999a), and sophisticated tools for the parsing of attentional processes have been available to researchers for quite some time (e.g., MacLeod, Mathews, & Tata, 1986; Williams, Mathews, & McLeod, 1996).

The principal aim of our present research was therefore to test the hypothesis that implicit motives modulate attentional orienting to motivational incentives. More specifically, we examined whether the implicit needs for power (i.e., a concern for having impact on others and dominate them; e.g., Winter, 1973) and affiliation (i.e., a concern for having warm, friendly relationships with others; Koestner & McClelland, 1992) influence how much attention individuals allocate to the facial expressions of emotion (FEE) of joy, anger, and surprise relative to a neutral expression.

Our research revolved around three basic predictions. The first and most fundamental prediction is that the allocation of attention towards (or away from) an FEE would depend on the strength of individuals' implicit motives. The stronger the motive, the stronger the attentional allocation effect.

The second prediction states that whether a given FEE is a motive-relevant incentive or disincentive depends on whether it is a salient dominance or affiliation signal. Research by Knutson (1996) and Hess, Blairy, and Kleck (2000) consistently shows that people can easily classify FEEs on dimensions representing dominance and affiliation, with joyful expressions being rated as high on both affiliation and dominance and anger being rated as low on affiliation and high on dominance. In addition, Schultheiss, Pang, Torges, Wirth, and Treynor (2005) argued that the expression of surprise should be a salient low-dominance signal, as it reflects the sender's lack of control. Drawing on earlier work in the field of interpersonal theory (e.g., Battistich & Aronoff, 1985; Kiesler, 1983), we furthermore proceeded on the assumption that the incentive value of an FEE for a power-motivated person should be *reciprocally* related to the degree of dominance it expresses. Thus, others' expressions of high dominance, such as anger and joy, should be disincentives, and others' expressions of low dominance, such as surprise, should be incentives for individuals high in power motivation. A neutral expression was not expected to have incentive value for power-motivated individuals.

In contrast to the reciprocal relationship between the incentive value of FEE dominance and the perceiver's power motive, we expected the relationship between the incentive value of FEE affiliation and the perceiver's affiliation motive to be *symmetrical* (cf. Kiesler, 1983). Thus, others' expressions of high affiliation, such as joy, should be incentives, and others' expressions of low affiliation, such as anger, should be disincentives for affiliation-motivated individuals. Neutral and surprised expressions were not expected to have incentive value for them.

Support for these predictions comes from a study by Schultheiss et al. (2005), in which power-motivated individuals showed enhanced instrumental learning in response to same-gender surprise faces, suggesting that another's surprise is a positive incentive for them, whereas they showed impaired instrumental learning in response to joy faces (particularly if the sender was of the same gender as the perceiver), which is consistent with the notion that joy faces represent an aversive dominance signal. Learning was generally impaired in the context of anger faces among power-motivated participants and, to a lesser extent, among affiliation-motivated participants, a finding that is consistent with the hypothesized aversiveness of the high-dominance, low-affiliation expression of anger. In affiliation-motivated individuals, learning was not influenced by the presentation of a surprised face, supporting the notion that surprise has neutral valence in the context of affiliation. Against their predictions, however, Schultheiss et al. (2005) failed to find evidence for a reinforcing effect of joy faces on learning in affiliation-motivated individuals, which the authors attributed to the greater sensitivity of affiliation-motivated individuals to rejection cues as compared to social-closeness cues (cf. Boyatzis, 1973).

A third central prediction deals with the question of whether attention is directed towards or away from (dis-)incentives. We expected high levels of affiliation or power motivation to be associated with allocation of attention towards power (i.e., low-dominance FEEs) and affiliation (i.e., high-affiliation FEEs) incentives, respectively, consistent with past research that shows that stimuli with positive incentive value grab and hold people's attention (e.g., Field, Mogg, & Bradley, 2004). For disincentives, we expected attention allocation to follow a more complex pattern. According to Wilson and MacLeod's (2003) shifted attentional function model of attentional orienting, mildly aversive stimuli do not typically pose an imminent threat to the individual and therefore elicit attentional avoidance, presumably in an attempt to maintain attention to current goals and to help preserve a positive mood state (cf. Mogg & Bradley, 1999b, p. 165). In contrast, strongly aversive stimuli, which pose more of a threat, demand attention. In support of their model, Wilson and MacLeod found that research participants allocated attention away from a mild disincentive (a low-anger facial expression), but towards a strong disincentive (a high-anger facial expression). Wilson and McLeod (2003) also found that the difference between a mild and a strong disincentive is in part a function of an individual's emotional dispositions. In their study, anxious individuals were more likely than non-anxious individuals to perceive even a mildly aversive stimulus as threatening and therefore turned their attention towards the threat stimulus at a lower level of stimulus intensity than non-anxious individuals.

What predictions does the shifted attentional function model allow us to make for the effects of implicit motives on attentional orienting to FEEs? For joy and anger faces in the case of power motivation and anger faces in the case of affiliation motivation, we expect participants' implicit needs to amplify attentional orienting to these disincentive FEEs. However, we predict that the direction of the effect (i.e., whether attention is allocated away from or towards the disincentive) depends on whether the motive's behavioral goal is predominantly approach-or avoidance-oriented and on the intensity of the disincentive.

Past research shows that the affiliation motive is characterized by a strong fear-of-rejection component, which makes affiliation-motivated individuals particularly sensitive to signals of rejection (cf. Boyatzis, 1973; Schultheiss, in press). We therefore expected high-affiliation individuals to shift at lower levels of stimulus intensity from attentional avoidance (i.e., attention allocated away from disincentive) to vigilance (i.e., attention allocated towards disincentive) in response to anger faces than low-affiliation motive individuals.

In contrast, the measure of power motivation we employ in the present research represents a relatively pure-bred measure of the approach goal of establishing one's dominance over others (as opposed to a fear of being weak; cf. Veroff & Veroff, 1972). We therefore face the difficulty of making a prediction for a case that has not yet received much coverage in the attentional-orienting literature: How does someone who is strongly motivated to attain or maintain a positive goal state (i.e., his or her own dominance) deal with environmental cues that signal a possible threat (someone else's dominance) to that goal? We suggest that at low to medium intensities of threat, high-power individuals are more likely to engage in attentional avoidance than low-power individuals. This hypothesis is consistent with Mogg and Bradley's (1999b) argument that ignoring a sub-threshold threat may help to shield one's goals from unnecessary interference, particularly if one's goals aim at securing or maintaining a positive outcome, such as dominance and status, rather than detecting and avoiding a negative outcome, such as weakness. It is also consistent with studies from the primate literature that show that dominant animals often choose to ignore minor challenges and threats from lower-ranked conspecifics in an effort to preserve their energies for those occasions when a competitor launches a sustained challenge to their elevated rank (e.g., Smuts, 1985).

We tested our predictions using Mogg and Bradley's (1999a) dot-probe task (DPT). On a DPT trial, an emotional and a neutral stimulus are presented side by side on the computer screen, with exposure duration being controlled by the subsequent presentation of masks replacing the stimuli. Attentional orienting is assessed by presenting a little dot (the probe stimulus) in the location of one of the two original stimuli. If a person's attention was oriented towards the stimulus in whose location the probe is subsequently presented, he or she will be faster to respond to the probe than if his or her attention was oriented towards the other stimulus. In this way, it can be determined whether a person's attention is oriented towards (indicated by shorter response latencies if the probe is presented in the same location) or away from (indicated by longer response latencies if the probe is presented in the same location) an emotional stimulus, relative to a neutral stimulus. The intensity of incentives and disincentives was operationalized by varying the duration at which participants were exposed to FEEs. In doing so, we focused on low-intensity (i.e., 12 ms exposure duration) and medium-intensity (116 and 231 ms exposure durations) levels.

Study 1

To put our hypotheses to a first test, we had participants complete a DPT featuring pictures of anger, joy, surprise, and neutral expressions posed by male and female Caucasians taken from Matsumoto and Ekman's (1988) Japanese and Caucasian Facial Expressions of Emotion (JACFEE) and Neutral Faces (JACNEUF) picture set.

Method

Participants

Fifty-five undergraduate and graduate students at the University of Michigan, Ann Arbor, participated in the experiment, which was advertised as a study on attention and performance. Three participants did not follow instructions and produced high error rates (see below). Their data were therefore excluded from all analyses. The remaining 52 participants (29 women; gender information was missing for one participant) were 20 years old on average. Psychology majors were not admitted to the study.

Design and procedure

Emotion (joy, anger, surprise), face gender, exposure duration (12, 116, and 231 ms), emotional face location (left vs. right), dot probe location (left vs. right) and block (first vs. second) were varied within subjects, with the first 5 factors randomized within blocks and block representing a repetition factor. Motive scores (continuous power and affiliation motive scores) and participant gender represented between-subjects factors.

Each participant was tested in a single session lasting approximately 90 min. Participants were scheduled and tested in groups of up to four. After participants had given their informed consent, their motive levels were assessed with a PSE. Next, participants worked on the DPT and then on a forced-choice test (FCT), which assessed participants' conscious awareness of the FEEs presented under conditions similar to the DPT. Finally, participants provided demographic information about themselves, were debriefed and paid $15.

All instructions, stimuli and materials were presented and all responses recorded using the Experimental Run Time System (ERTS, BeriSoft Cooperation, Frankfurt a. M., Germany) on Dell Pentium personal computers with 14 inch cathode-ray color monitors (86.6 Hz vertical retrace) and standard keyboards. The exception was the PSE, for which participants wrote stories on paper sheets provided by the experimenter.

Implicit motives

We assessed implicit motives by having participants write an imaginative story about each of six pictures, using the stimuli and instructions described in Pang and Schultheiss (2005). Stories were later coded for motivational imagery by a trained scorer using Winter's (1994)

Manual for scoring motive imagery in running text. According to the manual, power imagery is scored whenever a story character shows a concern with having impact on others through strong, forceful actions, controlling, influencing, helping, impressing or eliciting emotions in others. Affiliation imagery is scored whenever a story character shows a concern with establishing, maintaining or restoring friendly relations, as expressed by positive feelings toward others, sadness about separation, affiliative activities, or friendly, nurturing acts. The scorer had previously exceeded 85% interrater agreement on calibration materials prescored by an expert that are contained in the manual and was blind with regard to participants' gender or performance on the DPT and the FCT. A second trained scorer independently and blindly coded PSE stories from one third of all participants ($n = 18$). For this subsample, interrater reliability for imagery sum scores across all six stories was high, with Pearson correlation coefficients of .81 for power imagery and .93 for affiliation imagery. On average, participants wrote 608 ($SD = 157$) words, containing 4.67 ($SD = 2.78$) power and 4.77 ($SD = 2.83$) affiliation images summed across all six stories. Motive scores were positively correlated with protocol length (ps $< .01$) and we adjusted them for protocol length by multiplying them by 1000 and dividing them by word count.

Stimulus materials

For the DPT and the FCT we used digitized slides of all Caucasian posers displaying joy, anger, or surprise (two exemplars for each emotion/gender combination) from Matsumoto and Ekman (1988; see Biehl et al., 1997, for the validity of this picture set). Faces were cropped so that each was visible from cheekbone to cheekbone and hairline to chin, and picture portions below the jawline were blackened. Faces were resized to 12.0 cm height after cropping (width could vary, depending on posers' physiognomy). A 12.2 cm (height) × 9.0 cm (width) mask was created by copying fragments from each poser's neutral expression onto a black background such that the combined fragments resembled the contours and proportions of a regular face, but did not show any feature of the face (e.g., an eye, mouth, nose) as a whole.

Attentional orienting

Each trial on the DPT started with a central fixation cross, presented for 500 ms, followed by a face pair, presented 18.5 cm apart (midpoint to midpoint); followed by a mask pair, presented 18.5 cm apart (midpoint to midpoint; 9.5 cm distance between inner edges) and for 66 ms, in place of the previous face pair; followed by a single dot (2.5 mm × 2.5 mm) in the location of the midpoint of one of the faces. Response time (RT) registration started with probe onset. Participants were seated with ca. 100 cm distance to the screen and instructed to press the CTRL key corresponding to the screen location (left or right) the dot appeared in. The probe disappeared and the trial was terminated upon a response or after 1000 ms had elapsed since probe onset. If a participant pressed the wrong key or did not respond within 1000 ms, the response was classified as an error and the trial was repeated at the end of the block until a correct response was registered. Inter-trial intervals varied randomly in 50 ms-steps from 500 to 1250 ms. The foreground color on all trials was white or color (for faces and the mask) and the background color was black. During an initial training phase, participants worked on trials that did not feature any face pairs but that provided them with feedback on their response speed and accuracy to help them learn the task. After 24 obligatory training trials, participants proceeded to the baseline phase as soon as they had completed either an additional 24 consecutive trials without error or a total of 200 trials. During the baseline phase, participants completed 24 trials, resulting from a 2 (probe location) × 12 (repetitions) factorial with randomized presentation, which featured neither face presentations nor feedback. Participants then worked on 288 trials of the emotional-face DPT, resulting from a 3 (emotion) × 3 (exposure duration) × 2 (face gender) × 2 (exemplars per face gender/emotion combination) × 2 (emotional face location) × 2 (probe location) × 2 (block) factorial, with trial presentations randomized within each block.

After removing three participants with very high error rates from the sample (124, 52, and 50 errors), the average error rate (percent errors on 288 trials) on the emotional-face DPT was 2.33% for the remaining 52 participants. Note that because trials with late or incorrect responses were repeated until correctly solved, our data set did not contain missing data. However, trials classified as "correct" could still contain abnormally fast RTs resulting from premature responses that just happened to be correct. We therefore scrutinized box-and-whisker plots of all 288 trials for extreme values in the low range of RTs and determined that RTs smaller than 150 ms (0.16% of all response times recorded) were suspect. RTs on these trials were replaced by the average RT on baseline trials with matching probe location. Mean RT across all trials of the emotional-face DPT was 376 ms ($SD = 32$ ms).

Awareness test

Trials on the FCT were exactly like those on the DPT, except that when face pairs were presented, they could consist either of one emotional and one neutral expression or two identical neutral expressions displayed by one poser, and instead of the probe, participants viewed a screen featuring an emotional-neutral face pair on the left and a neutral-neutral face pair by the same poser on the right side, with the instruction to indicate by key press which face pair they had seen before the mask. For emotional-neutral face pairs, the pairing of the faces on the choice screen (emotional left and neutral right or neutral right and emotional left) matched the pairing of the faces presented before the mask. Participants first worked on 48 trials of a baseline block, during which no face pairs were presented before the mask. The number of trials resulted from crossing the dummy factors "emotion," "face gender," "exemplars per face gender/emotion combination," "emotional face location," and "correct response key" (left CTRL, right CTRL). Participants' performance on this no-face control block allowed us to empirically determine central tendencies and distributions of "correct" responses obtained under chance conditions and then compare these to participants' discrimination performance when face pairs were actually presented before the mask. Next, participants worked on a total of 144 FCT trials, resulting from a 3 (emotion) × 3 (exposure duration) × 2 (face gender) × 2 (exemplars per face gender/emotion combination) × 2 (emotional face location) × 2 (block) factorial, with trial presentations randomized within each block. Thus, the FCT was designed to resemble the DPT in all crucial features. Moreover, because participants were only required to decide whether an emotional face had been presented or not (as opposed to choosing between different emotions, naming the emotion, or choosing between different emotion labels), the FCT represented a low-threshold test of participants' awareness of an emotional expression displayed before the mask.

Statistical analyses

To accommodate our continuous motive variables and to maximize test power, we performed all analyses in this study and in Study 2 using (repeated-measures) multiple regression procedures in SYSTAT 10. In analyses of the DPT data, we focused only on significant interactions including the Emotional Face Location × Probe Location term, because this term codes for the relative allocation of attention to the emotional or the neutral face, as indicated by detection of the probe presented in place of either type of stimulus (cf. Mogg & Bradley, 1999a). Because the Emotional Face Location × Probe Location interaction represents the linear combination of four RT variables, it can be expressed as an attentional bias score, calculated as (emotional face left/probe right + emotional face right/probe left)/2 − (emotional face left/probe left + emotional face right/probe right)/2. Positive values on a bias score indicate attentional orienting towards the emotional face (and away from the neutral face), whereas negative values indicate attentional orienting towards the neutral face (and away from the emotional face). Consistent with our hypotheses, we expected the Emotional Face Location × Probe Location interaction to be moderated by participants' motives or properties of the faces (e.g., type of emotion, exposure duration, face gender) or combinations of these factors.

Results

Awareness

Participants' ability to discriminate between face pairs featuring an emotional face and neutral face pairs increased in a monotonic fashion with exposure duration, with performance at 12 ms ($M = 52.52\%$, $SD = 4.80$) not significantly differing from performance on no-face control trials ($M = 50.92\%$, $SD = 6.52$), $F(1, 51) = 2.87$, $p > .05$, and significantly above control-trial levels at exposure durations of 116 ms ($M = 76.24\%$, $SD = 10.06$), $F(1, 51) = 210.08$, $p < 10^{-14}$, and 231 ms ($M = 84.425$, $SD = 10.57$), $F(1, 51) = 320.95$, $p < 10^{-14}$ (for the main effect of exposure duration [no-face, 12, 116, and 231 ms], $F[3,153] = 252.67$, $p < 10^{-14}$). Thus, participants did not become consciously aware of FEEs presented for 12 ms, but showed clear signs of duration-graded stimulus awareness at longer durations.

Attentional orienting

We obtained Motive × Exposure Duration × Emotion × Face Gender × Emotional Face Location × Probe Location interactions both for the power motive, $F(4, 200) = 3.19$, $p = .01$, and the affiliation motive, $F(4, 200) = 2.40$, $p = .05$. These interactions were not moderated by participant gender, *p*s > .05. The interaction effect involving the power motive could be traced back to significant Power Motive × Exposure Duration × Face Gender × Emotional Face Location × Probe Location interactions for anger faces,

Table 1 Regression slopes representing the significant Power Motive × Exposure Duration × Face Gender effects on attentional bias scores for anger and surprise faces in Study 1

Exposure duration	Male faces *B*	*SE*	*r*	*p*	Female faces *B*	*SE*	*r*	*p*
Anger								
12 ms	1.39	1.32	.15	.29	− 0.39	0.80	− .07	.62
116 ms	− 3.32	1.14	− .38	.005	− 0.23	1.18	− .03	.85
231 ms	− 1.70	1.14	− .21	.14	− 0.16	1.17	− .02	.89
Surprise								
12 ms	− 1.01	1.09	− .13	.36	2.40	1.12	.29	.04
116 ms	0.05	1.32	.01	.97	0.66	1.01	.09	.52
231 ms	0.96	0.91	.15	.30	− 1.53	1.04	− .20	.15

Note. Positive correlations reflect motive-driven attentional orienting to emotional face, negative bias scores reflect motive-driven attentional orienting to neutral face.

Table 2 Regression slopes representing the significant Affiliation Motive × Exposure Duration × Face Gender effect on attentional bias scores for anger faces in Study 1

Exposure duration	Male faces *B*	*SE*	*r*	*p*	Female faces *B*	*SE*	*r*	*p*
12 ms	− 3.39	1.18	− .38	.006	− 0.03	0.76	− .01	.96
116 ms	1.78	1.14	.22	.12	0.03	1.13	.01	.97
231 ms	1.99	1.07	.26	.07	− 1.53	1.09	− .19	.17

Note. Positive correlations reflect motive-driven attentional orienting to emotional face, negative bias scores reflect motive-driven attentional orienting to neutral face.

$F(2, 100) = 3.17$, $p < .05$, and surprise faces, $F(2, 100) = 4.13$, $p < .05$, but not for joy faces, ns.

Further analyses revealed that the power motive affected attentional orienting only to male anger faces and did so in an exposure duration-dependent way, $F(2, 100) = 4.48$, $p = .01$ ($F[1, 50] = 4.23$, $p < .05$, for the quadratic effect of exposure duration). In the anger condition, regression slopes (cf. Table 1) of attentional bias scores on power motivation at 116 ms and at 231 ms did not significantly differ from each other, but the slope of attentional bias scores averaged for long exposure durations (116 and 231 ms: $B = -2.51$, $SE = 0.88$, $r = -.37$, $p = .007$) differed significantly from the slope of attentional bias scores at 12 ms (for the interaction: $F[1, 50] = 6.58$, $p = .01$). As Table 1 shows, individuals high in power motivation showed no significant attentional bias for male anger faces in the 12 ms condition, but allocated more attention to neutral male faces than to angry male faces at longer exposure durations.

For surprise, the Power Motive × Exposure Duration × Emotional Face Location × Probe Location interaction was significant only for female faces, $F(2, 100) = 3.97$, $p < .05$ ($F[1, 50] = 6.50$, $p = .01$, for the linear effect of exposure duration). For female faces, the regression slope (cf. Table 1) for attentional bias scores was significant at 12 ms, but not at 116 or 231 ms, and the difference between slopes at 12 and 231 ms was significant, $F(1, 50) = 6.50$, $p = .01$. Also, at 12 ms exposure duration the slope for attentional bias to female surprise faces differed significantly from the slope for attentional bias to male surprise faces (for the interaction: $F[1, 50] = 4.97$, $p < .05$). As Table 1 shows, power-motivated individuals oriented their attention specifically toward female surprise faces presented at 12 ms, but not at other exposure durations or toward surprise displayed by men.

The interaction effect involving affiliation motivation was based on a highly significant Motive × Exposure Duration × Face Gender × Emotional Face Location × Probe Location interaction for anger faces, $F(2, 100) = 7.83$, $p < .001$. Follow-up analyses indicated that, similarly to the power motive, the affiliation motive affected attentional orienting only to male anger faces, and that this effect depended on exposure duration, $F(2, 100) = 8.65$, $p < .0005$ ($F[1, 50] = 3.64$, $p = .06$, for the quadratic effect of exposure duration). Regression slopes (cf. Table 2) of attentional bias scores on affiliation motivation at 116 and 231 ms did not significantly differ from each other, but the slope of attentional bias scores averaged for long exposure durations (116 and 231 ms: $B = 1.89$, $SE = 0.87$, $r = .30$, $p < .05$) differed significantly from the slope of attentional bias scores at 12 ms (for the interaction: $F[1, 50] = 15.39$, $p < .0005$). As Table 2 shows, individuals high in affiliation motivation turned their attention away from male anger faces in the 12 ms condition, but towards male anger faces at longer exposure durations.

For joy faces, only the Affiliation Motive × Emotional Face Location × Probe Location effect became significant in the follow-up analyses, $F(1, 50) = 5.25$, $p < .05$. We created an overall bias score for joy faces by averaging joy-face bias scores across exposure durations and face gender and found that affiliation-motivated individuals oriented their attention towards joy faces, $B = 0.91$, $SE = 0.40$, $r = .31$, $p < .05$.

Additional analyses

Power and affiliation motives were not substantially correlated in this study, $r = -.09$, ns. In this study and in Study 2, we also explored whether power and affiliation motives had interactive effects on attentional orienting to FEEs, but without significant results, $ps > .10$. Thus, their effects on attentional orienting to emotional expressions were purely additive.

Discussion

The results of Study 1 provided initial evidence for a modulatory effect of implicit motive dispositions on attentional orienting to FEEs. Consistent with our predictions, we found that power-motivated individuals oriented their attention away from anger FEEs, although this effect was restricted to male faces and emerged only for exposure durations at which participants became increasingly aware of the presentation of an emotional expression (116 and 231 ms). We also obtained limited evidence that power-motivated individuals oriented their attention towards surprise faces. The effect emerged only for female surprise faces presented for 12 ms, but not for male surprise faces or longer exposure durations. The hypothesis that power-motivated individuals should orient attention away from joy faces received no support, however.

Consistent with our predictions, we also found that affiliation-motivated individuals oriented their attention towards joy faces. For the anger expression, results were more complex: Affiliation-motivated individuals oriented attention away from male anger faces presented outside of conscious awareness (12 ms), but towards male anger faces presented at exposure durations that increasingly allowed conscious identification of the expressed emotion (116 and 231 ms). These findings support the hypothesis that high-affiliation individuals should be more vigilant for rejection threat and therefore be more likely to allocate attention to anger faces than low-affiliation individuals. Our findings are thus consistent with Wilson and MacLeod's (2003) shifted attentional function model. The initial attentional avoidance response to low-intensity threat stimuli predicted by Wilson and MacLeod was actually significantly more accentuated in high-affiliation individuals than other participants in our study. Both the stronger initial avoidance of and the later stronger vigilance for male anger faces among high-affiliation individuals are consistent with the hypothesis that an angry expression should be a stronger negative incentive for individuals high than for those low in affiliation motivation.

Before drawing more far-reaching conclusions based on the findings we obtained in Study 1, it seems prudent to consider to what extent some of our findings (e.g., the greater salience of male anger faces compared to female anger faces; the effect of power motivation on attentional orienting to 12 ms female surprise faces) may have been due to methodological factors. For one, in Study 1 each emotion-gender combination was represented by only two posers, which makes it more likely for individual pictures or posers to have idiosyncratic effects on attentional orienting, perhaps due to the poser's physiognomy. Thus, although stronger emotional effects of male relative to female anger faces have also been reported in past research (e.g., Mazurski, Bond, Siddle, & Lovibond, 1996) and the difference between male and female anger expressions may represent a genuine effect of face gender, it is still possible that the reason why we found stronger motive effects on attentional orienting to male anger faces may simply be that, for instance, one or both of the female anger pictures happened to display anger in a less effective or prototypical way. Increasing the pool of stimuli for each specific emotion-gender combination should make such idiosyncratic effects less likely to occur.

A further design feature that may have influenced our findings is the fact that we randomized the presentation of FEEs at various exposure durations within blocks. Therefore, short (12 ms) and longer (116 and 231 ms) presentations of the same FEEs often occurred in close proximity and in no particular order. This may have had two consequences. First, familiarity with a given poser's FEE through previous exposure at longer exposure durations (i.e., 116 and 231 ms) may have sensitized participants to these expressions when they were subsequently presented at 12 ms. Thus, it is unclear whether 12 ms presentations of an FEE will elicit motive-driven attentional orienting effects even if the expression has not been preceded by long duration presentations. Second, the juxtaposition of low-intensity (12 ms) and higher-intensity (116 and 231 ms) FEEs may have created a contrast effect, making 12 ms presentations of anger expressions less threatening, and thus more likely to be disregarded, than 116 and 231 ms presentations. Such a contrast effect may have contributed to our finding that affiliation-motivated individuals initially oriented attention away from male anger faces at 12 ms.

Study 2

We tried to address these issues in our second study in the following ways: We included the pictures of Japanese posers contained in Matsumoto and Ekman's (1988) stimulus set in Study 2 and thus doubled the number of pictures for each FEE. Moreover, to examine whether differences between FEEs presented at short and long exposure durations also emerge if exposure durations are not intermixed, we blocked by exposure duration and counterbalanced exposure duration sequence (ascending or descending) across participants to control for order effects. The latter design feature also allowed us to test if familiarity with FEEs at longer exposure durations is necessary for attentional orienting effects to occur at short (i.e., 12 ms) exposure durations.

Method

Participants

Sixty undergraduate and graduate students (31 women) at the University of Michigan, Ann Arbor, with an average age of 20 years, participated in the experiment, which was advertised as in Study 1. Psychology majors were not admitted to the study.

Design and procedure

Emotion (anger, joy, surprise), race (Japanese, Caucasian), face gender (male, female), emotional face location (left, right), dot probe location (left, right) and exposure duration were varied within subjects, with the first 5 factors randomized within exposure duration, and exposure duration sequence (ascending: 12, 116, 231 ms; descending: 231, 116, 12 ms) varied between subjects in both the DPT and the FCT. Thirty participants were randomly assigned to each exposure duration sequence. Motive scores and participant gender represented additional between-subjects factors. The same testing procedure as in Study 1 was used.

Implicit motives

The same scorer as in Study 1 coded participants' PSE protocols for motive imagery. The scorer was blind with regard to participants' gender or performance on the DPT and the FCT. A second trained scorer independently and blindly coded PSE stories from one third of all participants ($n = 20$). For this subsample, interrater reliability for imagery sum scores across all six stories was high, with Pearson correlation coefficients of.87 for power imagery and .90 for affiliation imagery. On average, participants wrote 642 ($SD = 128$) words, containing 5.35 ($SD = 2.81$) power and 5.58 ($SD = 2.73$) affiliation images summed across all six stories. Motive scores were positively correlated with protocol length ($ps \leq .01$) and we adjusted them for protocol length as described in Study 1. To correct for a deviation from a normal distribution in word-count corrected power motive scores, we subjected them to a square-root transformation.

Stimulus materials

We added all Japanese anger, joy, and surprise faces, along with the corresponding neutral expressions, from the JACFEE/JACNEUF to our picture set. All faces were cropped and resized as described in Study 1.

Attentional orienting

After the training and baseline phases, participants worked on 288 trials of the emotional-face DPT, resulting from a 3 (emotion) × 3 (exposure duration) × 2 (race) × 2 (face gender) × 2 (exemplars per face gender/race/emotion combination) × 2 (emotional face location) × 2 (probe location) factorial, with trial presentations randomized within exposure duration levels. Trials with RTs < 150 ms were classified as errors (premature responses) and, like trials with key press errors or RTs > 1000 ms, repeated at the end of each exposure duration block until a correct response was registered. Otherwise, instructions and data collection procedures were identical with those used in Study 1. The average error rate (percentage of premature, late or incorrect responses) on the emotional-face DPT was 2.70% ($SD = 2.31\%$). Mean RT across all trials of the emotional-face DPT was 374 ms ($SD = 40$ ms).

Awareness test

As in Study 1, the FCT mirrored the preceding DPT in all crucial aspects, except that participants chose a face pair instead of responding to a dot probe after the mask. Participants worked on a total of 288 FCT trials, resulting from a 3 (emotion) × 3 (exposure duration) × 2 (race) × 2 (face gender) × 2 (exemplars per face gender/race/emotion combination) × 2 (emotional face location) × 2 (face pair: emotional-neutral, neutral-neutral) factorial. At the end of the FCT, participants worked on 96 no-face trials. The number of trials resulted from crossing the dummy factors "emotion," "face gender," "exemplars," "race," "correct response key" (left CTRL, right CTRL) and "emotional face location". Due to equipment failure, two participants did not complete the FCT; hence, $N = 58$ for all analyses on FCT data.

Results

Awareness

Participants' ability to discriminate FEEs was at chance levels (compared to no-face control trials, $M = 50.47\%$, $SD = 4.42$) for faces presented for 12 ms ($M = 50.45\%$, $SD = 4.13$), $F(1, 57) < 1$, ns, but differed from no-face control trials for faces presented at 116 ms ($M = 76.49\%$, $SD = 10.82$), $F(1, 57) = 318.18$, $p < 10^{-14}$, and at 231 ms ($M = 88.29\%$, $SD = 7.82$), $F(1, 57) = 1, 202.61$, $p < 10^{-14}$ (for the main effect of exposure duration [no-face, 12, 116 and 231 ms], $F[3,171] = 488.29$, $p < 10^{-14}$). The exposure duration effect was moderated by sequence: At 116 ms, but not at 12 or 231 ms exposure duration, participants were slightly better at discriminating FEEs when face pairs were presented with descending exposure durations ($M = 80.64\%$, $SD = 9.50$) than when they were presented with ascending exposure durations ($M = 72.34\%$, $SD = 10.60$); for the Sequence × Exposure Duration interaction $F(2, 112) = 5.75$, $p < .005$. Thus, participants did not become consciously aware of FEEs presented for 12 ms, but showed increasing conscious awareness of emotional faces at longer exposure durations, particularly when they completed the FCT in the descending exposure duration condition.

Attentional orienting

We obtained a significant Power Motive × Emotion × Emotional Face Location × Probe Location interaction,

Table 3 Regression slopes representing the significant Motive × Emotion effects on attentional bias scores in Study 2

Motive	Anger				Surprise				Joy			
	B	*SE*	*r*	*p*	*B*	*SE*	*r*	*p*	*B*	*SE*	*r*	*p*
Power	−3.57	2.67	−.17	.19	5.50	2.80	.25	.05	−3.02	1.91	−.20	.12
Affiliation	0.93	0.47	.25	.05	−0.17	0.52	−.04	.74	0.44	0.34	.16	.21

Note. Positive correlations reflect motive-driven attentional orienting to emotional face, negative bias scores reflect motive-driven attentional orienting to neutral face.

$F(2, 166) = 4.25$, $p < .05$. The effect could be traced back to a significant positive association between attentional bias scores and power motive scores in the surprise-face condition and non-significant negative associations in the anger-face and joy-face conditions (cf. Table 3). The slope in the surprise face condition differed significantly from slopes in the anger face condition ($F[1, 58] = 5.82$, $p < .05$) and in the joy face condition ($F[1, 58] = 6.14$, $p < .05$). Because we had argued that both anger and joy faces represent dominance signals and therefore expected them to have similar negative incentive value for power-motivated individuals, we also tested whether power motivation is a significant predictor of attentional bias scores averaged across anger and joy and found this to be the case ($B = -3.30$, $SE = 1.66$, $r = -.25$, $p = .05$). As shown in Table 3, power motivation predicted attentional orienting towards surprise faces and away from anger and joy faces.

We failed to find significant effects of the affiliation motive on attentional orienting to FEEs for the full analytic design, although the Motive × Emotional Face Location × Probe Location interaction approached the level of a trend, $p = .12$. However, when we restricted our analyses to only those two emotions—joy and anger—that we had predicted to hold incentive value for affiliation-motivated individuals, we obtained a significant Affiliation Motive × Emotional Face Location × Probe Location interaction, $F(1, 58) = 5.42$, $p < .05$. Follow-up analyses revealed positive regression slopes of attentional bias scores on affiliation motivation for the anger-face condition and the joy-face condition. As shown in Table 3, affiliation-motivated individuals were unresponsive to surprise faces, but oriented their attention towards anger faces and showed a non-significant tendency to attend to joy faces.

Additional analyses

These results were not moderated by exposure duration or sequence, face or participant gender, or face ethnicity. Because power and affiliation motives were correlated in this study ($r = -.33$, $p < .01$), we also tested whether the Power Motive × Emotion × Emotional Face Location × Probe Location effect in the overall design and the Affiliation Motive × Emotional Face Location × Probe Location interaction in the restricted design remained significant if the other motive was controlled for, and found this to be the case (*p*s $\leq .08$).

Discussion

As predicted, we found that power-motivated individuals oriented attention towards FEEs signaling low dominance (i.e., surprise) and away from FEEs signaling high dominance (i.e., anger and joy), although the latter effect only became significant after attentional bias scores for anger-and joy-face trials were pooled. Consistent with the notion that the affiliation motive makes people sensitive to signals of rejection, we also found this motivational disposition to predict attentional orienting towards anger faces. The hypothesis that affiliation-motivated individuals attend to joy faces was not supported, although the direction of the effect was as predicted.

In contrast to Study 1, these findings were not influenced by poser gender, which indicates that the gender effects observed in the previous study may have been due to idiosyncratic effects of individual pictures and not necessarily represent an influence of poser gender per se. Also in contrast to Study 1, our findings were not moderated by exposure duration, which suggests that intermingling of short and long exposure durations in Study 1 created stimulus intensity contrast effects that did not emerge when exposure duration was kept constant through blocking in Study 2. Motive effects on attentional orienting did not depend on whether exposure durations increased or decreased, suggesting that familiarity with FEEs presented within conscious awareness is not a prerequisite for motive-driven responding to FEEs presented outside of conscious awareness.

General discussion

We had hypothesized that implicit motives modulate individuals' attentional orienting to FEEs. More specifically, we had predicted that high levels of implicit power motivation are associated with attending towards the low-dominance, and therefore rewarding, surprise expression and away from the high-dominance, and therefore aversive, anger and joy expressions. We had also predicted that high levels of implicit affiliation motivation are associated with attending towards the high-affiliation, and therefore rewarding, joy face, but also towards the low-affiliation, and therefore aversive, anger expression, because the affiliation motive is known to sensitize individuals to signals of rejection (cf. Boyatzis, 1973). Across two studies employing the DPT as a measure of attentional orienting, we obtained support for many of our predictions.

For affiliation-motivated individuals, high vigilance for anger faces (male faces in Study 1, all faces in Study 2) emerged as a consistent effect across both studies, with Study 1 providing some evidence that when low-and medium-intensity stimuli are directly contrasted with each other, affiliation-motivated individuals switch from attentional avoidance for low-intensity (i.e., 12 ms exposure duration) anger faces to vigilance for medium-intensity anger faces (116 and 231 ms exposure duration). The predicted attentional bias for high-affiliation joy faces in affiliation-motivated individuals, on the other hand, emerged clearly only in Study 1 and did not become significant in Study 2, although the effect was in the predicted direction. Taken together, these findings reinforce the notion that affiliation-motivated individuals are sensitive to interpersonal cues signaling rejection, but they also suggest that these individuals may be *less* sensitive to high-affiliation signals than we originally expected. The latter conclusion is consistent with the previously mentioned failure of Schultheiss et al. (2005) to observe a reinforcing effect of joy faces on behavior in high-affiliation individuals. We speculate that a measure of the need for intimacy (McAdams, 1992), which captures the hope-of-closeness aspects of affiliation better than the affiliation measure we used in the present study, may be more suitable for differentiating between individuals who are sensitive to the rewarding properties of high-affiliation FEEs and those who are not. The validity of this assumption remains to be tested in future studies.

In line with the prediction that power-motivated individuals should allocate attention towards low-dominance FEEs and away from high-dominance FEEs, we found that power motivation predicted attentional orienting (a) towards surprise faces presented for 12 ms (female faces in Study 1) or at all exposure durations (all faces in Study 2), (b) away from anger faces at exposure durations greater than 12 ms in Study 1 and at all exposure durations in Study 2, and (c) away from joy faces (this effect emerged as a trend only in Study 2). Thus, in contrast to affiliation-motivated individuals, power-motivated participants showed no sensitization for the high-dominance expressions anger and joy; rather, they tended to avoid such faces. However, we suggest that what holds for affiliation-motivated individuals' attentional orienting to social signals that are incompatible with their needs should also hold for power-motivated individuals, and that power-motivated individuals should also shift from attentional avoidance to vigilance for stimuli that signal a threat to their need for dominance. Consistent with the notion that power-motivated individuals will only deal with threats to their own need for dominance if the challenge is so strong that it can no longer be ignored (cf. Smuts, 1985), we speculate that this switch may occur at higher stimulus intensities, though. Hence, we would predict that if exposure duration is increased beyond the range we employed in our present research, attentional orienting towards high-dominance faces should eventually be observed in high-power individuals.

Limitations and future directions

Besides extending this research to other FEEs (e.g., fear, sadness, disgust) and varying the intensity of FEEs, we believe that the following issues deserve further attention.

Can similar findings be obtained at longer exposure durations?

In our studies, we used comparatively short exposure durations to examine effects of implicit motives on automatic attentional orienting. It will be worthwhile to explore whether similar effects can be obtained if faces are presented for durations at which more controlled, strategic forms of attention take over (e.g., exposure durations ≥ 500 ms; cf. Adolphs, 2002). Consistent with the robust finding that self-report measures of emotion reliably predict attentional orienting to emotional stimuli presented at longer exposure durations (e.g., Mogg & Bradley, 1999a), we speculate that controlled attentional orienting processes are at least partially guided by individuals' explicit motives (i.e., their consciously held beliefs about their motivational dispositions) and that implicit and explicit motive dispositions may conjointly influence controlled forms of attention.

Do the observed effects reflect engagement or disengagement of attention?

Using variants of the DPT, both Derryberry and Reed (1994) and Koster, Crombez, Verschuere, and De Houwer (2004) have shown that salient incentives are not necessarily more likely to capture attention, but are more likely to hold a person's attention once it is engaged. In our present research, we did not obtain separate measures for these two aspects of attention. It therefore remains to be determined if implicit motives influence the degree to which FEEs capture attention, hold it, or both.

Do the observed effects depend on the sender's gaze direction?

Recent research indicates that the meaning of FEEs can change dramatically with the sender's gaze direction (e.g., Adams, Gordon, Baird, Ambady, & Kleck, 2003). Gaze direction (in conjunction with head orientation) can be interpreted as an indicator of whether the emotion is displayed as a result of the perceiver's interaction with the sender or is due to the sender's response to some other person or event in the environment. Our hypotheses were based on the assumption that the FEE is the result of an interaction between sender and perceiver, and we therefore predict that to the extent that the displayed emotion is not directed at the perceiver (suggesting that it did not result from an interaction with the perceiver), it is also less likely to represent an incentive for the perceiver's implicit power and affiliation motives and thus to elicit motive-driven attentional orienting.

Conclusion

While some of our present findings, such as the inconsistent evidence for an affiliation motivation effect on attentional orienting to joy faces or the question of when power-motivated individuals switch from attentional avoidance to vigilance when facing high-dominance FEEs, certainly warrant further investigation, the overall pattern of results emerging from this research supports the hypothesis that implicit motives modulate attentional orienting to motivational incentives. Our findings therefore provide evidence for a previously largely uncharted function of implicit motives, namely their ability to orient the person towards motivational cues, which according to McClelland (1987) represents a defining feature of the implicit motive construct. Our findings also corroborate the idea that implicit motives are particularly attuned to the processing of nonverbal stimuli and incentives (Schultheiss, in press; see also Klinger, 1967; McClelland et al., 1989) and contradict earlier claims that motives do not respond to identifiable stimuli (McClelland, 1980), which, if true, would make detailed experimental analyses of motive-driven processes all but impossible. Rather, the present investigation and the implicit-learning findings reported by Schultheiss et al. (2005) provide introductory, albeit convergent, support for the hypothesis that nonverbal stimuli interact with perceivers' implicit motives in specific ways to influence cognition and behavior. We are confident that these findings will help open the door to more detailed analyses of how implicit motives shape cognitive, emotional and behavioral processes and outcomes.

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References

Adams, R. B., Jr., Gordon, H. L., Baird, A. A., Ambady, N., & Kleck, R. E. (2003). Effects of gaze on amygdala sensitivity to anger and fear faces. *Science*, *300*(5625), 1536.

Adolphs, R. (2002). Recognizing emotion from facial expressions: Psychological and neurological mechanisms. *Behavioral and Cognitive Neuroscience Reviews*, *1*, 21–61.

Atkinson, J. W. (1957). Motivational determinants of risk-taking behavior. *Psychological Review*, *64,* 359–372.

Atkinson, J. W., & Walker, E. L. (1958). The affiliation motive and perceptual sensitivity to faces. In J. W. Atkinson (Ed.), *Motives in fantasy, action, and society: A method of assessment and study* (pp. 360–366). Princeton, NJ: Van Nostrand.

Battistich, V. A., & Aronoff, J. (1985). Perceiver, target, and situational influences on social cognition: An interactional analysis. *Journal of Personality and Social Psychology*, *49,* 788–798.

Biehl, M., Matsumoto, D., Ekman, P., Hearn, V., Heider, K., Kudoh, T., et al. (1997). Matsumoto and Ekman's Japanese and Caucasian facial expressions of emotion (JACFEE): Reliability data and cross-national differences. *Journal of Nonverbal Behavior*, *21,* 3–21.

Boyatzis, R. E. (1973). Affiliation motivation. In D. C. McClelland, & R. S. Steele (Eds.), *Human motivation—a book of readings* (pp. 252–276). Morristown, NJ: General Learning Corporation.

Derryberry, D., & Reed, M. A. (1994). Temperament and attention: Orienting toward and away from positive and negative signals. *Journal of Personality and Social Psychology*, *66*(6), 1128–1139.

Field, M., Mogg, K., & Bradley, B. P. (2004). Eye movements to smoking-related cues: Effects of nicotine deprivation. *Psychopharmacology (Berl)*, *173*(1–2), 116–123.

Hess, U., Blairy, S., & Kleck, R. E. (2000). The influence of facial emotion displays, gender, and ethnicity on judgments of dominance and affiliation. *Journal of Nonverbal Behavior*, *24,* 265–283.

Kiesler, D. J. (1983). The 1982 interpersonal circle: A taxonomy for complementarity in human transactions. *Psychological Review*, *90,* 185–214.

Klinger, E. (1967). Modeling effects on achievement imagery. *Journal of Personality and Social Psychology*, *7,* 49–62.

Knutson, B. (1996). Facial expressions of emotion influence interpersonal trait inferences. *Journal of Nonverbal Behavior*, *20,* 165–182.

Koestner, R., & McClelland, D. C. (1992). The affiliation motive. In C. P. Smith (Ed.), *Motivation and personality: Handbook of thematic content analysis* (pp. 205–210). New York: Cambridge University Press.

Koster, E. H., Crombez, G., Verschuere, B., & De Houwer, J. (2004). Selective attention to threat in the dot probe paradigm: Differentiating vigilance and difficulty to disengage. *Behaviour Research and Therapy*, *42*(10), 1183–1192.

MacLeod, C., Mathews, A., & Tata, P. (1986). Attentional bias in emotional disorders. *Journal of Abnormal Psychology*, *95,* 15–20.

Matsumoto, D., & Ekman, P. (1988). *Japanese and Caucasian facial expressions of emotion (JACFEE) and neutral faces (JACNeuF) [Slides]*. San Francisco: Author.

Mazurski, E. J., Bond, N. W., Siddle, D. A., & Lovibond, P. F. (1996). Conditioning with facial expressions of emotion: Effects of CS sex and age. *Psychophysiology*, *33*(4), 416–425.

McAdams, D. P. (1992). The intimacy motive. In C. P. Smith (Ed.), *Motivation and personality: Handbook of thematic content analysis* (pp. 224–228). New York: Cambridge University Press.

McClelland, D. C. (1980). Motive dispositions. The merits of operant and respondent measures. In L. Wheeler (Ed.), *Review of personality and social psychology* (Vol. 1, pp. 10–41). Beverly Hills, CA: Sage.

McClelland, D. C. (1987). *Human motivation*. New York: Cambridge University Press.

McClelland, D. C., Koestner, R., & Weinberger, J. (1989). How do self-attributed and implicit motives differ? *Psychological Review*, *96,* 690–702.

McClelland, D. C., & Liberman, A. M. (1949). The effect of need for achievement on recognition of need-related words. *Journal of Personality*, *18,* 236–251.

Mogg, K., & Bradley, B. P. (1999). Selective attention and anxiety: A cognitive-motivational perspective. In T. Dalgleish & M. Power (Eds.), *Handbook of cognition and emotion* (pp. 145–170). Chichester: Wiley.

Mogg, K., & Bradley, B. P. (1999). Some methodological issues in assessing attentional biases for threatening faces in anxiety: A replication study using a modified version of the probe detection task. *Behaviour Research and Therapy*, *37,* 595–604.

Pang, J. S., & Schultheiss, O. C. (2005). Assessing implicit motives in U.S. college students: Effects of picture type and position, gender and ethnicity, and cross-cultural comparisons. *Journal of Personality Assessment*, *85*(3), 280–294.

Schultheiss, O. C. (in press). Implicit motives. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research (3rd ed.)*. New York: Guilford.

Schultheiss, O. C., Pang, J. S., Torges, C. M., Wirth, M. M., & Treynor, W. (2005). Perceived facial expressions of emotion as motivational incentives: Evidence from a differential implicit learning paradigm. *Emotion*, *5*(1), 41–54.

Smith, C. P. (Ed.). (1992). *Motivation and personality: Handbook of thematic content analysis*. New York: Cambridge University Press.

Smuts, B. B. (1985). *Sex and friendship in baboons*. New York: De Gruyter.

Spangler, W. D. (1992). Validity of questionnaire and TAT measures of need for achievement: Two meta-analyses. *Psychological Bulletin*, *112,* 140–154.

Veroff, J., & Veroff, J. B. (1972). Reconsideration of a measure of power motivation. *Psychological Bulletin*, *78,* 279–291.

Williams, J. M. G., Mathews, A., & MacLeod, C. (1996). The emotional Stroop task and psychopathology. *Psychological Bulletin*, *120,* 3–24.

Wilson, E., & MacLeod, C. (2003). Contrasting two accounts of anxiety-linked attentional bias: Selective attention to varying levels of stimulus threat intensity. *Journal of Abnormal Psychology*, *112*(2), 212–218.

Winter, D. G. (1973). *The power motive*. New York: Free Press.

Winter, D. G. (1994). *Manual for scoring motive imagery in running text*, (4 ed.). Department of Psychology, University of Michigan, Ann Arbor: Unpublished manuscript.