Affective Divergence: Automatic Responses to Others' Emotions Depend on Group Membership

Max Weisbuch and Nalini Ambady
Tufts University

Extant research suggests that targets' emotion expressions automatically evoke similar affect in perceivers. The authors hypothesized that the automatic impact of emotion expressions depends on group membership. In Experiments 1 and 2, an affective priming paradigm was used to measure immediate and preconscious affective responses to same-race or other-race emotion expressions. In Experiment 3, spontaneous vocal affect was measured as participants described the emotions of an ingroup or outgroup sports team fan. In these experiments, immediate and spontaneous affective responses depended on whether the emotional target was ingroup or outgroup. *Positive* responses to fear expressions and *negative* responses to joy expressions were observed in outgroup perceivers, relative to ingroup perceivers. In Experiments 4 and 5, discrete emotional responses were examined. In a lexical decision task (Experiment 4), facial expressions of joy elicited fear in outgroup perceivers, relative to ingroup perceivers. In contrast, facial expressions of fear elicited less fear in outgroup than in ingroup perceivers. In Experiment 5, felt dominance mediated emotional responses to ingroup and outgroup vocal emotion. These data support a signal-value model in which emotion expressions signal environmental conditions.

Keywords: affective priming, nonverbal behavior, automaticity, emotion expression, emotion recognition

Others' emotions influence our own. Exposure to people who feel good tends to make us feel good, and exposure to people who feel bad tends to make us feel bad (Hatfield, Cacioppo, & Rapson, 1994). These effects are thought to be powered by an affect system that responds *automatically* to others' emotions (Buck, 1984; Dimberg, 1997; Öhman, 2002; Russell, Bachorowski, & Fernández-Dols, 2003). Exposure to emotional facial expressions can generate immediate and unintentional congruent affective responses (e.g., Dimberg, Thunberg, & Elmehed, 2000; Murphy & Zajonc, 1993; Ravaja, Kallinen, Saari, & Keltikangas-Jarvinen, 2004; Stapel, Koomen, & Ruys, 2002). Indeed, even subliminal emotional expressions, particularly those of fear and happiness, generate reliable subcortical responses (e.g., Hariri, Tessitore, Mattay, Fera, & Weinberger, 2002; Liddell et al., 2005; Öhman, 2002; Whalen et al., 1998). Finally, listening to a happy or sad voice can evoke congruent affect in listeners, even when listeners are cognitively busy and even though listeners are unaware of these effects (e.g., Neumann & Strack, 2000). In short, affective responses to others' emotions appear to be unintentional and efficient, and occur without awareness.

Max Weisbuch and Nalini Ambady, Department of Psychology, Tufts University.

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Correspondence concerning this article should be addressed to Max Weisbuch, Department of Psychology, Tufts University, Medford, MA 02155. E-mail: max.weisbuch@tufts.edu

In much of the work examining automatic and/or neural responses to emotional expressions, factors that might be important moderators of responses in the natural world are tightly controlled. For example, group memberships of emotion-expressing targets have generally been held constant (e.g., Dimberg et al., 2000; Murphy & Zajonc, 1993) or have been eliminated (e.g., Neumann & Strack, 2000). However, it is well established that some group memberships, such as race, gender, and age, can, like emotion, be processed preconsciously and can activate automatic affective responses (Devine, Plant, Amodio, Harmon-Jones, & Vance, 2002; Dovidio, Kawakami, Johnson, Johnson, & Howard, 1997; Fazio, Jackson, Dunton, & Williams, 1995). If group memberships and emotional states can both be processed preconsciously, then it is also possible that the two variables interact to produce unique affective responses. The research described here is a first step in understanding how automatic affective responses are influenced by the interaction between perceptions of group membership and emotion.

The Role of Group Membership in Interpreting Emotion Expressions

Dividing the complex social world into a manageable number of social categories has obvious benefits for individual minds (e.g., Macrae & Bodenhausen, 2000), and attending favorably to the ingroup has obvious benefits for individuals (e.g., Tajfel & Turner, 1986). Indeed, social identity and self-categorization theories (Tajfel, 1978; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987) suggest that group memberships (e.g., race, nationality, sports teams) help to

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define the social world for the individual. In intergroup contexts, people may thus consider themselves as group members first and foremost and see the world through the lens of ingroup–outgroup distinctions. Consistent with these ideas, responses to other people depend crucially on the group memberships of those other people. For example, attributions for another's behavior depend on whether that other person is a member of one's ingroup (with more positive attributions for ingroup members; Pettigrew, 1979). Likewise, self-evaluation may suffer or benefit from the superior performance of another, depending on whether that other person shares one's race or is a fan of the same football team (e.g., Hirt, Zillmann, Erickson, & Kennedy, 1994). The impact of group membership is so basic that even if groups are formed in a way that is completely and obviously arbitrary, ingroup members are evaluated more positively than outgroup members (e.g., Tajfel & Billig, 1974). Consistent with this idea, outgroup members can automatically evoke negative affect (e.g., Fazio et al., 1995).

Group membership also appears to play an important role in the interpretation of emotions. In general, expressions of emotion are better recognized in the faces, bodies, and voices of ingroup members than in the faces, bodies, and voices of outgroup members (Elfenbein & Ambady, 2002). This phenomenon extends from racial, ethnic, and cultural groups to less commonly studied groups, such as cat lovers and basketball players (who are especially good at identifying emotions in cats and basketball players, respectively; Thibault, Bourgeois, & Hess, 2006). The speed with which people are able to identify emotions also appears to be contingent on group membership. For example, although emotion recognition typically occurs faster for happiness than for other (negative) emotions, this finding is reversed when White participants judge Black targets (Hugenberg, 2005). And the interpretation of anger appears to depend on the race and gender of the target—specifically, perceivers are faster and more prone to make anger judgments when the target is a man or is Black than when the target is a woman or is White, at least when perceivers are prejudiced (Hugenberg & Bodenhausen, 2003; Plant, Kling, & Smith, 2004). In summary, there is substantial evidence that emotion interpretation depends crucially on the group membership of the target and of the perceiver (cf. Elfenbein & Ambady, 2002).

The Role of Group Membership in Affective Responses to Emotion Expressions: The Present Research

If group membership can alter the meaning or interpretation of emotion expressions, then it follows that group membership might influence affective responses to those expressions. Indeed, recent research suggests that affective responses to others' *outcomes* depend crucially on the group membership of those others. In one set of studies (Leach, Spears, Branscombe, & Doosje, 2003), for example, Dutch soccer fans expressed pleasure at the misfortunes of rival soccer teams. In similar research, students expressed less negative affect and greater positive affect in response to reading about a negative occurrence when the "victim" was an outgroup member than when the victim was an ingroup member (Gordijn, Wigboldus, & Yzerbyt, 2001). Thus, affective responses to target *outcomes* depended crucially on the group membership of the target, relative to the perceiver.

In the present research, we extended this analysis to affective responses to ingroup and outgroup *emotion expressions*. Specifically, ingroup emotion expressions were expected to elicit convergent automatic affect, consistent with previous research (e.g., Murphy & Zajonc, 1993). However, because outgroup identity (a) interferes with emotion decoding (Elfenbein & Ambady, 2002), (b) automatically activates affect that opposes that activated by ingroup targets (Fazio et al., 1995), and (c) is associated with incongruent affective responses to group outcomes (e.g., Leach et al., 2003), it is likely that outgroup emotion expressions would elicit muted or even opposing affective responses. The divergence in affective responses to ingroup versus outgroup emotion ("affective divergence") may arise because outgroup emotions are misinterpreted, are evaluated as irrelevant, or are used as a comparison standard for evaluating one's own affect (cf. Ruys, Spears, Gordijn, & de Vries, 2007). More radically, such divergence may be a consequence of different adaptive meaning attached to ingroup versus outgroup emotion expressions.

A Signal-Value Model of Affective Divergence

A number of theoretical accounts suggest that automatic responses to emotion expressions are adaptive (Dimberg, 1997; Öhman, 2002; Russell et al., 2003). According to such theories, emotions communicate something about the environment or the person expressing the emotion—those who effectively and efficiently respond to these emotions are likely to succeed within that environment. This perspective dovetails with approaches that highlight the coevolution of stimulus qualities and perceptual responses to those stimulus qualities (e.g., Gibson, 1979; McArthur & Baron, 1983; Zebrowitz, 2003). For example, when certain stimulus qualities (e.g., a particular color on a snake) signal something important about the stimulus or surrounding environment, perception may be drawn to those stimulus qualities. In other words, stimulus qualities can signal important meaning or "affordances" for the perceiver, and it is those affordances that elicit perceiver responses. According to this "signal-value" perspective, responses to facial expressions should reflect the meaning or function of those expressions for the individual perceiver.

For example, outgroup emotions may signal relative group dominance, leading to divergent affective responses. Indeed, fear is thought to signal low dominance, and happiness is thought to signal high dominance (e.g., Knutson, 1996; Montepare & Dobish, 2003). Thus, *outgroup fear* may implicate the weakness of the outgroup relative to the ingroup and hence signal safety and positive affect for the ingroup and self. *Outgroup happiness* may implicate the strength of the outgroup relative to the ingroup and hence signal danger and negative affect for the ingroup and self. *Ingroup fear and happiness*, however, could directly implicate distress (Marsh, Ambady, & Kleck, 2005) and safety (Knutson, 1996), respectively, for the self vis-à-vis the ingroup.

We tested this signal-value perspective across five experiments. In Experiments 1–3, we examined the degree to which automatic affective responses to emotion expressions diverged on the basis of group membership. Of these, we examined "affective divergence" in the first two experiments within an affective priming paradigm. This paradigm permits examination of unintentional and (under some conditions) preconscious affective responses (e.g., Fazio et al., 1995). In the third experiment, we examined affective divergence within a prosodic affect paradigm. We used this paradigm to examine whether affective divergence occurs spontaneously, with a measure of affect that does not require evaluative processing.

In Experiments 4–5, we examined signal-value hypotheses with regard to responses indicative of *particular* emotions and cognitions.

Specifically, we used a lexical decision task (LDT; Neely, 1977) in Experiment 4 to examine emotion-specific responses (especially fear) to facial expressions of emotion. In Experiment 5, we examined the extent to which self-reported emotion and dominance responded to vocal affect. We used this self-report paradigm to examine the extension of affective divergence to "felt" emotions and to examine a mediator (dominance) of affective divergence.

Experiments 1–3: Hypotheses

In the first three experiments, we tested the hypothesis that *affective responses to emotion expressions would depend on group membership*. Moreover, given that both emotion expressions and group identity can elicit automatic affective responses, we expected the hypothesized pattern to be evident in automatic affective responses. Thus, we expected group membership to interact with emotion expression in producing automatic affective responses. Our specific hypotheses were as follows:

> *Hypothesis 1:* Fear expressed by an ingroup member should automatically elicit greater negative affect than fear expressed by an outgroup member.
>
> *Hypothesis 2:* Happiness expressed by an ingroup member should automatically elicit greater positive affect than happiness expressed by an outgroup member.
>
> *Hypothesis 3:* The patterns for fear and happiness should occur in opposite directions, producing an interaction.

The alternative, of course, is that group membership would not moderate affective responses to others' emotion and that there would be only a main effect of emotion expression.

In Experiments 1 and 2, we examined these hypotheses with an affective priming paradigm (Fazio, Sanbonmatsu, Powell, & Kardes, 1986). In this paradigm, primes precede positive or negative targets, and response times to those targets are measured. Perceivers' affective responses to primes can be derived from the extent to which the primes alter reaction times to the targets. For example, a happy face prime would be expected to speed reaction times to positive targets relative to negative targets. In this case, the happy face would be said to have elicited a relatively positive response from the perceiver. Primes are presented immediately prior to targets, limiting or preventing perceivers from consciously correcting their responses. This type of paradigm has been used in numerous studies over the last several decades (see, e.g., Fazio, 2001), and perceiver "scores" derived from this paradigm can be used to predict later behaviors consistent with affective responses (e.g., Fazio et al., 1995)—thus, the measure has sound predictive validity.

The primes that we used in the present study were Black and White faces with happy, neutral, or fearful expressions. We chose race as a visible indicator of group membership because automatic negative affective responses to outgroups are typically observed with other-race targets (e.g., Fazio et al., 1995). Thus, race may serve as an especially effective visible proxy for group membership, at least in the absence of other visible coalitional cues (Cosmides, Tooby, & Kurzban, 2003).

We chose happiness and fear as positive and negative emotions, respectively, for several reasons. Of the few most commonly cited as "basic" emotions (e.g., Ekman, 1992), happiness is the only unambiguously positive emotion. Of the four or so unambiguously negative emotions (fear, anger, disgust, sadness), anger was not considered because it is implicated in stereotypes about Black people (Devine, 1989). Of the remaining three emotions, fear most clearly implicates subcortical pathways (e.g., LeDoux, 1996) and has been used most commonly in examining affective responses to emotion expressions (e.g., Whalen et al., 1998).

Experiment 1

Method

Design and Overview

A 2 (expresser race: White, Black) × 3 (facial expression: fearful, neutral, happy) completely within-subjects factorial design was used. Participants completed an affective priming task in which facial expression photographs were primes, and positive/negative images were targets. On each of 48 trials, participants were asked to indicate the valence of the target image as quickly as possible. Each target image was preceded (for 315 ms) by a photograph of a White or Black person with a fearful, happy, or neutral facial expression. Reaction time to target judgments (good–bad) was measured.

Participants

Thirty-five Caucasian (22 women, 13 men) undergraduate students participated in exchange for partial course credit. The experiment was run in groups of 2–6, and each participant was assigned an individual cubicle.

Materials

Facial expression photographs. Emotional expressions posed by Black and White men and women were culled from the MacBrain stimulus set (Tottenham, Borscheid, Ellertsen, Marcus, & Nelson, 2002), the Hess (Beaupre & Hess, 2005) collection, the Japanese and Caucasian Facial Expressions of Emotion (Matsumoto & Ekman, 1988) collection, and our own collection. For each race, four male and four female photographs were selected for each facial expression (neutral, fear, joy). To ensure that any findings observed in the present research were due to group-level phenomena rather than to experimental artifact, photographs that (a) appeared to clearly convey the emotion and (b) were of approximately equal intensity between races were selected.

To confirm that Black and White emotional expressions were equally decodeable, a pretest was conducted with 12 undergraduate students (6 White women, 6 Asian women). In this pretest, all 48 photographs were presented individually on a computer monitor with the use of MediaLab™ software (Jarvis, 2006). Photographs were presented in a different random order for each participant. For each photograph, participants were asked to select the emotion expressed from seven choices (neutral, anger, fear, joy, sadness, surprise, disgust).

Accuracy scores were computed for each photograph and averaged across category (e.g., "White fear"). *T* tests confirmed that average accuracy scores in each category were significantly greater than chance (all $ps < .0001$)—in fact, in all three categories, accuracy was quite high. Joy on both White and Black faces was correctly identified 100% of the time. Fear was correctly identified at approximately

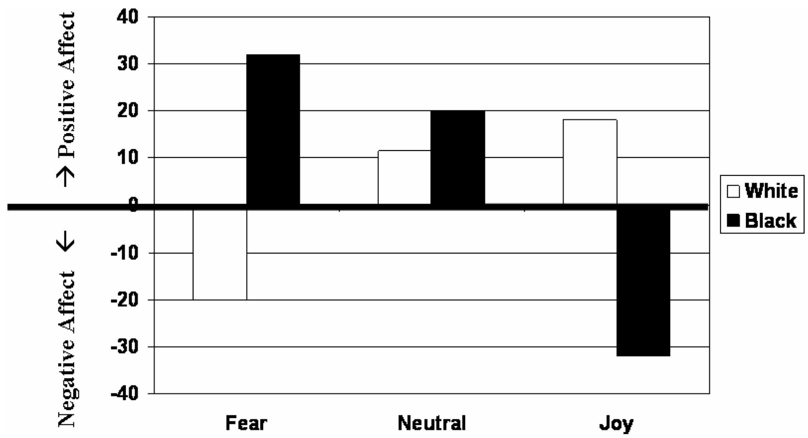

Figure 1. Automatically activated affect as a function of emotion expressed and race of prime in Experiment 1. Affect was measured as differences in reaction time to positive and negative targets. Positive numbers indicate that participants were faster to respond to positive (vs. negative) target images; hence, positive numbers index positive affect in the affective priming paradigm.

equal rates when the expresser was White (77.5%) and when the expresser was Black (75%), $t(11) = 0.8$, $p > .4$, $d = 0.08$. Surprisingly, a lack of emotion ("neutral") was marginally more accurately identified when the expresser was Black (93.75%) than when the expresser was White (83.75%), $t(11) = 1.81$, $p = .1$, $d = 0.71$. Thus, fear and joy facial expressions were accurately decoded across the two races.

Positive and negative target images. Target images were selected on the basis of three requirements. Images selected were those that (a) were clearly positive or negative, (b) did not include violent or sexual material, and (c) did not include emotional facial expressions. The majority of the images were selected from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 1999). The positive images selected from the IAPS included flowers, kittens, bunnies, dolphins, nature scenes, and babies. The positive IAPS images were supplemented by public domain Internet images depicting birds, desserts, and nature scenes. The negative images selected from the IAPS included cockroaches, spiders, snakes, car accidents, and a scar. The negative IAPS images were supplemented by public domain Internet images depicting scorpions, demons, bats, and a skull and crossbones.

Procedure

After completing informed consent, participants followed instructions that appeared on a computer monitor. As part of these instructions, participants were told that the experiment was about social concentration, and, as such, they would be expected to ignore certain images. For each trial, participants were asked to focus their attention on a row of asterisks that would appear on the center of the monitor for 1 s. Subsequently, an image of one of the pretested facial images was chosen at random (without replacement) to appear for 315 ms immediately prior to an IAPS picture (for similar procedures, see Fazio et al., 1986; Lowery, Hardin, & Sinclair, 2001). Participants were asked to ignore the facial image but to judge whether the second (target) image was "good" or "bad" (to be indicated with the *a* and *l* keys, counterbalanced). Reaction time to each target image was recorded via DirectRT™ software. In total, each prime category (e.g., White fearful) was paired four times with positive images and four times with negative images.

Results

Data Reduction

Incorrect responses and outliers. We eliminated (4%) reaction times on trials with incorrect responses (e.g., responding "good" when the target was negative). Additionally, we eliminated reaction times greater than 3 standard deviations above the mean. Further transformation of these data (i.e., a log transformation) did not alter the pattern of findings described here, and as such, the findings reported here are of the raw reaction time scores rather than log-transformed scores. Sphericity was not violated in any of the experiments reported herein, as tested via Mauchly's test of sphericity (Mauchly, 1940).

Calculation of cell means. For each participant, we calculated separately average reaction times to fearful, happy, and neutral images for White and Black expressions. These averages were also calculated separately for positive and negative images; thus, for each participant, we calculated a total of 12 means. Following previous research (e.g., Lowery et al., 2001; Sinclair, Lowery, Hardin, & Colangelo, 2005), we substracted average response times to positive targets from average response times to negative targets for each prime category (e.g., "White fear"). We used these scores to index automatically activated affect generated by each prime category—thus, positive scores should be indicative of relatively positive affect and negative scores indicative of relatively negative affect (cf. Lowery et al., 2001; Sinclair et al., 2005).

Affective Responses to Fear and Joy Expressions as a Function of Group Membership

We submitted affect scores to a 2 (race) × 3 (prime emotion) repeated measures analysis of variance (ANOVA). Although there were no significant main effects (Fs < 1), there was a significant interaction, $F(2, 68) = 3.08$, $p = .05$. Consistent with hypotheses, the affective influence of the emotion-expression prime depended on the group membership (race) of the emotion expresser (see Figure 1).

We had hypothesized opposing effects of fearful and happy expressions: Fear expressed by an ingroup (White) member should elicit greater *negative* affect than fear expressed by an outgroup (Black) member. In contrast, happiness expressed by an ingroup member should elicit greater *positive* affect than happiness elicited by an outgroup member. Finally, a neutral expression on the face of an ingroup member should elicit more positive affect than a neutral expression on the face of an outgroup member (e.g., Fazio et al., 1995). We conducted focused contrasts, consistent with the hypotheses, to examine the effect of group membership within each emotion. Within each emotion, we weighted ingroup responses (i.e., responses to White emotions) with the opposite sign of outgroup responses ($+1$ vs. -1).

Affective responses to ingroup and outgroup fear. Consistent with predictions, ingroup-fearful affect scores were significantly more negative than outgroup-fearful affect scores, $t(34) = -1.69$, $p = .049$, $r = .28$.

Affective responses to ingroup and outgroup happiness. Consistent with predictions, ingroup-happy affect scores were significantly more positive than outgroup-happy affect scores, $t(34) = 1.62$, $p = .05$, $r = .27$.

Affective responses to ingroup and outgroup neutral expressions. Inconsistent with previous research, White-neutral affect scores were not significantly different from Black-neutral affect scores, $t(34) = 0.40$, $p = .35$, $r = .07$.

Discussion

Previous research has shown that emotion expressions automatically elicit congruent (similar) affect in perceivers. Here, exposure to emotional expressions led to more congruent affect when the target was an ingroup member than when the target was an outgroup member. Specifically, affective responses to ingroup fear were more negative than responses to outgroup fear; affective responses to ingroup happiness were more positive than responses to outgroup happiness.

Although this study provided preliminary evidence that group membership can alter the affective influence of facial expressions, several factors limit the conclusions that can be drawn. First, although both White and Black prime images were used, only White participants were included in this study. It is possible that the Experiment 1 findings have much more to do with the race "Black" than with group membership per se. Many negative stereotypes are associated with "Black," and these stereotypes may be activated for White and Black people alike (Johnson, Trawalter, & Dovidio, 2000; Plous & Williams, 1995). It therefore seemed possible that the observed effects had more to do with negative associations with Black people than with an intergroup phenomenon. To address this limitation, both White and Black participants took part in Experiment 2.

A second limitation is that it is possible that the affective responses were not truly automatic. That is, the prime photograph was presented for 315 ms, which is clearly long enough for perceivers to consciously recognize the face and emotional expression of the poser. Perhaps on recognizing these faces, participants consciously altered their response patterns in a manner that led to the reaction time patterns observed. This seems unlikely—the primes were presented immediately prior to the target, and average response times to the target were on the scale of 2/3 of a second. Previous research (e.g., Fazio et al., 1986) suggests that 315-ms prime exposure time is too brief for perceivers to control their responses. Second, it seems unlikely that participants would control their responses in a manner leading to the rather complex pattern that we observed. Instead, it seems more likely that they would have simply tried to appear nonprejudiced by lengthening their responses to Black–negative pairings.

Nonetheless, we felt that it was important to show that the hypothesized effects occurred preconsciously. Much of the evidence about responses to fearful expressions comes from research on neural processing in which the fearful faces are presented for briefer periods of time (much less than 100 ms) and are masked. Many of these findings suggest that affective responses to fearful facial expressions are preconscious (e.g., Whalen et al., 1998). It seemed important to know whether ingroup–outgroup moderation of such effects also occurs preconsciously. Thus, in Experiment 2, emotional expressions were masked and presented for only 12 ms (too fast for conscious recognition; see below for recognition tests).

Experiment 2

Method

Design and Overview

White and Black participants completed an affective priming task nearly identical to that in Experiment 1. Primes in Experiment 2 were subliminal, however. Thus, Experiment 2 was a 2 (participant race: White, Black) × 2 (expresser race: White, Black) × 3 (expression: fear, neutral, joy) factorial design, with repeated measures on the latter two factors.

Participants

Thirty-three (15 White, 18 Black) introduction to psychology students participated in exchange for partial course credit. The experiment was run in groups of 2–6, and each participant was assigned an individual cubicle.

Recognition Pretest

Fourteen undergraduate students were asked to guess the emotion and race of faces that would "flash" on a computer monitor. For these pretest participants, each trial would proceed as follows: A face would be flashed for 12 ms, followed by a distorted version of one of the primes (i.e., the mask), and then two questions. One question asked about the emotion on the face (happy, afraid, or neutral), the other question asked about the race of the face (White, Black). Participants achieved 34.2% accuracy on the emotion, which was not significantly different from chance (33%), $t(13) = 1.05$, $p = .3$. They achieved only 50.7% accuracy on race, which also was not significantly different from chance (50%), $t(13) = 0.44$, $p = .66$.

Procedure

The materials and procedure were identical to those used in Experiment 1 except that the prime photographs were presented for only 12 ms and were masked by a distorted version of one of the primes. The mask appeared as a combination of curved and straight lines—it did not look like a face or facial expression.

Results

Data Reduction

Incorrect responses and outliers. As in Experiment 1, we eliminated reaction times on trials in which incorrect responses were given (3.5%). Additionally, we eliminated reaction times greater than 3 standard deviations above the mean (2%). As in Experiment 1, further transformation of these data (i.e., a log transformation) did not alter the pattern of findings described here, so the findings reported below are of the raw reaction time scores rather than log-transformed scores.

Calculation of cell means. We calculated scores for each participant in the same manner as those of Study 1, and we used them to index automatically activated affect generated by each prime category—thus, positive scores indicated relatively positive affect, and negative scores indicated relatively negative affect.

The Role of Group Membership in Automatic Affective Responses to Emotion Expressions

We submitted affect scores to a 2 (perceiver race) × 2 (prime race) × 3 (prime emotion) mixed model ANOVA. Although there were no significant main effects of perceiver race, prime race, or prime emotion (Fs $<$ 1), nor any significant two-way interactions (Fs $<$ 1), the expected three-way interaction was significant, $F(2, 62) = 3.12$, $p = .05$. The overall pattern suggests that the affective influence of the emotion expression depended on the interaction between the race of the poser and the perceiver (see Figure 2).

As in Experiment 1, the interaction was decomposed in a manner that followed our hypothesis. Specifically, we hypothesized opposing effects of fearful and happy expressions: Fear expressed by an ingroup member should elicit greater negative affect than fear expressed by an outgroup member. In contrast, happiness expressed by an ingroup member should elicit greater positive affect than happiness elicited by an outgroup member. Finally, a neutral expression on the face of an ingroup member should elicit more positive affect than a neutral expression on the face of an outgroup member (e.g., Fazio et al., 1995). Thus, we conducted focused contrasts to examine the effect of group membership within each emotion.

We assigned contrast weights of +1 to ingroup emotion expressions. Thus, White perceivers' responses to White emotion and Black perceivers' responses to Black emotion received contrast weights of +1. We assigned contrast weights of −1 to outgroup emotion expressions. Thus, White perceivers' responses to Black emotion and Black perceivers' responses to White emotion received contrast weights of −1.

Affective responses to ingroup and outgroup fear. Consistent with predictions, ingroup-fearful affect scores were significantly more negative than outgroup-fearful affect scores, $t(62) = 1.66$, $p = .05$, $r = .21$.

Affective responses to ingroup and outgroup happiness. Consistent with predictions, ingroup-happy affect scores were significantly more positive than outgroup-happy affect scores, $t(62) = 1.62$, $p = .055$, $r = .20$.

Affective responses to ingroup and outgroup neutral expressions. Inconsistent with previous research, White-neutral affect scores were not significantly different from Black-neutral affect scores, $t(62) = 1.11$, $p = .13$, $r = .14$.

Alternative hypotheses. The patterns illustrated in Figure 2 appear similar for White and Black perceivers in the sense that both responded to ingroup emotions with congruent affect and to outgroup emotions with incongruent affect. However, it is possible that the observed effects were different for White and Black perceivers. To ensure that White and Black perceivers did not differ in their responses to ingroup versus outgroup expressions, we conducted a new ANOVA. This ANOVA included perceiver race (White, Black) and emotion (Happy, Fearful) as between-subjects and within-subjects factors, respectively. We changed the third factor, however, from target race (White, Black) to target group (ingroup, outgroup). In this ANOVA, our hypotheses called for a two-way Target Group × Emotion interaction. However, if our hypotheses held for only White or Black perceivers, there should be a three-way interaction.

The two-way interaction was significant, $F(1, 31) = 6.05$, $p = .02$, $r = .40$. The three-way interaction, however, did not near significance, $F(1, 31) = 0.42$, $p = .52$, $r = .11$. Although it is not possible to prove the null hypothesis, it is worth noting that the effect size of the "alternative" three-way interaction is roughly one quarter the size of the hypothesized two-way interaction. Thus, it seems reasonable to

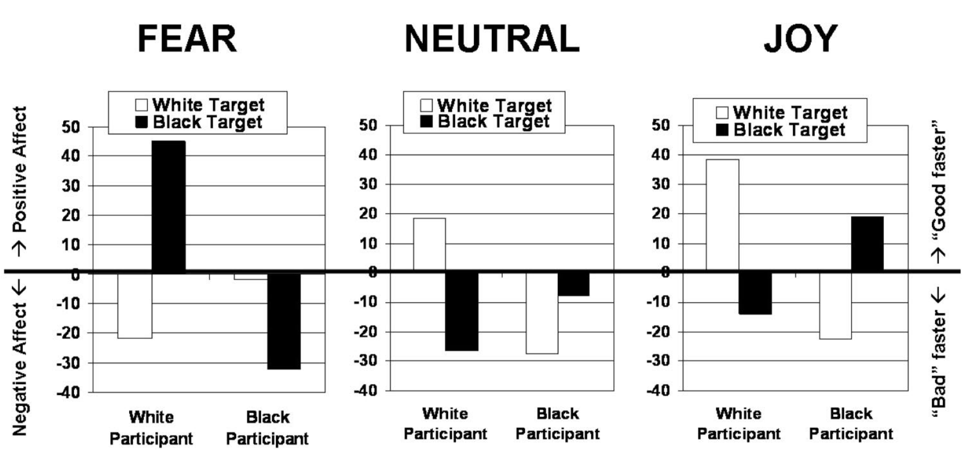

Figure 2. Automatically activated affect as a function of emotion expressed, race of target, and race of perceiver in Experiment 2. Affect was measured as differences in reaction time to positive and negative targets.

conclude that there exist negligible differences, if any, between White and Black perceivers. In other words, both Black and White perceivers exhibited a pattern of greater affective congruency with ingroup than with outgroup emotion expressers.

In summary, consistent with prior research (e.g., Murphy & Zajonc, 1993), emotional facial expressions preconsciously activated congruent affect in ingroup (same race) perceivers. Departing from traditional findings, however, emotional facial expressions did not preconsciously activate congruent affect in outgroup (different race) perceivers.

Discussion

In Experiment 2, we replicated the findings of Experiment 1 and showed that the hypothesized effects held across races, and even when the eliciting stimuli were presented preconsciously. Together, Experiments 1 and 2 suggest that emotional expressions elicit automatic affective responses that depend on whether the target is a member of the perceiver's ingroup. Of course, a process may be automatic in some ways but not in others (Bargh, 1994). Thus, affective divergence effects may be both unintentional and preconscious yet require a conscious goal, such as the goal to evaluate target images. We conducted a third experiment to test whether affective divergence effects are spontaneous, occurring independent of an evaluative processing goal.

Experiment 3

Spontaneous evaluations tend to be reflected in nonverbal behaviors (e.g., Dovidio et al., 1997). Of the nonverbal channels (face, body, voice), the vocal (prosodic) channel is thought to be most spontaneous and difficult to consciously control (e.g., Rosenthal & DePaulo, 1979). Because our hypothesis was that affective responses to ingroup and outgroup emotion expressions are relatively spontaneous and uncontrolled, we expected such responses to be revealed via vocal prosody. Specifically, we expected the automatic affect pattern observed in Experiments 1 and 2 to be reflected in prosodic speech behavior (i.e., vocal tone).

An additional benefit of using a prosodic paradigm is that it can be used to examine another component of automaticity. Specifically, many measures of "automatically activated" affect actually require a conscious intention to evaluate (see, e.g., Bargh, Chaiken, Raymond, & Hymes, 1996). Participants' conscious goal during such tasks is to evaluate (as "good" or "bad") a target image or word. To evaluate targets but not primes would thus require participants to "turn off" the processing goal (for the prime) and then turn it back on (for the target) in the matter of a third of a second—a feat often thought to be impossible (see Bargh et al., 1996; see also Neely, 1977). Hence, it is possible that affective divergence effects are contingent on an evaluative goal. Conversely, because many stimuli automatically activate goal-independent affect (e.g., Bargh et al., 1996), it is also possible that affective divergence effects do not require an evaluative goal. Thus, by using a "read aloud" task in Experiment 3 (removing the evaluative goal), we were able to examine the extent to which affective divergence effects occurred in the mere presence of others' emotions.

We also examined in Experiment 3 the extent to which affective divergence can be extended to (a) nonracial groups and (b) verbal emotion descriptions. By examining verbal descriptions of emotion, it was possible to control for group-level differences in accuracy of emotion decoding. As noted earlier in the introduction, muted affective responses to the emotions of outgroup members may be a result of inaccurate decoding. Verbal descriptions are much less ambiguous than facial expressions; thus, any group differences in affective responses to verbal descriptions would have to be attributable to a process beyond decoding accuracy.

We hypothesized that exposure to others' emotions would elicit congruent affect to the extent that target and perceiver were members of the same social group. We expected this pattern even in the absence of explicit, intentional evaluation and even in response to verbal descriptions of emotion.

Method

Design and Overview

Participants' voices were recorded while they read a scenario aloud. The scenario described "Tom," who was either a New York Yankees fan or a Boston Red Sox fan (in the northeastern United States, the Yankees and the Red Sox are hated rivals). The scenario described Tom as either happy or afraid. After reading the scenario, participants indicated loyalties to the two baseball teams (Yankees, Red Sox).

Subsequently, Tom's group membership (Red Sox vs. Yankees fan) was edited out of the voice recordings. Independent judges then evaluated affect in each reader's voice. Because the vocal channel is arguably the least controllable nonverbal channel (Ekman & Friesen, 1969; Rosenthal & DePaulo, 1979), this channel was expected to reveal affect that was automatically activated by the group membership and emotions of Tom. Specifically, to the extent that participants were Yankees fans (and not Red Sox fans), their voices should reveal more positive affect when describing a happy Yankees fan than when describing a happy Red Sox fan. Likewise, the voices of Yankees fans should reveal more negative affect when describing a fearful Yankees fan than when describing a fearful Red Sox fan. Opposite patterns were expected, of course, when participants were Red Sox fans. Thus, Experiment 3 was a 2 (expresser team: Yankees, Red Sox) $\times$ 2 (expresser emotion: fear, joy) between-subjects factorial design with a continuous moderator (participants' team loyalties).

Participants

Seventy-three male volunteers participated in exchange for candy. Of these 58 of these volunteers were recruited at a large train station in the northeast, and 15 were recruited at the campus eatery of a private university in the northeast. Participants' voices were recorded in public, either at the train station or at the campus eatery.

Materials

Written scenarios. Four scenarios, consistent with a 2 (team) $\times$ 2 (emotion) design, were created. The scenarios included several sentences about the emotional state of the target and one sentence describing the favored baseball team of the target. To reduce demand characteristics, the favored team of the target was embedded with other information. The scenario for "happy" was as follows:

> Tom was a pretty typical guy. He worked a nine-to-five job and got along pretty well with his coworkers. He was an avid sports fan and

> liked to watch his favorite team, the New York Yankees (Boston Red Sox). Tom enjoyed a moderately active social life and was close to several family members. Although Tom was a pretty typical guy, today was not going to be a typical day. Tom was really happy because he was going to see his brother for the first time in almost a year. In fact, over the last week or two, Tom had been in a pretty good mood in anticipation of his brother's arrival. Tom always seemed to have a smile on his face around his brother, and today he was really excited to finally see him. But before his brother arrived, Tom had to do a few things—he had to pick up some groceries, arrange dinner reservations, and clean his apartment.

The scenario for "afraid" was:

> Tom was a pretty typical guy. He worked a nine-to-five job and got along pretty well with his coworkers. He was an avid sports fan and liked to watch his favorite team, the New York Yankees (Boston Red Sox). Tom enjoyed a moderately active social life and was close to several family members. Although Tom was a pretty typical guy, today was not going to be a typical day. Tom was really scared because he was going to find out if he really had cancer. In fact, Tom had been in a pretty anxious mood ever since the cancer-screening test last week. All week, Tom had a pretty frightened look on his face, and he knew that he would look quite nervous when he saw the doctor. But before he went to the doctor, Tom had do a few things—he had to pick up some groceries, arrange dinner reservations, and clean his apartment.

Participants were assigned to read one of the four scenarios on a randomly predetermined basis.

Recording and editing of voices. An Olympus VN-960PC® digital voice recorder was used. Each recorded voice was downloaded to a computer and edited with Adobe Premiere® software. The first four sentences were edited out of each clip such that the edited clips began with the sentence, "Although Tom was a pretty typical guy . . . "

Team allegiance questionnaire. Participants responded to two questions to indicate their allegiance to the Red Sox and Yankees. The Red Sox–Yankees rivalry is quite strong in New England, especially in light of the recent successes of both teams—we capitalized on this rivalry in measuring team allegiance. Participants were asked to indicate, on a scale ranging from -2 (*strongly disagree*) to $+2$ (*strongly agree*), the extent to which they agreed with the statements, "I love the Red Sox" and "I love the Yankees." These scores were negatively correlated ($r = -.38$, $p < .05$). Subsequently, "Yankees" love scores were subtracted from "Red Sox" love scores. Positive numbers indicated greater allegiance to the Red Sox than to the Yankees, whereas negative numbers indicated greater allegiance to the Yankees than to the Red Sox. These scores are referred to as *team allegiance scores*.

Procedure

Male participants were approached (either at the train station or at the campus eatery) by a female research assistant who asked whether he would participate in a short experiment in exchange for candy. Those who agreed to participate (the majority did) were given an informed consent sheet and were subsequently asked to read the randomly assigned scenario into the digital voice recorder. After reading the scenario, participants completed the team allegiance questionnaire. Participants were then debriefed, thanked, given candy, and dismissed.

Compilation of Vocal Affect Scores

Two groups of independent judges rated the edited voice clips on positivity/negativity. They were asked to indicate "how positive or negative the person in the clip sounded." These ratings were made on a scale ranging from 1 (*extremely negative*) to 6 (*extremely positive*). Twelve undergraduate psychology student judges rated only the "fearful" clips ($\alpha = .76$), and 11 student judges rated only the "happy" clips ($\alpha = .88$). This strategy was used to ensure that the judges were rating the vocal qualities of the participants rather than the content of the scenarios. Ratings of the "happy" judges were averaged as were ratings of the "fearful" judges.

Results

Manipulation Check

To ensure that the measure of team allegiance was not influenced by the manipulations of target emotion or target team, we submitted team allegiance scores to a 2 (target emotion: happy, fearful) $\times$ 2 (target team: Red Sox, Yankees) ANOVA. Only nonsignificant effects emerged for target emotion, target team and the Team $\times$ Emotion interaction (ps = .54, .07, and .98, respectively).[1] Because team allegiance scores constituted a continuous predictor variable, we used multiple regression analyses to analyze the Experiment 3 data.

Does Vocal Affect Differ as a Function of Target Group and Emotion?

We hypothesized that the vocal affect of the reader would be congruent to that of the target, *but only to the extent that reader and target shared team allegiance*. To test this hypothesis, we regressed vocal affect scores onto a dummy coded "team" variable (0 = Red Sox Tom), a dummy coded "emotion" variable (0 = afraid Tom), centered team allegiance scores, and all interactions among these variables. Two-way interactions were entered and interpreted at Step 2, followed by the three-way interaction at Step 3 (Aiken & West, 1991). This analysis revealed only a significant three-way interaction ($\beta = -.55$, $p = .006$). As revealed in Figure 3, the overall pattern was strikingly similar to the pattern observed in Experiments 1 and 2.

As revealed through separate examinations of the fear and happy scenarios, congruent affective responses became more likely when reader and target shared group membership (team allegiance). Among those reading about fearful targets, increasingly negative affective responses occurred to the extent that target and perceiver shared team allegiance, a pattern that resulted in a significant two-way interaction between target team allegiance and perceiver team allegiance ($\beta = -.46$, $p = .03$; Red Sox $\beta = -.35$; Yankees $\beta = .45$). In contrast, among those reading about happy

[1] Although the effect of target team was small (relative to the observed effects) and nonsignificant, we performed the main analyses with both the original team allegiance scores and team allegiance *residual* scores, corrected for the influence of target team. Slope patterns and patterns of significance were identical for the two types of team allegiance scores. The analyses reported in the main text use the original scores.

targets, increasingly positive affective responses occurred to the extent that target and perceiver shared team allegiance, a pattern that resulted in a significant two-way interaction between target team allegiance and perceiver team allegiance ($\beta = .52$, $p = .04$; Red Sox $\beta = -.11$; Yankees $\beta = .53$).

Discussion

Of the nonverbal channels of communication, vocal prosody is thought by many to be the least consciously controlled (cf. Rosenthal & DePaulo, 1979). Specifically, much of what is revealed through prosody may be revealed without the conscious intention of the speaker. With that in mind, we examined the extent to which vocal affect followed the same pattern as that observed with an affective priming paradigm. The paradigm used in Experiment 3 permitted measurement of affect without requiring an explicit evaluation goal. Yet, consistent with Experiments 1 and 2, affective divergence was observed for verbal descriptions of both fear and happiness. Speakers sounded positive when reading about a happy target and negative when reading about a fearful target, *but only to the extent that speakers and targets were fans of the same team*. Because of the method of measurement, the observed effects may be said to be independent of an evaluative processing goal (cf. Bargh et al., 1996).

The results of Experiment 3 replicated the findings of the first two experiments but (a) with a different type of group; (b) with verbal, rather than facial emotion expressions; and (c) with a different, more subtle method of measuring affect. Finally, because emotions were expressed verbally and unambiguously (via a written scenario), at least one explanation is implausible—readers could not have had a more difficult time interpreting the emotions of outgroup than ingroup members.

Experiment 4

In Experiment 4, we measured specific emotional (rather than diffuse affect) responses to test the idea that group-based emotion expressions serve as signals of danger or threat. To the extent that an emotional expression signals danger, it should elicit fear. That is, fear is thought to facilitate avoidance of danger (e.g., Adolphs et al., 1999; LeDoux, 1995, 1996; Öhman & Mineka, 2001), and fear responses are especially influenced by stimuli that signal the level of environmental danger (e.g., LeDoux, 1995, 1996; Whalen et al., 1998). According to the signal-value model, happiness expressions should signal "safety" for the ingroup but "danger" for the outgroup, whereas fear expressions should signal "danger" for the ingroup but "safety" for the outgroup. Thus, we expected happy expressions to elicit less fear for the ingroup than the outgroup; conversely, we expected fear expressions to elicit more fear for the ingroup than the outgroup.

Immediate, stimulus-driven fear responses may be more functional than immediate happy–sad responses. That is, the functional value of an automatic response to danger is that resource-free or speeded responses may spare one's life or reduce the likelihood of harm (LeDoux, 1995, 1996). The functions of happiness and sadness are less clearly tied to harm avoidance (e.g., Lazarus, 1994) and should be less responsive to facial cues of relative danger. Consequently, we did not expect group membership to influence immediate sad–happy responses to others' emotions.

We also examined the signal-value function of group-based anger. The function of anger may be its propensity to facilitate aggression (or antagonistic behavior; Berkowitz, 1990; Izard, 1993; Moyer, 1976). According to a signal-value model, then, anger is most adaptive when others' emotions signal conflict or another reason to aggress. Angry faces and especially angry *outgroup* faces should signal the sentiment "we have a conflict." Indeed, angry faces automatically elicit anger, at least in some people (Sonnby-Borgstrom, Jonsson, & Svensson, 2003). If the function of anger is to facilitate aggression (cf. Izard, 1993), then an automatic angry response to outgroup anger would be functional, perhaps more so than an automatic angry response to ingroup anger. That is, aggression may be more adaptive for dealing with outgroup than ingroup aggression—ingroup anger or aggression may be better handled in humans via other forms of communication. Thus, we expected angry faces (but not fearful or happy faces) to elicit automatic anger responses.[2]

In summary:

> Happiness expressed by an outgroup member should facilitate fear responses, relative to happiness expressed by an ingroup member.

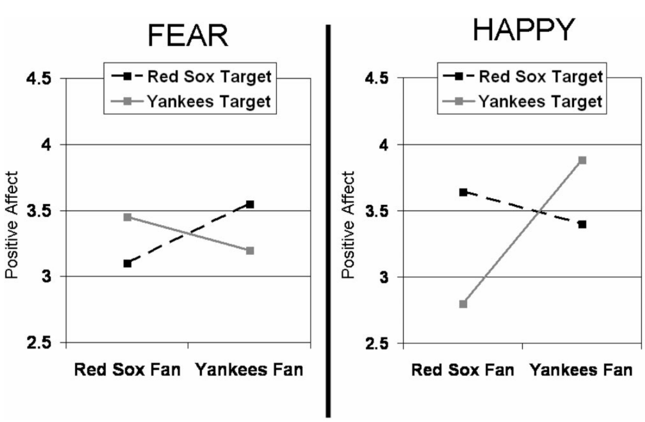

Figure 3. Paraverbal affect as a function of participants' team allegiance, target team allegiance, and target emotion. Red Sox targets are indicated by dotted black lines; Yankees targets are indicated by solid grey lines. Higher numbers on the *y*-axis indicate more positive (vs. negative) affect.

[2] Alternative hypotheses for anger also exist. Most notably, angry expressions may elicit *fear* responses that differ by group membership. Anger from an outgroup member may be especially fear provoking because such anger might be more likely to translate into aggression than ingroup anger. Indeed, increased conciliatory behavior and fear are typical responses when a negotiating foe directs anger toward a perceiver (van Kleef, De Dreu, & Manstead, 2004). However, the opposite is also possible. The anger of an ingroup member may be especially fear provoking—scorn from the ingroup may have greater negative consequences than scorn from the outgroup. Because these two alternatives oppose one another and are speculative, we did not have a clear a priori hypothesis for fear responses to anger. Nonetheless, we did examine the extent to which fear responses to anger differed by group membership.

> Fear expressed by an ingroup member should facilitate fear responses, relative to fear expressed by an outgroup member.
>
> Anger expressed by an outgroup member should facilitate anger responses, relative to anger expressed by an ingroup member.

Method

Overview and Design

The design of Experiment 4 was a 3 (prime expression: joy, fear, anger) × 4 (target emotion: joy, fear, anger, sadness) × 2 (prime race: Black, White) completely within subjects design. The experiment consisted of a series of trials. As in the first two experiments, each trial consisted of brief exposure (315 ms) to an emotional face (the prime) followed by a target. Each target was a series of letters, and the participants' task was to identify whether the target was a word or not. The letters either produced an emotion word (e.g., *angry*) or a control nonword (e.g.,*gryan*)—response speed for each emotion word was assessed relative to the response speed to the paired control words. Emotion-specific reaction times therefore controlled for letter-specific reaction times. Consistent with the conceptual hypotheses listed above, (a) fear responses to outgroup happiness displays should be speeded relative to ingroup happiness displays, (b) fear responses to outgroup fear displays should be slowed relative to ingroup fear displays, and (c) anger responses to outgroup anger displays should be speeded relative to ingroup anger displays. Effects for any other emotions were not expected. The different race-based patterns for emotion response by emotion display should result in a three-way interaction.

Participants and Setting

Fifteen Caucasian (10 women, 5 men) undergraduate students participated in exchange for partial course credit. Each participant was run in an individual cubicle equipped with a computer.

Procedure

The procedure and materials for Experiment 4 were quite similar to that of Experiment 1. After completing informed consent, participants followed instructions that appeared on a computer monitor. As part of these instructions, participants were told that the experiment was about social concentration and, as such, that they would be expected to ignore certain images. For each trial, participants were asked to focus their attention on a row of asterisks that would appear on the center of the monitor for 1 s. Subsequently, an image of one of the pretested facial images was chosen at random (without replacement) to appear for 315 ms immediately prior to a target.[3] Participants were asked to ignore the facial image and judge—as quickly and accurately as possible—whether the target letters were a "word" or "nonword" (to be indicated with the *a* and *l* keys, counterbalanced). For each trial, the target was either one of four emotion words (*fear*, *anger*, *sad*, *happy*), a synonym (e.g., *scared*, *angry*, *misery*, *joy*) or a letter-matched nonword (e.g., *aref* and *recrads* for *fear* and *scared*). In total, each prime category (e.g., White fearful) was paired twice with each target emotion and twice with matching nonwords for that target emotion.

Results

Data Reduction

Incorrect responses and outliers. Reaction times on trials with incorrect responses (e.g., responding "word" when the target was not a word) were eliminated (3%). Additionally, reaction times greater than 3 standard deviations above the mean were eliminated (2%). Further transformation of these data (i.e., a log transformation) did not alter the pattern of findings described here, and, as such, the findings reported here are of the raw reaction time scores rather than the log-transformed scores.

Calculation of cell means. Within each image type (e.g., White joy), we calculated emotion scores by subtracting average response times to emotion words (e.g., fear) from reaction times to the relevant nonwords (e.g., nonword matches for fear). Consequently, positive "emotion scores" indicated that reaction times were faster to words, for example, than to nonwords. Higher emotion scores indicates relatively faster responses to those words.[4]

Emotional Responses to Fear, Joy, and Anger Expressions as a Function of Group Membership

We submitted emotion scores to a 2 (prime race) × 3 (prime emotion) × 4 (target emotion) repeated measures ANOVA. A main effect of prime emotion, $F(2, 28) = 3.42$, $p = .047$, indicated that fear primes sped responses ($M = 18.03$) relative to anger primes ($M = -23.87$), $t(15) = 2.73$, $p < .01$, $r = .58$, and joy primes ($M = -24.76$), $t(15) = 1.87$, $p = .04$, $r = .44$. Visual examination of Figure 4 also reveals several nonsignificant trends: Across all three primed emotions, people responded faster to "joy" words and slower to "anger" and "sad" words when those words were preceded by a White (as opposed to a Black) face ($ps > .23$). These effects, however, were qualified by the predicted three-way interaction, $F(6, 84) = 2.21$, $p = .049$.

The interaction is depicted in Figure 4. We had hypothesized that happiness expressed by an outgroup (Black) member should

[3] The White and Black "angry" face images were pretested on a group of 7 undergraduates. The anger images were included with an equal number of neutral and fear images. Participants' task was to select (for each image) the expressed emotion from a list of five emotions (anger, sadness, fear, neutral, disgust). White anger was correctly identified (mean accuracy = 92%) at a rate that was identical to the rate for Black anger (mean accuracy = 92%). Thus, as in the pretests for the fear and happy faces, Black and White emotion displays were equally clear.

[4] Of course it may be argued that, within any particular condition, only positive emotion scores can indicate "facilitation"—negative scores should indicate "inhibition." This argument, in turn, assumes that negative scores reflect inhibitory processes in which positive scores do not. Whether absolute, individual condition scores are positive or negative, and whether absolute positive or negative scores reflect inhibition, our concern was with the relative, between-condition differences. We thus use the term *speeded* only to highlight relative between-condition differences in emotion scores. Hence, when one condition has a less negative (or more positive) score than another, we say that emotion scores in the former were speeded (facilitated) relative to the latter. In such scenarios, people responded faster to emotion words in the first condition relative to the second condition.

elicit greater fear (but not other emotions) than happiness expressed by an ingroup (White) member. Moreover, fear expressed by an outgroup member should elicit less fear (but not other emotions) than fear expressed by an ingroup member. Finally, anger expressed by an outgroup member should elicit more anger (but not other emotions) than anger expressed by an ingroup member. We conducted focused contrasts, consistent with the hypotheses, to examine the effect of group membership within each emotion prime. Ingroup responses (i.e., responses to White emotions) were weighted with the opposite sign of outgroup responses ($+1$ vs. -1).

Emotion responses to ingroup and outgroup happiness. We predicted that fear responses to happy expressions would be speeded when the expresser was an outgroup member relative to when the expresser was an ingroup member. Consistent with this prediction, fear scores were significantly greater following outgroup happy displays than following ingroup happy displays, $t(15) = 2.71$, $p = .004$, $r = .57$. There were no other significant ingroup–outgroup differences (all ts $< |1.2|$, all ps $> .13$; see the top panel of Figure 4).

Emotion responses to ingroup and outgroup fear. We predicted that fear responses to fearful expressions would be speeded when the expresser was an ingroup member relative to when the expresser was an outgroup member. Consistent with this prediction, fear scores were significantly greater following ingroup fear displays than following outgroup fear displays, $t(15) = -2.31$, $p = .01$, $r = .52$. There were no other significant ingroup–outgroup differences (all ts $< |1.2|$, all ps $> .13$; see the middle panel of Figure 4).

Emotion responses to ingroup and outgroup anger. We predicted that anger responses to angry expressions would be speeded when the expresser was an outgroup member relative to when the expresser was an ingroup member. Consistent with this prediction, anger scores were significantly greater following outgroup anger displays than following ingroup anger displays, $t(15) = 1.97$, $p = .02$, $r = .47$. There were no other significant ingroup–outgroup differences (all ts $|.7|$, all ps $>$ .26; see the bottom panel of Figure 4).

Discussion

The results of Experiments 1–3 suggested that affective responses to others' emotions depend on group membership, with ingroup emotions eliciting similar affect and outgroup emotions eliciting dissimilar affect, a pattern that we have described as "affective divergence." On the basis of the idea that happiness signals danger, but only when perceived by outgroup members, we expected and found that exposure to outgroup happiness speeds lexical fear responses relative to ingroup happiness. And based on the idea that fear signals danger, but only when perceived by ingroup members, we expected and found that exposure to ingroup fear speeds lexical fear responses relative to outgroup fear. Given the special and adaptive role of fear in responding to dangerous stimuli (cf. LeDoux, 1996), it is no surprise that group-based emotion expressions elicit fear-relevant responses.

Another interesting finding to emerge from Experiment 4 was that others' anger was especially likely to speed lexical anger responses among outgroup members, as opposed to ingroup members. It is noteworthy that lexical fear responses to anger expressions were not moderated by group. This pattern suggests that anger expressions (a) do not emit signals relevant to fear ("danger") or (b) emit opposing signals relevant to fear (see Footnote 2). Regardless of the particular explanation for the null result for fear, the fact that outgroup anger expressions reap different responses than do fear expressions suggests that automatic responses to others' emotions are not based on a simple encoding of that emotion as good or bad. Moreover, the fact that outgroup anger speeded only anger responses is consistent with the idea that automatic responses to others' emotions are functional responses to the immediate signal value of others emotion. That is, anger may function as a primitive means of facilitating aggression (e.g., Izard, 1993). Anger on the face of the outgroup member may be especially likely to signal "conflict," or outgroup identity may heighten the adaptiveness of a physical aggression response to anger.

Finally, and as expected, facial expressions of emotion did not facilitate group differences in lexical sadness or happiness responses. Immediate happy or sad responses to stimuli may be considerably less functional than immediate fear or anger expressions. Conversely, emotions that are developed beyond several hundred milliseconds may be more likely to reveal happy and sad responses to stimuli. This may be especially likely if happiness and sadness are derivative of or mixed with fear or anger. For example, fear may be the immediate effect of hearing fear in an ingroup members' voice, but this initial fear response may give way to or combine with sadness and anger over time.

Experiment 5

In the introduction, we speculated that ingroup or outgroup facial expressions may signal danger or safety because these expressions signal relative strength or vulnerability. In Experiment 5, we examined the hypotheses that (a) self-evaluations of strength/dominance would be stronger after exposure to outgroup anxiety than after exposure to ingroup anxiety and that (b) this "dominance" response would reduce felt anxiety among the outgroup. We also examined the degree to which affective divergence extends to another form of emotion expression and to subjective experience. Specifically, we manipulated emotion expression via vocal prosody and measured emotions via self-report.

Method

In a purported pretest, Democrat participants listened as speech givers identified themselves as liberals or conservatives in either a "nervous" or "neutral" tone of voice. After rating the short speech, participants were introduced to an ostensibly new study on mood and task performance. Participants then rated their feelings of strength and weakness as well as their levels of nervousness, happiness, sadness, and anger. We expected Democrats to report more anxiety after hearing a nervous liberal voice than after hearing a nervous conservative voice. We expected similar differences in Democrats' self-evaluations of dominance. In contrast, we expected no such effects after hearing neutral voices.[5]

[5] Pretesting revealed substantial difficulty in creating prosody that was clearly perceived as one distinct emotion. "Neutral" was substituted for "happy" because happy speeches were typically also interpreted as especially not sad, angry, nervous, and so on.

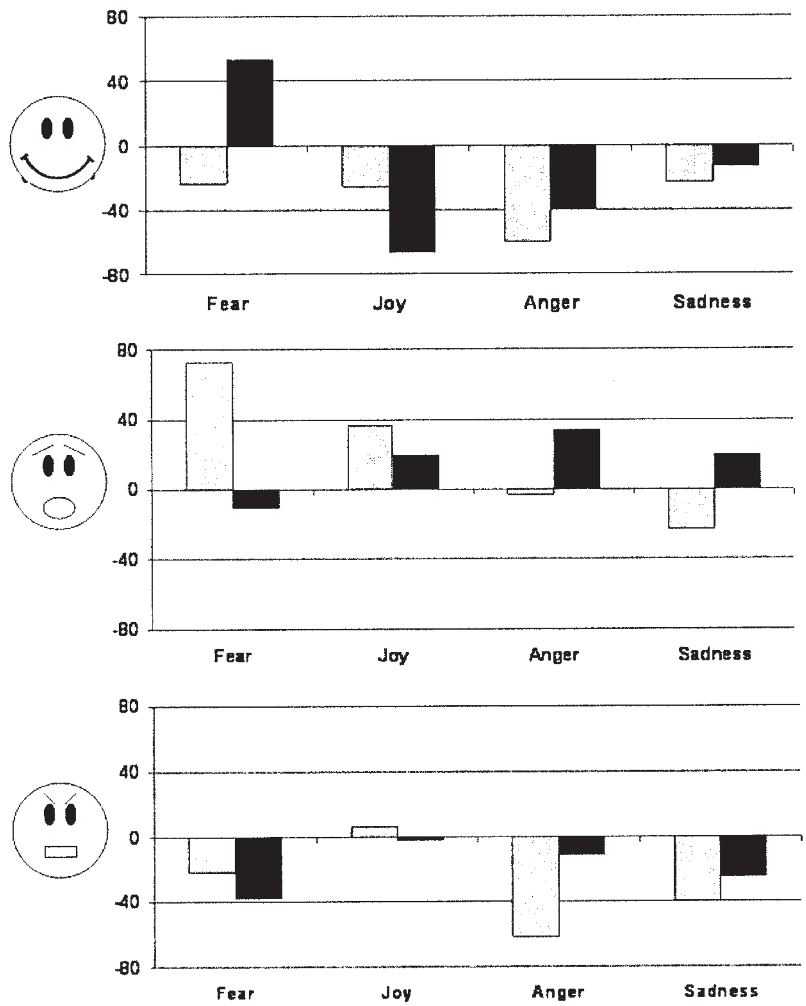

Figure 4. Reaction times to emotion target words as a function of prime emotion and prime race. Higher scores indicate increased speed to the emotion words, relative to the matched control words. The top panel represents responses to facial happiness primes. The middle panel represents responses to facial fear primes. The bottom panel depicts responses to facial anger primes. Solid gray bars = White; solid dark bars = Black.

Participants

As part of a mass departmental prescreening, 446 introduction to psychology students indicated whether they were a Democrat, Republican, or neither. Due to practical difficulties in recruiting Republican participants (less than 5% of students reported themselves as Republican), 13 male Democrats and 31 female Democrats participated in exchange for partial course credit.

Materials

Voice recordings. An advanced research psychologist with acting training recorded himself first in a nervous tone of voice and then in a neutral (slightly positive) tone of voice. Special emphasis was placed on equating the recordings for all vocal qualities, save nervousness. He was instructed to put himself in the position of being in an experiment and having to give a short speech about political affiliation. The short speech was "okay, so, politically, I'm pretty much a___________. I tend to side with ________ on issues like abortion, the Iraq war, gay marriage, and affirmative action."

To minimize confounds between political orientation conditions, the "liberal" and "conservative" versions were exactly the same audiotape. This was accomplished by recording only two speeches—a nervous speech and a neutral speech. The words *liberal*(s) and *conservative* (s)—read by the same speaker in a neutral tone of voice—were digitally inserted into each speech (through the use of Adobe Audition® software) in a manner that was imperceptible to participants. Thus, the nervous "liberal" speech was acoustically identical to the nervous "conservative" speech save for those two words (liberal vs. conservative). Likewise, the neutral "liberal" speech was acoustically identical to the neutral "conservative" speech.

To ensure that the intended emotion was communicated via prosody, a total of 20 undergraduates (10 for each version) listened to one of the two audio clips (without political affiliation inserted) and selected the emotion expressed from five possibilites (nervous, angry, sad, surprised, and happy). For the nervous clip, 90% selected "nervous" (1 participant selected "sad"), whereas for the neutral clip, only 40% selected "nervous" (the others selected "happy," "surprised," and "angry"): for "nervous," $\chi^2(1, N = 10) = 5.50$, $p = .019$. Hence, the nervous clip sounded especially nervous, whereas the neutral clip did not have a clear emotion signal.

Self-report measure. Participants were instructed to use 6-point scales to indicate the extent to which they felt nervous, sad, angry, happy, and dominant ranging from 1 (*not at all*) to 6 (*very*). For the sake of clarity, measured nervousness is referred to as "anxiety," whereas vocal nervousness is referred to as such.

Procedure

After completing informed consent, participants were told that they would be participating in two short studies. All aspects of the studies were presented via MediaLab® software. According to the instructions presented on the computer monitor, the ostensible purpose of the first study was to evaluate—for the use of the "spontaneous" speech in a future study—short speeches given by "real" people in previous studies. This cover story was used in order to create the impression that listening to the speech was not related to the feeling-rating task (see below). After listening to the speaker, participants indicated the extent to which they agreed or disagreed with the speaker's position.

Participants were thanked for completing this "first study" and asked to move on to the second study. The "second study" was presented on the computer monitor with a different font and background, so as to minimize suspicion. Participants were told that the experiment was about the effects of thoughts and emotions on performance. As such, they would be asked to rate themselves on several characteristics prior to engaging in a performance task. Participants then responded to the self-report items listed above; completed a sham reaction time task; and were thanked, debriefed, and dismissed. No participants reported knowledge of hypotheses or suspicion about the voice.

Results

Manipulation Check

We analyzed the attitude item that immediately followed the speech sample with a 2 (speaker political orientation: liberal, conservative) × 2 (vocal emotion: nervousness, neutral) between-subjects ANOVA. This ANOVA revealed only a main effect of speaker political orientation, such that the Democrat participants agreed more with the liberal speaker ($M = 5.10$) than with the conservative speaker ($M = 1.26$), $F(1, 40) = 121.90$, $p < .001$. Given the nonsignificant main effect of emotion ($p = .28$) and the nonsignificant interaction effect ($p = .6$), any influences of vocal emotion on perceiver emotion could not be attributed to simple attitude change.

Emotional Responses to Prosodic Anxiety

On the basis of the results in Experiment 4, we expected greater anxiety among participants exposed to a nervous ingroup (liberal) speaker as opposed to participants exposed to a nervous outgroup (conservative) speaker. We did not expect any such differences among those listening to neutral speakers. Hypotheses for other emotions were more exploratory, but on the basis of the findings of Experiment 4, we expected no significant effects.

We analyzed each emotion response separately with initial 2 (emotion: nervous, neutral) × 2 (speaker political orientation: liberal, conservative) independent groups ANOVAs. Consistent with Experiments 1–4, we examined the influence of group membership within expressed emotion with simple effects tests.

Anxiety. Although ingroup (liberal) voices elicited greater anxiety ($M = 3.0$) than did outgroup (conservative) voices ($M = 2.26$), $F(1, 40) = 4.63$, $p = .04$, $r = .32$, this effect was qualified by the predicted Vocal Emotion × Group Membership interaction, $F(1, 40) = 5.8$, $p = .02$, $r = .36$. As predicted, nervous voices evoked significantly greater anxiety when the voice belonged to an ingroup member ($M = 3.6$) than when the voice belonged to an outgroup member ($M = 2.0$), $t(40) = 3.23$, $p = .001$, $r = .45$. In contrast, there were no group differences for neutral voices (Ms = 2.45, 2.55 for ingroup and outgroup, respectively), $t(40) = -0.2$, $p = .42$, $r = .03$.

Sadness. Although nervous voices elicited greater sadness ($M = 2.59$) than did neutral voices ($M = 1.86$), $F(1, 40) = 6.85$, $p = .01$, $r = .38$, this effect was qualified by a Vocal Emotion × Group Membership interaction, $F(1, 40) = 5.46$, $p = .02$, $r = .35$. Nervous ingroup voices elicited significantly more sadness ($M = 3.20$) than did nervous outgroup voices ($M = 2.08$), $t(40) = 2.67$, $p = .005$, $r = .39$. In contrast, there were no group differences for neutral voices (Ms = 1.73, 2.00 for ingroup and outgroup, respectively), $t(43) = -0.64$, $p = .26$, $r = .01$.

These results suggest that, given time, initially specific emotional responses may transfer to other emotions. If group-based sadness responses to vocal nervousness derive from anxiety, then controlling for anxiety should eliminate effects of group membership on sadness. Indeed, controlling for anxiety rendered the previously strong ($p = .005$) effects of group membership (marginally) nonsignificant ($p = .06$). In contrast, controlling for sadness in anxious responses did not eliminate the effects of group membership ($p = .007$). Thus, ingroup nervousness, as compared with outgroup nervousness, may have increased participant nervousness, which then transferred to participant sadness.

Anger. There were no significant effects for anger (all ps > .2).

Happiness. There were no significant effects for happiness (all ps > .16).

Dominance Ratings

A 2 × 2 ANOVA on dominance revealed that nervous voices elicited stronger self-evaluations of dominance ($M = 4.14$) than did neutral voices ($M = 3.41$), $F(1, 40) = 6.10$, $p = .02$, $r = .36$. However, this main effect was qualified by the predicted two-way interaction between vocal emotion and group membership, $F(1, 40) = 6.76$, $p = .01$, $r = .38$. As expected, nervous voices elicited significantly stronger self-evaluations of dominance when the voice belonged to an outgroup member ($M = 4.58$) than when the voice belonged to an ingroup member ($M = 3.60$), $t(43) = -2.51$, $p = .008$, $r = .37$. In contrast, significant group differences in dominance did not emerge among those listening to neutral voices (Ms = 3.64, 3.18 for ingroup and outgroup, respectively; $p > .12$).

In the introduction, we argued that dominance may play an important role in responses to ingroup and outgroup fear. To the extent that hearing a nervous voice is similar to hearing a fearful voice, this dominance-related hypothesis can be examined here. In support of this hypothesis, those who heard a nervous voice felt both less anxious and more dominant when the voice belonged to an outgroup member than when it belonged to an ingroup member. If the effects of group membership on nervousness are mediated by feelings of dominance, then regressing nervousness scores onto dominance scores and the dummy-coded group membership variable (0 = ingroup) should reveal (a) that dominance scores significantly predict nervousness scores and (b) a reduction in the effect of group membership on nervousness. Indeed, in just such a regression equation, dominance scores significantly predicted anxiety scores ($\beta = -.43$, $p = .045$). With the addition of dominance into the regression equation, the size of the group membership effect (on anxiety) dropped from $\beta = .57$, $p = .005$ to $\beta = .34$, $p = .1$. Thus, much of the effect of group membership on anxiety occurs through feelings of dominance. This effect represents mediation (cf. Baron & Kenny, 1986) in that the beta weight dropped from highly significant to nonsignificant.

To formally assess the indirect effect of group membership on nervousness through dominance, we used a bias-corrected bootstrap mediation model, as is recommended for relatively small sample sizes (here, the relevant $n = 22$; see Efron & Tibshirani, 1993; Preacher & Hayes, 2004; Shrout & Bolger, 2002). That is, the traditional Sobel test is a "low power" test that poses special problems for small samples. This bootstrap used 1,000 resamples of the original data set, yielding 1,000 estimates of each path, including the indirect path. Assessing the indirect effect in this manner yielded a 95% confidence interval (2.5% in each tail) of .1326, 1.9339. Because 0 is excluded from the 95% interval, we may say that the indirect effect of group membership on nervousness (through dominance) was significant.

Discussion

The results of Experiment 5 extend the findings of Experiments 1–4 in several ways. First, subjective emotional responses to others' emotions were shown to be impacted by the group membership of the perceiver, relative to the sender. Hence, the preconscious, unintentional, and spontaneous effects observed in Experiments 1–4 extend to subjective emotional experience, at least for anxiety. Second, self-evaluations of dominance mediated the relationship between sender emotion and perceiver emotion. Exposure to outgroup nervousness resulted in increased feelings of dominance, relative to exposure to ingroup nervousness, and these feelings of dominance accounted for consequent anxiety. These findings lend further support to the idea that group membership alters the signal value of emotional displays. The third important facet of the Experiment 5 results is that a third—and subtle—form of vocal emotional expression (prosody) influenced perceiver emotions in a manner consistent with other forms of emotion expression (i.e., facial emotion and verbal descriptions of emotion).

One other aspect of these findings is noteworthy. The influence of a nervous voice on sadness was impacted by group membership by virtue of the same influence on anxiety. The combination of a nervous voice and the group membership of the speaker resulted in anxiety that appeared to transfer to sadness. In comparison to Experiment 4, in which we measured emotion in less than 1 s, there may have been more of an opportunity for one discrete emotion to influence others.

Overall Statistical Summary: Experiments 1–5

Across five experiments, congruent affect was more likely to be automatically evoked by emotional expressions of the ingroup than by emotional expressions of the outgroup. A meta-analysis on the Emotion (fear, happy) × Group (in, out) interaction term of these five experiments reveals $r = .43$, $p < .00001$, fail-safe $N = 51$. Fifty-one studies with nonsignificant findings would be required to reduce the significance of this meta-analysis below the critical value (see Rosenthal, 1979).

General Discussion

Evidence from nonverbal, reaction time, and neuroscientific paradigms converges on the idea that emotional expressions automatically activate similar affect in others (Dimberg et al., 2000; Murphy & Zajonc, 1993; Neumann & Strack, 2000; Ravaja et al., 2004; Stapel et al., 2002; Whalen et al., 1998). The findings presented here suggest that automatic responses to others' emotion depend crucially on the group identity of the perceiver, relative to the sender. Experiments 1–3 established that immediate, unintentional, and spontaneous affective responses occurred to the *interaction between* emotion expression and group membership rather than to either group or emotion independently. For example, increasingly negative automatic responses to joy expressions occurred to the extent that perceivers were the outgroup, relative to targets. This occurred whether affect was measured via reaction time, nonverbal behavior, or self-reports, and occurred whether emotion and group were communicated nonverbally or verbally.

These findings support a signal-value perspective, in which affect responds to the ecological affordance (meaning) signaled by an emotional expression, which itself depends on the group membership of the target relative to the perceiver. In Experiments 4–5, we further examined a signal-value perspective by measuring emotion-specific responses. Fear, which theoretically responds to the affordance of "danger" (e.g., LeDoux, 1996), was activated in response to outgroup expressions of happiness and to ingroup expressions of fear. These findings are consistent with the idea that fear and happiness expressions can signal the relative dominance of the outgroup, relative to the ingroup, and hence the relative danger of the person perceiving those expressions (vis-à-vis the ingroup). Indeed, in Experiment 5, outgroup anxiety expressions evoked increased feelings of dominance relative to ingroup anxiety expressions, and these feelings of dominance mediated the impact of emotion expression and group on perceiver anxiety.

The automaticity of these effects may be considered in light of the methodological parameters in the five experiments. In Experiments 1, 2, and 4, we measured affective responses in a manner that prevents (or greatly reduces) intentional responding (i.e., limited stimulus onset asynchrony). In Experiment 2, affective responses were predictably influenced by faces that were presented so quickly that neither the race nor the emotion could be consciously recognized. This methodology prevents or limits the role of conscious awareness. In Experiment 3, we observed affective responses corresponding to the predicted pattern in a nonverbal channel known to be particularly difficult to control (vocal prosody). And in Experiment 5, we showed that these unintentional and spontaneous effects extended to subjective emotional states. We have thus provided evidence that affective responses to emotion expressions are *unintentionally, efficiently, and spontaneously* moderated by group membership *outside of conscious awareness*. These automatically generated effects appear to extend to subjectively experienced emotion. In summary, we observed automatic affective divergence across a variety of paradigms, with a variety of social groups, forms of emotional expression, and methods of measurement.

The Role of Meaning in Automatic Responses to Others' Emotions

The results of the present research suggest that automatic affective responses to others' emotions follow a more complex set of rules than was previously theorized. We have shown that group membership determines automatic affective responses to others' emotion. Why might this be the case?

It seems likely that the *meaning* of emotion expressions is influenced by group membership. Meaning can be considered on two different levels. First, meaning may simply refer to the inferred content of the expressed emotion. For example, if exposure is extremely brief, then the facial expression of a Black person may be processed as "fearful" to a Black perceiver but "neutral" to a White perceiver. Indeed, the inferred meaning of an emotional expression depends on whether the perceiver and target share group membership (e.g., Elfenbein & Ambady, 2002). A lack of shared group membership appears to interfere with accurate decoding of facial expression meaning. Thus, the results of Experiments 1 and 2 may have derived from perceivers' confusion about the emotional content of outgroup facial expressions. However, this explanation is less persuasive for the results of Experiment 3 and Experiment 5. Whereas facial expressions of emotion can, with race or culture, differ in appearance, the verbal description in Experiment 3 and the prosodic emotion cues in Experiment 5 were exactly the same for both the ingroup and outgroup target. Instead, a different type of meaning may moderate affective responses to emotional expressions.

Specifically, others' emotions carry meaning for the perceiver—fear on another's face may signal "danger," anger may signal "conflict," and happiness may signal "safety." Such affordances may depend on whether perceiver and sender share group membership. For example, outgroup happiness may implicate an advantage for the outgroup relative to the ingroup and hence may signal danger for the ingroup and self. Conversely, outgroup fear may implicate the weakness of the outgroup relative to the ingroup and hence signal safety for the ingroup and self. In the same manner, ingroup happiness and fear may signal safety and danger, respectively, for the ingroup and self. The consequent affective responses should be appropriate to danger or safety.

By this analysis, a fear display should elicit reduced fear among outgroup members, relative to ingroup members; likewise, a joy display should elicit increased fear among outgroup members, relative to ingroup members. This is exactly the pattern that we observed here. Moreover, if outgroup fear does implicate outgroup weakness, then perceivers may consequently experience heightened feelings of dominance. Again, this is exactly what we observed with regard to outgroup nervousness;more importantly, these feelings of dominance mediated the relationship between group membership and anxiety.

In Experiment 4, we also examined emotional responses to anger and here also the signal-value hypothesis was supported. Anger may emit a conflict signal that is (a) only interpreted as such in outgroup anger and/or (b) only translated into aggressive tendencies (via anger) with outgroup targets. More specifically, several scholars have argued that the function of anger is to prepare the organism for aggression (e.g., Berkowitz, 1990)—anger expressions may thus signal conflict for both ingroup and outgroup, but aggression (via anger) may only be an adaptive response when the target is outgroup. Additionally, anger may exert only a "weak" conflict signal that becomes stronger when paired with outgroup membership. In both cases, anger expressions send a signal of conflict and therefore invite conflict-driven responses (i.e., anger). As expected, outgroup identity speeded lexical anger responses to anger expressions, relative to ingroup identity.

In summary, ingroup and outgroup perceivers have strikingly divergent automatic responses to others' emotions. These patterns were anticipated on the basis of a signal-value model. Emotion displays were conceptualized as affordances to which perceivers' affective systems have been adapted or have become "attuned" (Gibson, 1979; McArthur & Baron, 1983; Zebrowitz, 2003).

Implications for Future Research

The present findings have implications for those researchers interested in continuing work on emotion, face and voice perception, intergroup phenomena, or mimicry. Specifically, with the established validity of the affective priming paradigm and a wealth of other methodologies, it has become possible to examine responses that perceivers (a) do not intend to perform, (b) are not aware of, (c) cannot stop from performing, and (d) perform extremely quickly (e.g., Bargh, 1994). Now that many of these paradigms are well established, additional growth in the systematic sampling and integration of social stimuli might provoke further insight into the automatic processing of social information. For example, an appropriate next step with regard to emotion expressions, which has perhaps begun with the present research, might be to examine the application of these automatic effects to a variety of social groups. Likewise, it might be worthwhile to examine automatically activated prejudice in the context of nonverbal information ranging from emotion to gestures to intentions. After all, when we encounter people of other races, we usually have access to nonverbal information.

The fact that the same pattern of affective divergence was observed with several different types of groups attests to the robustness of affective divergence. Yet the moderation of emotional "signals" by group membership should not apply equally to certain groups. For example, the signal-value perspective suggests that outgroup fear can signal safety and thereby increase perceiver positive affect. Yet, when the relevant groups are male and female, for example, different types of responses may be considered adaptive. Speculatively, men who protected fearful women may have been especially attractive to those women; hence, men who responded to female fear with positive affect may have appeared unattractive and been unlikely to reproduce. Indeed, post hoc (and low-power) tests of gender effects in the present experiments revealed null results. As the gender example illustrates, affective divergence may be less relevant with specific groups for which there have existed historically adaptive emotional responses. Hence, it may be useful to examine affective responses with respect to gender-based, status-based, and age-based emotional displays.

We can also consider the broader practical implications of the present findings. Most notably, we can consider the plight of the individual who must spend an extended time period as a minority in a particular setting. For example, a Black student attending any traditional American university, a Yankees fan living in Boston, or even a liberal working at Fox News would be considered outgroup and minority within the setting. These individuals may not have their emotions shared and, in fact, may often find their emotions contradicted. The lack of shared emotion may occur at several levels, including nonverbal (Experiment 3) and verbal (Experiment 5) responses. Given the affiliative impact of shared emotion (cf. Schachter, 1959), it seems reasonable to argue that, as a consequence of affective divergence, minorities (of all types) will be at risk for a variety of issues, ranging from loneliness and depression to increased conflict (with the prevailing majority) to removing oneself from the situation. Moreover, minority individuals may find themselves gravitating toward those who share their emotions. Hence, a Black student on a predominately White campus may gravitate toward other Black students—not only because this Black student shares the beliefs or attitudes of the other Black students but also because other Black students are more likely to share in his or her emotions. Clearly, these comments are speculative and go beyond the data; nonetheless, we hope that some of these ideas can motivate research on the role of affective divergence in intergroup relations and conflict.

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