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Adult Attachment and the Perception of Facial Expression of Emotion

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Adult attachment orientation has been associated with specific patterns of emotion regulation. The present research examined the effects of attachment orientation on the perceptual processing of emotional stimuli. Experimental participants played computerized movies of faces that expressed happiness, sadness, and anger. Over the course of the movies, the facial expressions became neutral. Participants reported the frame at which the initial expression no longer appeared on the face. Under conditions of no distress (Study 1), fearfully attached individuals saw the offset of both happiness and anger earlier, and preoccupied and dismissive individuals later, than the securely attached individuals. Under conditions of distress (Study 2), insecurely attached individuals perceived the offset of negative facial expressions as occurring later than did the secure individuals, and fearfully attached individuals saw the offset later than either of the other insecure groups. The mechanisms underlying the effects are considered.

Attachment theory holds that the quality of attachment, what we call *attachment orientation* (e.g., Rholes, Simpson, & Stevens, 1998), is related to the ways in which individuals manage their own emotions and respond to the emotions of others. Indeed, John Bowlby (1980) held that "the psychology and the psychopathology of emotion is found to be in large part the psychology and psychopathology of affectional bonds" (p. 40). This view is supported by a number of fruitful studies concerning the types of emotion likely to be experienced in challenging and distressing situations, and the strategies for emotion regulation preferentially used, as a function of attachment orientation and its support-seeking requirements and expectations (e.g., Bartholomew, 1990; Cooper, Shaver, & Collins, 1998; Kobak & Sceery, 1988; Main & Weston, 1982; Mikulincer & Florian, 1998; Rholes, Simpson, & Orina, 1999; Simpson, Rholes, & Nelligan, 1992; Sroufe & Waters, 1977).

However, attachment orientation probably does not merely influence emotional expression and regulation after distress has already been provoked. Attachment orientation may also affect how individuals process incoming information that is emotionally significant and potentially relevant to attachment concerns (Collins & Read, 1994; Fraley, Davis, & Shaver, 1998). Specifically, as recent related findings suggest, attachment orientation may influence the *attention* to and the *encoding* of emotional information from the external environment (e.g., Feeney, Noller, & Callan, 1994; Tucker & Anders, 1999). For example, although one individual may not even notice an expression of irritation pass over the face of another person, a second individual may not only notice this expression, but also see it as rather flagrant and as categorically communicating contempt. Obviously in the first case, the facial expression will elicit very little if any reaction on the part of the perceiver, whereas in the second case, a host of responses and action tendencies may follow. Individual differences in the encoding of emotional stimuli may therefore determine reactions to previously observed attachment-related behaviors.

One of the most important types of emotional information encountered in social interaction is that of facial expression of emotion (Buck, 1988; Darwin, 1872/1965; Ekman, 1982; Fridlund, 1990; Izard, 1980; Tomkins, 1962, 1963). Individuals use facial expression information, more or less skillfully, to alter conversation topics to avoid conflict, to monitor their attempts to alter emotional states or reactions of interaction partners, and to determine the subtle and not-so-subtle attitudes of others (Salovey & Mayer, 1990). But as illustrated above, there is certainly variability in the information that individuals extract from a facial expression, and in the correspondence between the intended expression and the emotional information encoded (in the sense of registered) by the perceiver (Buck, 1988; Hall, 1984; Hess, Blairy, & Kleck, 1997; Matsumoto, 1989; McAndrew, 1986; Niedenthal, Halberstadt, Margolin, & Innes-Ker, 2000; Wagner, MacDonald, & Manstead,

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1986). The perception of facial expression of emotion can, for example, be affected by emotional state (Niedenthal, Brauer, Halberstadt, & Innes-Ker, 2001). In theory, attachment orientation is represented as a *working mental model*, or "conscious and unconscious schematic elements that guide perceptions and trigger characteristic emotions, as well as defensive mechanisms, or rules for regulating emotion and for processing or failing to process certain kinds of attachment-relevant information" (Cooper et al., 1998, p. 1381). This suggests that individual differences in attachment orientation also moderate the perception of emotional information. Such a possibility was examined in the present set of experiments.

Adult Attachment

Hazan and Shaver (1987) conceptualized adult love relationships in terms of the categories of infant attachment originally identified by Ainsworth and colleagues (e.g., Ainsworth, 1982; Ainsworth, Blehar, Waters, & Wall, 1978), and it was subjected to further careful measurement by Main and colleagues (e.g., Main, Kaplan, & Cassidy, 1985; Main & Solomon, 1990). Specifically, consistent also with the approach of Kobak and Sceery (1988), Hazan and Shaver suggested that individual differences in adult romantic relationships could be described as *secure, anxious–ambivalent,* and *avoidant*. In support of this approach, initial research showed that self-report of attachment orientation using a three-category measurement instrument was related to attitudes toward, and feelings about, intimate relationships as well as memories of childhood experiences with parents (Hazan & Shaver, 1987).

Bartholomew and Horowitz (1991) subsequently proposed a four-category conceptualization of attachment orientation that was derived theoretically by fully crossing the content of mental models (i.e., self vs. other) with the valence associated with that content (i.e., positive vs. negative). In this conceptualization, the secure (positive self, positive other) and anxious–ambivalent (negative self, positive other, but now called *preoccupied*) categories are more or less consistent with the three-category approach. However, the resulting scheme distinguishes *fearful avoidant* attachment, which describes individuals who hold a negative view of self and of the supportiveness–availability of others, from *dismissive avoidant* (most similar to previous conceptualizations of avoidant attachment), which describes individuals with a positive view of the self but a more negative view of others.

The four categories can and have been accounted for by a two-dimensional structure referring to the extent to which an individual exhibits anxious (about abandonment) and avoidant (of intimacy) attachment-related behaviors (see Bartholomew & Shaver, 1998; Brennan, Clark, & Shaver, 1998; Fraley & Waller, 1998, for reviews). The following discussion and predictions are largely organized around the category approach because much literature on attachment orientation and emotion has been presented that way (e.g., Mikulincer & Florian, 1998), making hypothesis generation easier, and to provide a comparison with past work (cf. Feeney, 1998). However, we conducted analyses with both categories and dimensions to report findings relevant to both approaches.

Attachment Orientation and Emotional Experience

Attachment orientations have been shown to be associated with specific patterns of emotional responses and emotion regulation strategies (e.g., Bartholomew, 1990; Griffin & Bartholomew, 1994; Mikulincer & Florian, 1998; Mikulincer & Orbach, 1995; Simpson & Rholes, 1994). To briefly summarize recent research on this topic, it appears that secure individuals respond effectively to displays of emotion expressed by attachment figures, and can cope with their own emotions as well (e.g., Kobak & Hazan, 1991; Kobak, Cole, Ferenz-Gillies, Fleming, & Gamble, 1993). Secure individuals seek intimacy, and, when distressed, expect and accept support from intimate others (Mikulincer & Florian, 1998; Simpson et al., 1992). In contrast, theory and research suggests that dismissing-avoidant individuals have perfected a strategy, originating in early childhood interactions, of denying the need for intimate relationships. They also repress or independently dissipate negative emotions that stem from rejection (e.g., Shaver & Hazan, 1993; Simpson & Rholes, 1994), often by orienting attention away from conflict and negative attachment issues (Simpson, Rholes, & Phillips, 1996). Preoccupied individuals have a strong need for intimacy. They are also highly sensitized to negative emotional signals from attachment figures and are concerned about the meaning of those cues for the stability and quality of the intimate relationship (Bowlby, 1980). Consequently, these individuals respond intensely to negative emotional input, and cope poorly with their own emotional responses, perhaps by directing too much attention to them (Shaver & Hazan, 1993). Finally, fearful-avoidant individuals shy away from emotional information, fearing that positive input will not be forthcoming and that negative information is all too probable. They are thought to try to minimize intimacy to minimize the pain of disappointment and rejection (Bartholomew & Horowitz, 1991).

The vulnerabilities to emotions and strategies for managing emotions that characterize different attachment orientations discussed above suggest specific ways in which attachment may affect the perception of emotional stimuli. Before outlining specific predictions along these lines, however, we introduce our experimental procedure to provide a more detailed context for the present hypotheses.

Perception of the Offset of Facial Expression of Emotion

The strategy for assessing the perception of facial expression used in the present research was recently developed to examine the perception of the offset of (Niedenthal et al., 2000) and change in (Niedenthal, Brauer, Halberstadt, & Innes-Ker, 2001) emotional expression. Participants in those studies played a series of 100-frame computerized "movies" in which a face initially displaying a particular emotional expression gradually changed over the course of the movie. The participants used a computer mouse to play the movies and stopped the display at the point at which, for the first time, the initial expression appeared to have disappeared from the face. The frame of initial expression offset thus constituted the data point of interest.

In one study, experimental participants in manipulated states of happiness, sadness, or neutral emotion played morph movies in which some faces initially expressed happiness and others initially expressed sadness, and all faces gradually became neutral over the

course of the movie (Niedenthal et al., 2000). Findings revealed an emotion congruence effect such that individuals in the happy condition saw happy expressions linger longer on a face that initially expressed happiness than did individuals in the sad condition. For sad expressions, the finding was reversed; participants in the sad condition saw sad expressions linger longer on an initially sad face than did participants in the happy condition. Individuals in the control condition saw the offset of both happy and sad expressions at a point somewhere in between.

The value of the morph movie technique is that the signal (the happy or sad emotional expression) becomes gradually degraded. At some point, the evidence that happiness or sadness is still present on the face becomes perceptually debatable. The question is how efficiently the individual can process the evidence. Clearly, the technique has great ecological validity. Although people may not often see an expression dissolve smoothly from the face, they do often see traces of expressions, such as those present in the morph movies, on the faces of other individuals. And they either respond as if there were an expression present or as if no emotion was being expressed. The task is thus a technique with which to address questions about individual differences in the efficiency of perception of positive and negative facial expressions. In the two experiments reported here, the morph movies contained faces that initially expressed happiness, sadness, or anger; all three types of emotional expression terminated in a neutral expression. Participants were therefore looking for the offset of an initially clear and categorical facial expression.

Attachment and Perception of Expression Offset

It is important to recognize that according to attachment theory, the attachment system evolved to motivate adaptive proximity-seeking behaviors in times of distress or threat (e.g., Bowlby, 1969; Sroufe & Waters, 1977). Thus, an individual's attachment system is not always activated, and its characteristic behaviors are not always to be expected. Because they communicate information that is relationship relevant, facial expressions of emotion in and of themselves are likely activators of the attachment system. Nevertheless, the influence of attachment orientation on the processing of the facial expressions may be moderated by the distress level of the perceiver, because the signal value of the face changes under those circumstances.

Specifically, facial expressions are generally perceived in terms of the emotional state of the person expressing the emotion (Ekman & Friesen, 1975), but also in terms of the behavioral requirements of that state for the perceiver (for discussions of the affordances signaled by facial expressions, see, e.g., Buck, 1991, 1999; Burgoon, Buller, & Woodall, 1996; Chovil, 1991; Fridlund, 1994; Frijda, 1986; Knutson, 1996; McArthur & Baron, 1983). For instance, sadness signals a need to be taken care of, which places the perceiver in a caretaker role; anger signals the necessity to handle conflict, which places the perceiver in either an attack or a negotiating role. But the meaning of the emotional state communicated by a facial expression differs for a perceiver who is distressed. In this case, the facial expression conveys information about the availability of the expresser of the emotion to provide support for the distressed perceiver. In particular, sadness and anger signal unavailability caused by self-preoccupation and hostility, respectively. Thus, individuals who are not distressed would process facial expressions as invitations for them, the perceivers, to engage in intimate social interaction. When individuals are distressed, facial expressions of others would be processed in terms of the availability or willingness of the person expressing the emotion to provide support.

How is this analysis related to the perception of the offset of facial expression as assessed by the morph task? In fact, the precise processes measured by the morph task are not yet clear. The Niedenthal et al. (2000) result was interpreted in terms of the facilitated encoding of emotion-congruent information. In the present research, we supposed that attachment orientation also influences the efficiency of perceptual encoding and that this influence may be attributed to individual differences in interpersonal motivations. Thus, for example, individuals who eschew or fear interpersonal interactions, and the associated behavioral requirements, may consciously or unconsciously avoid processing cues that invite such interactions. In the context of the morph task, this means they would see the offset of a facial expression that signals such an interaction earlier than an individual without the desire to avoid such interactions. The complimentary prediction would be made for individuals who tend to seek interpersonal interaction; they would process more efficiently evidence that invites such interaction.

Present Hypotheses

Given that, as we have argued, the signal value of a facial expression differs depending on the level of distress experienced by the perceiver, we conducted two experiments. In the first, experiment, individuals with different attachment orientations performed the morph task without having been made distressed by the experimental situation. In the second experiment, participants were induced to feel distressed before performing the morph task. The predictions for the first study are presented here, and the predictions for the second study, which are based on the same reasoning about differences in perceptual processing among the insecure groups presented below, are outlined in a later section.

In the first study, participants were not experiencing distress, and did not, consequently, have to deal with their own emotional states. Thus, facial expressions were expected to be processed in terms of the fact that they signal opportunity for interpersonal interaction. The same predictions concerning the influence of attachment orientation on behavior in the morph task were made for all three facial expressions because all three signal an invitation for social interaction of some sort: Happy emotional expressions are invitations to the perceiver to approach the expresser; sadness is a signal that the expresser needs to be cared for, and is in a submissive position, finally, expressions of anger demand conflict resolution on the part of the perceiver (Knutson, 1996).

Responses of secure individuals were used as a baseline or standard with which the insecure groups were compared. We were rather confident about predicting differences from the secures for the preoccupied and fearful groups. The preoccupied individuals crave closeness and are vigilant to cues related to intimacy. Thus, compared with secures the preoccupied individuals were expected to see the offset of emotional expressions at a later point in the morph movies. The fearful individuals, who fearfully avoid intimacy and invitations for closeness, were, in contrast, expected to see the offset of such expressions earlier than secures. More

difficult were predictions about dismissive individuals. This was the case because, although clearly not a measure of representational processes, the morph task, as mentioned, is not strictly a measure of automatic processes. Therefore, we could not be sure how much higher order (e.g., defensive processing) it actually assessed.

Findings from past research that used measures of automatic processes suggest similarities between the preoccupied and dismissive individuals. Specifically, although dismissive individuals typically report that attachment concerns are not important to them, this denial is often not observed on more implicit measures. On such measures, dismissives actually reveal heightened concern with intimacy (e.g., Crittenden & Ainsworth, 1989; Mikulincer, Florian, & Tolmacz, 1990). Thus, at an implicit level, dismissives seem to have a way of processing attachment cues similar to that of the vigilant and intimacy-craving preoccupied individuals. Indeed, the typical differences between the two attachment orientation groups may emerge later in processing. For example, with regard to perceiving facial expression, dismissives may encode facial cues very efficiently with the ultimate aim of avoiding or repressing the information (Fraley et al., 1998; see Halberstadt & Niedenthal, 1997, for a discussion of this process), and preoccupieds may also encode such information efficiently, but with the ultimate aim of processing, even obsessing about it, further. So, the initial encoding behavior as measured by the morph task may be similar for these two groups. With this reasoning, the dismissives like the preoccupieds would be predicted to see the offset of facial expressions later in the morph task than the secure group.

However, if the morph task is also sensitive to higher order defensive processes, such as the conscious desire to avoid intimacy, then the dismissives could behave more like the fearfuls and see the offset of facial expressions significantly earlier in the morph movies than the secure group. Our analytic strategy tested these two hypotheses: dismissives could be similar to preoccupieds and see the offset of facial expressions later than secures as evidence of their largely unconscious concerns with intimacy, or else they could behave more like fearfuls and see the offset of expressions earlier than secures, as evidence of their more defended denial of a need for intimacy.

Study 1

Method

Participants

Individuals who took part in a prescreening of introductory psychology students (*N* was approximately 600) completed the Bartholomew and Horowitz (1991) Relationships Questionnaire (RQ), which contains four paragraphs that describe prototypic examples of four attachment orientations: secure, preoccupied, fearful avoidant, and dismissing avoidant. Respondents chose the paragraph that best described how they felt about their intimate relationships. Individuals from all four categories were called in order to recruit equal numbers of participants of each attachment orientation until eventually 108 individuals, between 20 and 28 in each category, agreed to participate in a study of face perception. (Assignment of participant to attachment orientation group was ultimately determined by measurement during the subsequent laboratory session. This initial selection was done to be sure to sample approximately equally across groups.) Participants received either course credit for their introductory psychology class or payment ($5) for their efforts. The responses of 8 participants were removed from the data set because these participants did not complete the morph task or because they did not perform the procedure as instructed (they either did not run the movie at all or they systematically played it to the end, thus yielding data composed largely of 1 s and 100 s). Among the remaining 100 participants, 57 were women and 43 were men.

Materials

Pictures of 10 happy, sad, angry, and neutral faces of actor–models were selected for use in the study. These images are part of a larger set of photographs pretested on a group of 83 participants who established the validity of the actors' facial expressions (e.g., Halberstadt & Niedenthal, 1997; Niedenthal et al., 2000). The face of the same individual did not necessarily appear in each facial expression category. Pretesting revealed that the selected faces displayed good examples of happy, sad, and angry expressions. On 1–7 scales, respectively, pretest participants provided an average happiness rating of 6.21 for the happy faces, an average sadness rating of 4.74 for the sad faces, and an average anger rating of 5.48 for the angry faces.

Morph software (Maxwell, 1994) was used to map a set of anchor points onto an image of an actor expressing an emotion and onto an image of the same actor expressing a neutral emotion. The Morph program then produced a digital 640- $\times$ 480-pixel movie composed of 100 facial composites, such that successive composites changed a mathematically equal degree toward the neutral face. Thus, for each emotional face (expressing happiness, sadness, and anger) we created a movie in which the facial expression became gradually neutral. (See Figures 1–3 for example frames from the morph movies.) In the main experiment, the movies were presented, and the data collected on Dell 450DE computers.

Procedure

Between 1 and 4 participants arrived at the laboratory at a time, and signed informed consent forms after hearing that the experiment involved the categorization of faces. The experimenter, who was unaware of attachment orientation as measured by the RQ, accompanied participants to individual experimental rooms.

Once installed in their cubicles, participants were told that the task involved two types of face categorizations, one relating to emotion and the other relating to gender. Participants performed four practice trials—two emotion trials and then two gender trials, in a fixed order—while the experimenter observed and answered questions. On each of the emotion

Figure 1. Five approximately equally spaced frames, including first and last, of a happy-to-neutral morph movie.

Figure 2. Five approximately equally spaced frames, including first and last, of a sad-to-neutral morph movie.

trials, the first frame of a happy-to-neutral or a sad-to-neutral morph movie was displayed on the screen. A sliding bar appeared at the bottom of the screen. By dragging the bar from left to right with the mouse, the participant manually played the movie, changing the facial expression to its neutral expression. The speed at which the movie played depended on the speed with which the sliding bar was operated. The movie did not run ballistically once it was begun. The sliding bar operated in both directions, so the movie could be replayed if the participant desired.

Participants were instructed to slide the bar from left to right, and to stop at the first frame in which they perceived that the face no longer expressed its initial emotion. It was emphasized that the initial emotion was the expression on the face when the sliding bar was in the extreme left (i.e., starting position). No emotion label was provided. Participants clicked the mouse on a button at the bottom of the computer screen when the frame of emotion change had been determined. The button registered the frame at which the movie was stopped in a data file, and then replaced the image on the screen with the first frame of the next movie.

On the gender practice trials, the faces changed sex from female to male, or the reverse, over the course of the morph movie. Participants were instructed to indicate the point at which the face no longer resembled a face of an individual of the initial sex. Such trials were not actually presented on experimental trials, however, and will not be discussed further.

When the participants indicated that they understood the morph task, they were told that they should continue with the experimental trials, and were asked to alert the experimenter when the trials had been completed. There were 60 trials, composed of two repetitions each of the 10 happy, 10 sad, and 10 anger expression movies. The order of movie presentation was randomized for each participant. The experimenter was not present in the cubicle during the experimental trials.

After the morph task had been completed, participants filled out both a scale that measured their present emotional state (the Brief Mood Introspection Scale [BMIS]; Mayer & Gaschke, 1988) and the 36-item Experiences in Close Relationships Scale (ECR; Brennan et al. 1998). The scale is composed of 18 items each that measure the anxiety dimensions of attachment orientation mentioned previously.

Results

Attachment Orientation

Participants' attachment orientation was determined in two ways by using Brennan et al.'s (1998) scoring instructions for the ECR. First, an avoidance score and an anxiety score were calculated for each participant. Then, participants were assigned to one of the four attachment orientations based on equations involving the classification coefficients (Fisher's linear discriminant functions) generated from a sample of $N = 1{,}082$ U.S. college students (Brennan et al., 1998). The four groups were secures ($n = 28$), preoccupieds ($n = 32$), dismissives ($n = 13$), and fearfuls ($n = 27$).

Emotional State

A first analysis considered the possibility that naturally occurring emotional states (admittedly measured at the end of the experiment) differed across attachment orientation groups. Because Niedenthal and colleagues (Niedenthal et al., 2000; Niedenthal et al., 2001) found that emotional state moderates the detection of facial expression offset, differences between groups in emotional state would confound the present findings.

A happiness score was computed for each participant by averaging ratings of the happy, content, peppy, lively, and active items on the BMIS, and a sadness score was calculated by averaging the sad, gloomy, tired, and drowsy items on the BMIS (see Niedenthal & Setterlund, 1994, for details). In addition, for this research, an anger score was calculated by averaging participants' ratings of the grouchy and fed up items (which were correlated at .47, $p < .001$).

A 4 (attachment orientation) $\times$ 3 (emotion score) mixed analysis of variance (ANOVA) revealed only an effect of emotion score, $F(2, 192) = 32.02$, $p < 001$, indicating that participants were overall less angry ($M = 1.80$) than they were happy ($M = 2.49$) or sad ($M = 2.47$). Most important for the present purposes, attachment orientation did not interact with emotion score, $F(6, 192) = 0.63$, *ns*, indicating that naturally occurring emotional states did not differ across attachment orientation groups. Participants' anger ratings were moderately correlated with perceived offset of facial expression, such that the more anger a participant felt, the longer he or she perceived the presence of anger on the face ($r = .18$, $p = .08$). This emotion congruence finding is consistent with the findings of Niedenthal and colleagues (2000). No other naturally occurring emotion was related to the perception of expression offset.

Figure 3. Five approximately equally spaced frames, including first and last, of an angry-to-neutral morph movie.

Facial Expression Offset

To examine the relationship between attachment orientation and the perception of emotional expressions, we first averaged the offset frames on the 20 trials (two replications of each individual face) for each of the emotional expressions, thus producing three average offset scores (happy, sad, and anger) for each participant. These scores were the dependent variables submitted to the main analyses.

The analytical strategy closely followed the suggestions made by Abelson and Prentice (1997). For each offset score and for each theoretical prediction, we first created a contrast that described the hypothesized rank ordering of the means. Given that there were four experimental groups, three orthogonal contrasts were needed to use all the degrees of freedom. Thus, we created two additional contrasts that were orthogonal to the first contrast and to each other. All three contrasts were entered simultaneously as independent variables in a multiple regression analysis. A result was considered consistent with the theoretical prediction when the following two conditions were satisfied: (a) the first contrast was statistically significant and (b) the two remaining contrasts, as a set, were not statistically significant. The second condition tests whether there is any variance left to explain after the variance explained by the contrast of interest has been removed. According to Abelson and Prentice, this procedure ascertains that the first contrast—the only one that is theoretically meaningful—is a parsimonious and accurate description of the rank ordering of means.

Abelson and Prentice (1997) suggested testing the second condition by performing an omnibus two-df test. As it turns out, such a test is a relatively lenient test of the second condition. One can imagine two contrasts, one of which is statistically significant just below the .05 level and one of which explains virtually no variance at all. If one were to test these two contrasts in an omnibus test, the result would probably be nonsignificant. As a consequence, the second condition would be considered to be satisfied, despite the fact that one of two contrasts actually captures a significant amount of the variance. To avoid this problem, we tested the variance explained by the two contrasts in a one df test. The *F* value was obtained by dividing the sums of squares associated with the two contrasts (as a set) by the mean square error of the error term. This is the most conservative test of the second condition one can imagine because it is equivalent to testing the best possible 1-df contrast for all the remaining variance. If that test is not significant, then there is no possibility that any other contrast is significant. To summarize, we applied the Abelson and Prentice method for testing specific contrasts, but we used a somewhat more conservative criterion for the second of the two conditions specified above.

Happiness offset. The mean scores for happy faces are shown in the left panel of Figure 4. The first hypothesis regarding the perception of happy faces is that preoccupied and dismissive individuals see the offset of the expression later than secure individuals, whereas fearful individuals see the offset earlier than secure individuals. The hypothesis corresponds to the Contrast A (−.25, +.75, +.75, −1.25, for secure, preoccupied, dismissive, and fearful participants, respectively). Two additional contrasts were created (−1, .25, .25, .5; and 0, −1, +1, 0) to produce a full

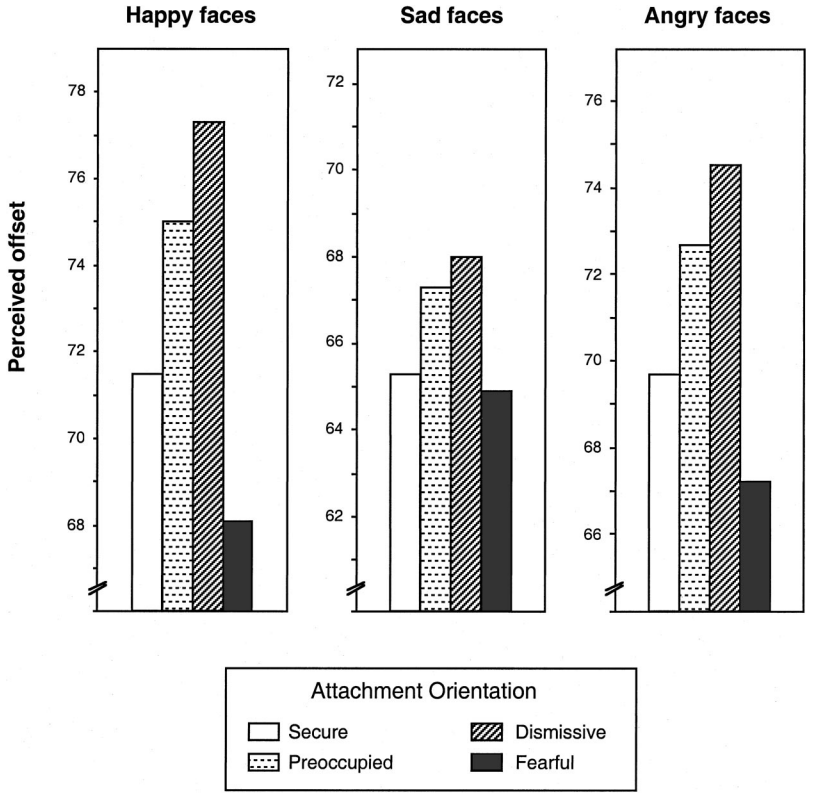

Figure 4. Mean offset scores for happy, sad, and angry faces, grouped by attachment orientation (Study 1).

set of three orthogonal contrasts. A multiple regression analysis in which participants' happy offset scores were regressed on all three contrasts revealed that the first contrast was statistically significant, $F(1, 96) = 6.27$, $p < .02$, $r^2 = .06$, The test examining the amount of variance explained by the remaining two contrasts was not significant, $F(1, 96) = 0.32$, *ns*, $r^2 < .005$. This pattern of results indicates that Contrast A is an accurate and parsimonious description of the data. The contrast captures a large part of the variance in the perceived offset of happy faces (Condition 1), and once this part of the variance is removed, there is nothing left to explain (Condition 2).

A second theoretical prediction for happy expressions was similar to the previous one, the only difference being that dismissive individuals would behave more like fearfuls than preoccupied individuals. In other words, a plausible hypothesis is that preoccupied individuals see the offset of this expression later than secure individuals, and that dismissive and fearful individuals see the offset earlier than secure individuals. The Contrast B (.25, +1.25, −.75, −.75, for secure, preoccupied, dismissive, and fearful participants, respectively) corresponds to this rank ordering of means. As before, two additional contrasts were created (+1, −.5, −.25, −.25, and 0, 0, −1, +1) and included as independent variables in the analysis. The analysis yielded a nonsignificant effect for the first contrast, $F(1, 96) = 0.33$, *ns*, $r^2 < .005$, and a significant effect for the remaining two contrasts as a set, $F(1, 96) = 4.78$, $p < .05$, $r^2 = .05$. None of the two conditions specified above is satisfied. As such, one may conclude that the Contrast B provides an inappropriate description of the data. To summarize, it seems that in comparison with secure individuals, preoccupied and dismissive individuals saw the offset of happy expressions relatively late, whereas fearful individuals saw the offset of these expressions relatively early.

Sadness offset. The mean scores for sad faces are shown in the middle panel of Figure 4. The same two theoretically derived predictions as those proposed for happy faces were tested. These two hypotheses correspond to the Contrast A (−.25, +.75, +.75, −1.25), and Contrast B (+.25, +1.25, −.75, −.75, for secure, preoccupied, dismissive, and fearful participants, respectively). The analysis of Contrast A and its associated orthogonal contrasts revealed nonsignificant effects both for the contrast of interest, $F(1, 96) = 1.29$, *ns*, $r^2 = .01$, and for the two orthogonal contrasts as a set, $F(1, 96) = 0.19$, *ns*, $r^2 < .005$. The analysis of Contrast B also yielded two nonsignificant effects, $F(1, 96) = 0.05$, *ns*, $r^2 < .005$, for the contrast of interest, and $F(1, 96) = 1.12$, *ns*, $r^2 = .01$, for its two associated orthogonal contrasts. None of the two theoretical predictions we considered plausible was confirmed by the data.

Anger offset. The mean scores for angry faces are graphed in the right panel of Figure 4. The two hypotheses for angry faces paralleled those for happy and sad faces, and the same Contrasts A and B were used in the multiple regression analyses. Contrast A was an accurate and parsimonious description of the rank ordering of means: Contrast A was statistically significant, $F(1, 96) = 7.37$, $p < .008$, $r^2 = .07$, but the two orthogonal contrasts that were tested at the same time as Contrast A were not statistically significant, $F(1, 96) = 0.38$, *ns*, $r^2 < .005$. Contrast B, however, provided an unsatisfactory description of the rank ordering of means: The contrast of interest was not statistically significant, $F(1, 96) = 0.41$, *ns*, $r^2 < .005$, but the remaining two contrasts as a set were statistically significant, $F(1, 96) = 5.61$, $p < .05$, $r^2 = 06$. Thus, neither of the two conditions specified by Abelson and Prentice (1997) were satisfied for Contrast B. The results for angry faces thus closely parallel those for happy faces: Only Contrast A appears to be a satisfactory description of the data. According to this contrast, preoccupied and dismissive individuals saw the offset of the expressions later than secures, whereas fearful individuals saw the offset earlier than secures.

Gender

The ratio of men and women in each attachment orientation group varied between 1:0.6 (for dismissive) and 1:2.1 (for secure). Thus gender analyses were considered feasible. No main effects of gender in the perception of facial expression offset were observed. Analyses also revealed that gender did not interact with attachment orientation in predicting the perception of facial expression offset. The only effect of theoretical interest was a significant Gender × Emotion Expression interaction considering only negative emotions, $F(1, 92) = 5.64$, $p < .02$, $r^2 = .06$. As can be seen in Figure 5, women tended to see the offset of sad expressions later than men (*M*s = 66.50 and 65.06, respectively), whereas they saw the offset of angry expressions earlier than men (*M*s = 69.98 and 71.41, respectively).

Residual Scores

Given that emotional state, as measured with the BMIS, produces variance in the process of interest (see Niedenthal et al., 2000), we re-ran the above-mentioned analyses, but this time with offset scores in which the variance explained by emotional state had been removed. Specifically, we regressed each of the three offset scores (happy, sad, and angry) onto the participants' scores for naturally occurring happiness, sadness, and anger, yielding three residual offset scores. These were the dependent variables submitted to the main analyses. The analyses closely replicated the results reported above. Contrast A was an accurate and parsimonious description of the offset of happy and angry faces (and Contrast B was not), whereas neither of the two contrasts seemed to capture a substantial part of the variance in sad offset scores.

Dimensional Analyses

As mentioned in the introduction, a number of authors (e.g., Fraley & Waller, 1998; Griffin & Bartholomew, 1994; Simpson et al., 1996) have conceptualized attachment orientation as a two-dimensional space in which individuals vary in the extent to which they are anxious (about abandonment) and avoidant (of intimacy). To test whether such a conceptualization makes better predictions for the offset of emotional expressions than the categorical approach, we conducted three regression analyses in which we regressed each of the three offset scores on participants' anxiety and avoidance scores (see the computation of the attachment orientation at the beginning of the *Results* section). There were no significant effects. We also conducted regression analyses in which we first transformed the anxiety and avoidance scores into mean deviation form and then added the interaction term to the regression model. Again, no significant effects emerged for any of the types of facial expression. More complicated analyses in which

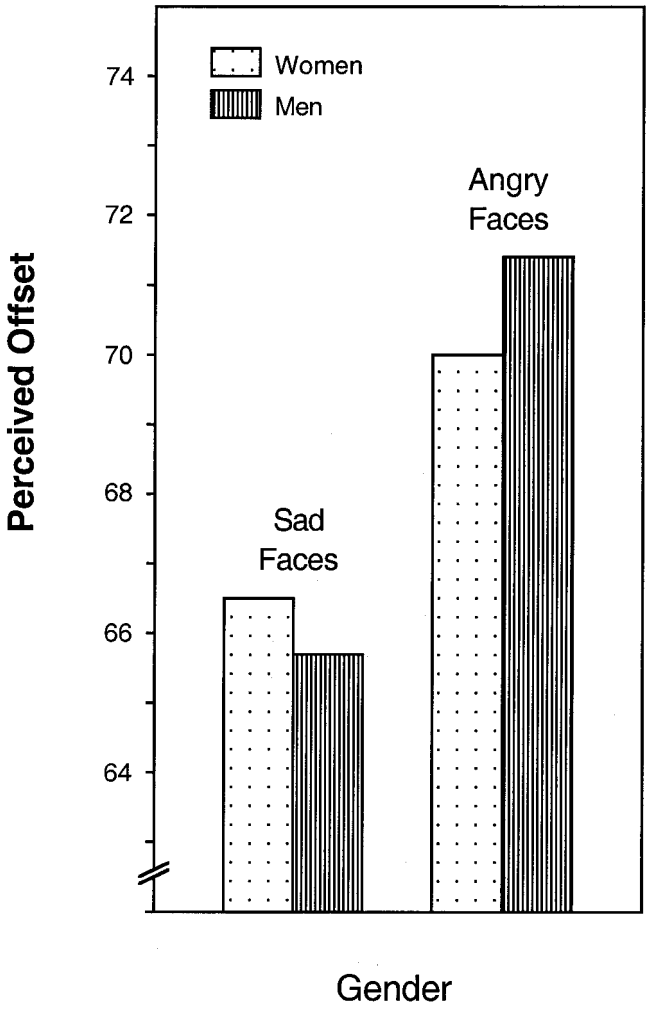

Figure 5. Mean offset scores for sad and angry faces, grouped by gender category (Study 1).

gender, or even the interactions of gender with avoidance and anxiety were added to the regression models all yielded nonsignificant results.

Discussion

The first study revealed some expected and sensible differences in how individuals with different attachment orientations process the dissolution of a facial expression from a face under nonstressful conditions. We predicted specific patterns of processing of facial expression across attachment orientation, but did not necessarily expect this pattern to differ by facial expression type. Thus, in testing the categorical model of attachment orientation, we tested the same sets of contrasts for all facial expressions. In fact, the same pattern was observed for happy and angry faces only.

As expected, at least for the happy and angry faces, fearful individuals saw the offset of the expression significantly earlier than did the secure individuals. Furthermore, consistent with our first hypothesis, both dismissive and preoccupied individuals saw the offset of these expressions later than secures, suggesting a vigilance to both positive and negative social cues, probably at early (nondefensive) levels of processing. Such a finding may represent preoccupation with these kinds of social cues by individuals with both types of attachment orientation. In the case of dismissives, this efficient processing would probably later be met with defensive avoidance of the information, and in the case of preoccupieds, the information would be passed to higher levels of processing.

We also tested the hypothesis that dismissive individuals behave like the fearful group and show avoidance of the processing of facial expression in this task. There was no support for this second hypothesis. When combined with past findings suggesting that on more implicit measures dismissive individuals are quite concerned with intimacy issues, the findings therefore suggest that the morph task assesses perceptual processes that are rather undefended in nature.

Unexpectedly, there was no observed influence of attachment orientation on the perception of the offset of sad expressions. We suggested that sadness signals the need to be taken care of, and we suspected that, as with happy and angry expressions, the offset of this expression would be perceived differently by individuals with different attachment orientations. Because this was not the case, the present finding should be replicated before it is strongly interpreted. However, it is possible that sadness is a less ambiguous signal and that the behavior requirements on the part of the perceiver are more stereotyped and less emotionally taxing than are the other two. This would make the sad expression less open to being perceived in terms of elicited attachment motivations.

Finally, it must be noted that the analyses conducted with the continuous variables of anxiety and avoidance did not yield significant results. We reserve discussion of this null finding for the *General Discussion* Section.

Study 2

The second study was a replication of the first, with one major change and one smaller technical change. The major change involved inducing a level of distress in participants, using a procedure developed by Simpson et al. (1992). Specifically, participants who had been recruited with the same procedure as that followed in the first study were told that they would be participating in two separate studies. The first study was described as a simple computer task concerned with face categorization, and the second was a physiological study, which required that a baseline pulse be taken. After the pulse was taken, the experimenter continued the distress induction by reading a description, based on that used by Simpson et al., (1992), which indicated that the second study typically evoked heightened anxiety and distress in participants, but which failed to disclose details about the procedure of the study. After the paragraph was read to the participants, they were encouraged to look into the room where the procedures were supposedly going to take place. The "distressing room" was a dimly lit cubicle at the end of a hall. A large machine that measured heart rate, systolic blood pressure, and diastolic blood pressure was placed in between a TV monitor and a computer on a desk. Unattached wires spilled over the machine and tabletop so that the equipment appeared unassembled. An old wooden chair with wires attached to it was placed in front of the desk. The experimenter mentioned that the equipment was not ready, but

would be by the time participants completed the computer task. After participants had looked into the room, they followed the experimenter into a cubicle where they received further instructions and performed practice morphing trials. They then continued with the morphing experiment.

A smaller technical change involved the morph movies themselves. For faster presentation, the files were compressed into 480- × 335-pixel movies. The movies were presented, and the data collected, with a customized program (based on the one used in the first study) created with MacroMedia Director software. The software was developed for, and the movies were presented on MacIntosh, rather than IBM, personal computers. Unfortunately, the changes from the first experiment in the presentation size, speed of the display, and type of personal computers used, do not allow for direct comparisons of the raw offset scores across the two sets of results. However, it was the within-study, across-attachment-style differences that were of interest.

Under conditions of distress, we predicted differences among the attachment orientation groups in the perception of offset of the negative facial expressions of sadness and anger, but not in the perception of happy expressions. Sadness and anger signal an unavailability of the expresser to the person in distress, albeit unavailability for different reasons. This unavailability is of special concern to insecurely attached individuals.

Regarding differences among insecurely attached individuals, we expected, first, that all insecure groups would see the offset of the negative facial expressions of emotion later than the secure group because of their concern, under distress, that a "safe haven" does not exist for them. We expected that this would be particularly true for the fearfuls who have the fewest psychological resources (i.e., neither feelings of worthiness of self nor feelings that others can be trusted). Although preoccupied and dismissive individuals may also be strongly motivated to process negative facial cues, feelings of distress (induced by the experimental manipulation in this case) might actually reduce the efficiency of processing of these individuals. Preoccupied individuals do not manage negative emotions well, and it is possible that when feeling distress they actually direct processing resources to their own emotional state at the expense of the efficient encoding of external stimuli. This would counteract somewhat the effect of their distress-heightened vigilance, yielding a perceived offset later than the secures, but still earlier than the fearful group. At the same time, equally consuming emotion management strategies engaged in by the dismissive individuals could also counteract the efficiency of their processing of facial expression information. Specifically, it could be that dismissives devote processing resources to dissipating or repressing their ambient feelings of distress at the expense, again, of efficient processing of external stimuli (Fraley et al., 1998; Simpson et al., 1996). According to this account, and consistent with the pattern of findings in the first experiment, the dismissives and preoccupieds would behave similarly to each other (although again, for slightly different reasons) in their tendency to see negative facial expressions lasting longer on a face than secure individuals, but not as long as the fearful individuals.

As in the first experiment, we also tested the hypothesis that the dismissive group would behave most similarly to the fearful group. It is certainly possible that adult dismissive individuals have become so expert at dissipating their negative emotions that they do not need to devote substantial processing resources to do so (Fraley & Shaver, 2000). If so, they may process negative facial expressions of emotion very efficiently and, along with the fearful individuals, see the offset of such emotions later than both secures and preoccupieds.

Results

Attachment Orientation

We calculated the attachment orientation of the participants in the same manner as in Study 1. The four groups were secures (n = 26), preoccupieds (n = 32), dismissives (n = 16), and fearfuls (n = 25).

Emotional State

The first analysis again examined naturally occurring emotional states. Happiness, sadness, and anger scores were calculated as in the first experiment.

A 4 (attachment orientation) × 3 (emotion score) mixed ANOVA revealed a main effect of emotion, $F(2, 190) = 31.56$, $p < .001$, indicating that participants were, as in the first experiment, less angry (M = 1.73) than they were happy (M = 2.38) or sad (M = 2.39). There was also a main effect of attachment orientation, $F(3, 95) = 3.01$, $p < .05$. Secure participants tended to have higher scores (M = 2.34) than insecure participants (Ms = 2.08, 2.13, and 2.16, for preoccupied, dismissive, and fearful participants, respectively). Again, attachment orientation did not interact with the emotion scores, $F(6, 190) = 1.28$, *ns*.

We also created an anxiety score from the BMIS by calculating the average of the two items nervous and jittery, which were correlated at .40, $p < .001$. A single-factor ANOVA comparing anxiety levels across attachment orientation groups showed no effect of orientation, $F(3, 95) = 0.86$, *ns*. Thus, the manipulation appeared to have been equally effective across attachment orientation groups. To evaluate, to some degree, the relative effectiveness of the manipulation, we compared these scores with those of participants in the first experiment. An independent samples t test revealed that the participants in the second experiment (M = 1.93) were significantly more anxious than the participants (M = 1.70) in the first experiment, $t(197) = 2.21$, $p < .03$. Given that these ratings were provided at the end of the experiment and that participants, although not yet debriefed, had performed a nonstressful task in-between having been told about the second part of the experiment, and completing the BMIS, this is probably an underestimate of the tension actually experienced during the morph task. This might also explain why no differences in anxiety across the attachment groups were observed, as has been observed in past studies (e.g., Simpson et al., 1992).

Facial Expression Offset

Offset scores were again averaged over the 20 trials in which the same type of facial expression was initially present. The same analytic procedure as in Study 1, adapted from Abelson and Prentice (1997), was used to analyze the data from Study 2. As a reminder, the first step of this procedure was to create a contrast of interest for each of the theoretical predictions. Then, two additional contrasts were created that were orthogonal to the first contrast and to each other. Multiple regression analyses were

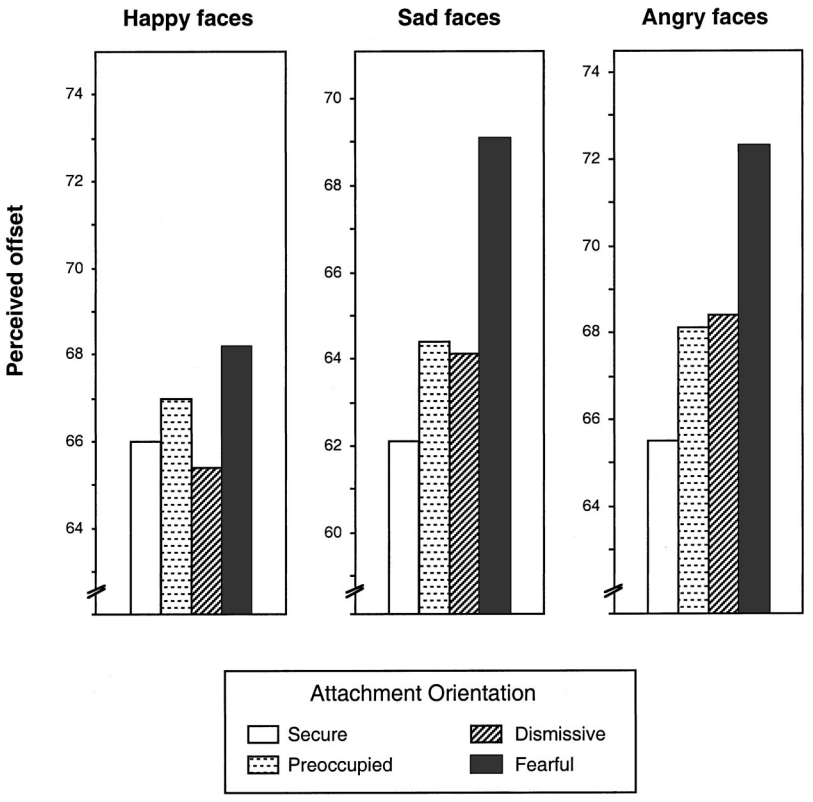

Figure 6. Mean offset scores for happy, sad, and angry expressions, grouped by attachment orientation (Study 2).

performed with the three contrasts as independent variables and the offset scores as dependent variables. A given contrast is considered satisfactory when its regression coefficient is reliably different from zero and, at the same time, the two other contrasts, as a set, explain a nonsignificant proportion of the variance.

Happiness offset. The mean scores for happy faces are shown in the left panel of Figure 6. In the introduction, we stated that we expected to find no differences in the offset of happy faces as a function of attachment orientation. This prediction corresponds to the null hypothesis according to which there are no differences between experimental groups. We examined this hypothesis in a 1-*df* test in which we compared the amount of variance explained by attachment orientation with the total amount of variance in the happy offset scores. Applying the same logic as the one we had used to test Abelson and Prentice's (1997) second condition, we simply regressed the happy offset scores onto three orthogonal (Helmert) contrasts and then calculated the *F* value by dividing the sums of squares associated with the three contrasts (as a set) by the mean square error of the error term. This test yielded a nonsignificant result, $F(1, 95) = 0.39$, *ns*, $r^2 < .005$, suggesting that attachment style was unrelated to perceived offset of happy faces. Of course, it is never possible to accept the null hypothesis. The only conclusion one can draw is that the data are consistent with the idea that there were no differences between secure, preoccupied, dismissive, and fearful individuals with regard to the perception of offset of happy faces.[1]

Sadness offset. The mean scores for sad faces are shown in the middle panel of Figure 6. The first hypothesis regarding the perception of sad faces was that fearful individuals see the offset of sad expressions much later than secure individuals, and preoccupied and dismissive individuals are somewhere in between. This hypothesis corresponds to the Contrast C (−1, 0, 0, +1, for secure, preoccupied, dismissive, and fearful participants, respectively). The two additional contrasts were 0, −1, +1, 0, and −1, +1, +1, −1. A multiple regression analysis yielded a significant effect for the first contrast, $F(1, 95) = 4.83$, $p < .04$, $r^2 = .05$, and a nonsignificant effect for the remaining two contrasts as a set, $F(1, 95) = 0.32$, *ns*, $r^2 < .005$, thus providing relatively good support for the above-mentioned hypothesis.

[1] Some readers may wonder why we did not simply test our prediction in an omnibus test with 3 degrees of freedom. Mathematically, the omnibus test and the test we report here are very similar. The only difference is that the numerator is divided by three in the omnibus test, whereas this is not the case in the test we conducted. No surprise, then, that the omnibus test yields an *F* value that is exactly one third of the *F* value we reported above, $F(1, 95) = 0.13$, *ns*, $r^2 < .005$. Conceptually however, the two tests ask quite different questions. The omnibus test asks whether one is entitled to reject the null hypothesis according to which the means in all four experimental groups are the same (H_0: $\mu_1 = \mu_2 = \mu_3 = \mu_4$). The null hypothesis in "our" 1-*df* test states that among all possible contrasts describing rank ordering of means, there is not a single one that will yield a significant effect. Given that we predicted the null hypothesis, this latter test is the more conservative test. If that test is nonsignificant, we know that there is no possibility that any 1-*df* contrast predicting a particular rank ordering of means is significant.

We also considered a plausible alternative hypothesis according to which fearful and dismissive individuals see the offset of happy expressions much later than secure individuals, and preoccupied individuals are somewhere in between. The Contrast D (−1.25, −.25, +.75, +.75, for secure, preoccupied, dismissive, and fearful participants, respectively) describes this alternative hypothesis. This contrast was tested, together with two other orthogonal contrasts (+.5, −1, +.25, +.25, and 0, 0, +1, −1) in a multiple regression analysis. The analysis yielded two nonsignificant effects for both the contrast of interest, $F(1, 95) = 2.48$, *ns*, $r^2 = .02$, and for the two orthogonal contrasts as a set, $F(1, 95) = 1.87$, *ns*, $r^2 = .02$. In sum, Contrast C, but not Contrast D, seems to provide an accurate and parsimonious description of the rank ordering of means for the offset of sad expressions.

Anger offset. The mean offset scores for angry faces are shown in the right panel of Figure 6. The two hypotheses for angry faces paralleled those for sad faces, and the same Contrasts C and D were used in the multiple regression analyses. As before, Contrast C described the data quite satisfactorily: The contrast itself was statistically significant, $F(1, 95) = 4.32$, $p < .05$, $r^2 = .04$, whereas the two additional contrasts associated with Contrast C virtually explained no variance at all, $F(1, 95) = 0.10$, *ns*, $r^2 = < .005$. And just as with sad faces, Contrast D provided an unsatisfactory description of the rank ordering of means. Neither Contrast D, $F(1, 95) = 2.71$, *ns*, $r^2 = .03$, nor its associated contrasts as a set, $F(1, 95) = 1.08$, *ns*, $r^2 = .01$, were statistically significant. To summarize, these data suggest that the negative emotional expressions of sadness and anger produce similar effects in distressed individuals. Insecure individuals generally see the offset of these expressions later than secure individuals. Among the insecure attachment orientations, fearful individuals see the offset of sad and angry expressions later than preoccupied and dismissive individuals, whose offset scores are approximately halfway between secure and fearful individuals.

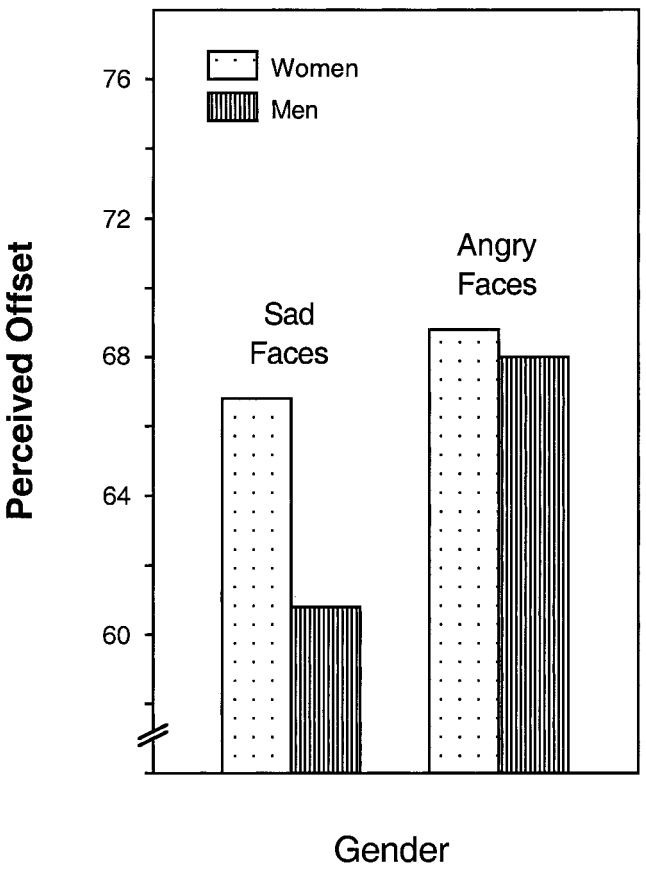

Figure 7. Mean offset scores for sad and angry faces, grouped by gender category (Study 2).

Gender

No main effects of gender in the perception of facial expression offset were observed. Analyses also revealed that gender did not interact with attachment orientation in predicting the perception of facial expression offset. As in Study 1, the only theoretically meaningful significant effect was a Gender × Emotion Expression interaction when negative emotions were considered, $F(1, 91) = 9.74$, $p < .002$, $r^2 = .10$. As can be seen in Figure 7, women tended to see the offset of sad faces later than men (*M*s = 66.21 and 60.79), whereas women and men did not differ in their perception of the offset of angry faces (*M*s = 68.16 and 67.99, respectively). This effect, also observed in the first study, is consistent with some previous demonstrations of gender differences in the perception of expressions of anger (Wagner et al., 1986). It may also reflect the idea that men and women are differentially comfortable with and socialized to experience—without conflict—these two emotions (e.g., Lewis & Saarni, 1985; Radke-Yarrow & Kochanska, 1990; Stapley & Haviland, 1989).

Residual Scores

As in Study 1, we conducted the above-mentioned analyses again, but this time with residual offset scores in which the variance explained by naturally occurring happiness, sadness, and anger had been removed. Again, the analyses closely replicated the results reported above in that all significance levels stayed the same.

Dimensional Analyses

Regression analyses in which we regressed each of the three offset scores onto participants' avoidance score and anxiety score, either with or without the interaction term, all yielded nonsignificant effects. As in Study 1, no significant effects emerged when gender or interactions of gender with avoidance and anxiety were added to the regression models.

General Discussion

The purpose of the present set of experiments was to examine the influences of attachment orientation in the perception of facial expression of emotion, and, in particular, perception of the offset of a facial expression. In Study 1, the participants, who represented four attachment orientations (Bartholomew & Horowitz, 1991; Brennan et al., 1998), and who were not induced to experience distress, played morph movies in which happy, angry, and sad expressions became gradually neutral. In Study 2, the procedure was replicated, only this time distress was induced by telling

participants that they would later engage in an anxiety-producing experimental task. The stimulus individuals, whose faces expressed happiness, sadness, and anger, were presented in computer movies, and they were strangers to the viewer–participants. We suspected that attachment orientation would nevertheless influence the perception of these faces because emotional expressions invite interpersonal interaction and thus can engage attachment concerns. Furthermore, we suspected that these influences would be moderated by the level of distress experienced by the perceiver. We suggested that individuals who have not been distressed perceive facial expressions as affording intimate interpersonal interaction and that individuals who have been distressed process facial expressions in terms of the availability of the expresser to provide support. Of course, distress was manipulated across rather than within study in this research, so differences observed here should be replicated in a single study in which distress is manipulated between participants. However, as expected, we observed different patterns of influences of attachment orientation across the two studies.

Under no distress, fearful individuals perceived the offset of happy and angry expressions earlier than secure individuals, who were used as a baseline, and preoccupied and dismissive individuals perceived the offset of these two expressions later. We interpret the early perception of facial expression offset under conditions of no distress to be a reflection of the fact that fearful-avoidant individuals generally shy away from emotional information and invitations to interpersonal interaction (Bartholomew & Horowitz, 1991). Under distress, however, these are the individuals who should feel the most vulnerable and the least prepared for dealing with the emotions involved in both desiring and not receiving support. The fact that they continued to see evidence of negative facial expressions as those expressions dwindled away may be a reflection of the cognitive processes that result from this vulnerability. Of course, this vigilance does not have to imply subsequent skill or effectiveness in using the emotional information that has been perceived (e.g., Dalgleish & Watts, 1990).

Interestingly, preoccupied and dismissive individuals behaved similarly to each other in both studies. Specifically, they saw the offset of happy and angry faces later than secures when not experiencing distress, and they saw the offset of sadness and anger later than secures, but earlier than fearfuls, when they were experiencing distress. We proposed earlier that the results of the first study may suggest that, at least as detected by more implicit measures, dismissive individuals are keenly attuned to the occurrence of intimacy-related stimuli in their environment. Their well-known defensiveness regarding the importance of intimacy may come into play at a later stage of processing. The difference between dismissives' more conscious denial of a need for intimacy, and the preoccupations that characterize some of their unconscious, and perhaps automatic perceptual behaviors (e.g., Main, 1981; Mikulincer et al., 1990), makes predictions about these individuals' behavior somewhat complicated. Further study of the role of attachment orientation in automatic attentional and perceptual activity would therefore be of great interest (Fraley et al., 1998; also discussed later).

In the second study, preoccupied and dismissive individuals behaved similarly to each other in seeing the offset of negative emotions somewhat earlier than fearfuls, although later than secures. Seeing evidence in favor of a facial expression is an indicator of efficient processing. Why were the preoccupieds and dismissives less efficient than the fearfuls? We suggested in outlining our predictions that, when experiencing stress, those two groups devote significant processing resources to managing their emotional states. We know that preoccupieds do not handle their own negative emotions well. Perhaps when stressed, then, they focus on the self at the expense of processing other stimuli. The dismissives also may devote processing resources to managing their own states, in this case, in the attempt to repress feelings that their attachment needs will surely not be met. Although consistent with past work (e.g., Cassidy, 2000; Mikulincer & Florian, 1998; Shaver & Hazan, 1993; Simpson & Rholes, 1994; Simpson et al., 1996), this interpretation should also be examined in research specifically designed to examine the allocation of processing resources.

Processing of Specific Facial Expressions

We predicted that attachment orientation would influence the perception of the offset of all three facial expressions—happiness, sadness, and anger—quite similarly in the first study, in which distress was not induced. Instead, results revealed that the manner in which attachment orientation influenced the perception of the offset of facial expression was similar only for happiness and anger. There were no differences in the point at which individuals with different attachment orientations perceived the offset of sadness. We suggested earlier that it could be that happiness, which invites approach, and anger, which demands conflict resolution, are more complicated interpersonal signals, the perception of which is more vulnerable to the motivations and defenses associated with attachment orientation. Sadness, an appeal for caretaking, may be a clearer or less ambiguous signal that elicits fewer of the motivations associated with attachment orientation.

Results of the second study revealed no differences between attachment groups in their perception of the offset of happiness. This was unsurprising to us as we expected the negative facial expressions to be more important in a distress situation. We expected all insecurely attached individuals to continue to see evidence of negative facial expressions longer than secure individuals, and this was indeed the case, particularly for the fearful group.

The lack of influence of attachment orientation in the perception of sad faces in the first study and in the perception of happy faces in the second study, thus relies on a particular interpretation of what those expressions mean under conditions of no distress and distress. In future research, it would be useful to examine facial expressions that have even less relevance to social interaction and to support. For instance, the stimulus material could include morph movies in which an expression of disgust is seen to slowly disappear from the face. Disgust could be argued to communicate little about interpersonal interaction at all, and very little about the availability of the expresser to provide support to a distressed perceiver. Thus, across the kinds of studies conducted here, involving no distress and distress, we would expect attachment orientation to play no role in the perception of the offset of a disgust expression.

Attachment and Mechanisms of Perception

The fact that the dismissive and preoccupied groups performed many times in similar ways on the morph task, but are known to deal with emotions quite differently and to have different interpersonal motives (Shaver & Hazan, 1993), suggests that finer grained analyses of the attention to and perception of emotional information by individuals with different attachment orientations will be necessary. Although the morph task probably measures, to some degree, the efficiency of encoding of information, as mentioned above it is also sensitive to other processes. This is because both automatic and controlled processes can operate, and because the time course of responding is quite long. Thus, for example, although preoccupied individuals may be experts at detecting or encoding negative relationship information, they may also tend to become so quickly absorbed in their emotional reactions to that information that they discontinue further processing. Responding on the morph task can be influenced by both of these processes. This is important because, as Halberstadt and Niedenthal (1997) pointed out, paraphrasing Dalgleish and Watts (1990), "even if participants do orient their attention to a particular stimulus, or spend more time looking at it, this does not necessarily mean that the stimulus received further processing, or provide insight into the nature of that processing" (p. 1020). Attention and perception tasks that measure processes occurring at different points in the time course from attention, to encoding, to operating on the resulting percept would provide a fine-grained look at the influences of attachment style on the perceptual end of the perception–cognition continuum. A variety of such tasks already exist in the attention and perception literatures.

Nevertheless, the advantages of the morph task are clear. The task can capture differences in the nature of a facial expression that is seen by one group of individuals as containing some evidence of an emotional expression, and by another group as expressing neutral emotion. This difference has enormous consequences for the interpersonal interaction that follows the facial gesture. For example, the perception (perhaps by a nondistressed, dismissive individual) that another person no longer needs to be taken care of, because their sadness has passed, will motivate the individual to redirect themselves away from the caretaking role to some other activity. The perception (perhaps by a distressed, preoccupied individual) that an another person is still angry will lead the individual to persist in appeasement behaviors that could be more irritating and destructive than actually necessary. Thus, clearly the investigation of the perception of offset of facial expression provides greater insight into the processes underlying attachment behavior, and goes well beyond the description of the emotional experiences and behaviors that characterize adults—and infants—with different attachment tendencies.

Summary

In spite of the acknowledged limitations of this research, we believe that two claims are supported by its findings. First, attachment orientation does indeed appear to influence the lower level cognitive process of perception; in particular, the timing of the perceived offset of facial expressions of emotion. The observed pattern of results seems sensibly related to the typical motivations associated with attachment orientation revealed by past research on emotion and emotion regulation. Second, attachment orientation appears to influence the perception of facial expressions of different emotions in different ways. In the first study, the perception of happy and angry, but not sad, expressions differed over attachment orientation groups. In the second study, perception of the two negative expressions of sadness and anger was influenced by attachment orientation, but perception of happiness was not. We propose that the differences were due to the different meanings of facial expressions in contexts of distress and no distress. Thus, in a study with a different experimental design, we expect that attachment orientation would interact with distress level and facial expression type in predicting perceived offset of facial expression. Clearly, then, the role of attachment orientation in processes of attention and perception and the interpretation of emotional expressions to individuals with different attachment orientations are issues of great interest for future research.

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