The Ripple Effect: Emotional Contagion and Its Influence on Group Behavior

Sigal G. Barsade
Yale University

Group emotional contagion, the transfer of moods among people in a group, and its influence on work group dynamics was examined in a laboratory study of managerial decision making using multiple, convergent measures of mood, individual attitudes, behavior, and group-level dynamics. Using a 2 x 2 experimental design, with a trained confederate enacting mood conditions, the predicted effect of emotional contagion was found among group members, using both outside coders' ratings of participants' mood and participants' self-reported mood. No hypothesized differences in contagion effects due to the degree of pleasantness of the mood expressed and the energy level with which it was conveyed were found. There was a significant influence of emotional contagion on individual-level attitudes and group processes. As predicted, the positive emotional contagion group members experienced improved cooperation, decreased conflict, and increased perceived task performance. Theoretical implications and practical ramifications of emotional contagion in groups and organizations are discussed.

Understanding shared social processes in groups is becoming increasingly important as firms move toward a greater team orientation. These shared social processes can serve as a conduit for a variety of group interactions and dynamics important to getting work done. Interestingly, research on the influence of shared social processes has focused almost exclusively on its cognitive aspects—how ideas and cognition are shared among group members. This can be seen in the social-information processing literature, which focuses on how people are influenced by the cognitions and attitudes of others in their social environment (e.g., Salancik and Pfeffer, 1978; Bateman, Griffin, and Rubinstein, 1987; Shetzer, 1993), as well as in research examining shared social cognitions, which also focuses exclusively on the process through which people construct and share thoughts, ideas, and memories (e.g., Moreland, Argote, and Krishnan, 1996; Cannon-Bowers and Salas, 2001).

While understanding how people share ideas adds to the knowledge of group dynamics, it does not give a complete picture. One also needs to take into account the sharing of emotions, or emotional contagion, that occurs in groups. The importance of emotions in organizational behavior, particularly at the individual level, has been solidly established (see Brief and Weiss, 2002, for a review), and researchers have begun to turn their attention toward understanding the processes and outcomes of collective emotion (see Barsade and Gibson, 1998; Kelly and Barsade, 2001; George, 2002, for reviews). Some theorists have gone so far as to say that "feelings may be the way group entities are known" (Sandelands and St. Clair, 1993: 445) and that the development of group emotion is what defines a group and distinguishes it from merely a collection of individuals.

Implicit attention has been paid to collective emotion in the organizational behavior literature, with many organizational processes grounded in such affective relations of group members as morale, cohesion, and rapport (Tickle-Degnen and Rosenthal, 1987). The advancement of the emotions lit-

0001-8392/02/4704-644/$3.00.

I would like to thank Barry Staw, Charles O'Reilly, JB, Ken Craik, Jennifer Chatman, J. Turners, Batia Wiesenfeld, John Nezlek, Linda Johanson, Joe Porac, Keith Murnighan, Sara Manning, and three anonymous *ASQ* reviewers for their help and the positive emotional contagion they have induced.

erature in psychology has also allowed for a more focused and explicit examination of collective emotion. George and colleagues showed that not only do group emotions exist, but these emotions, which they call group affective tone, can influence work outcomes (George, 1989, 1990; George and Brief, 1992). In a study of senior management teams, Barsade et al. (2000) found that a group's affective diversity, another way of conceptualizing group emotion, also had an effect on individual attitudes and team dynamics. But the question remains, what is the process by which these effects occur?

While literature on shared cognitions can provide some insight into how collective emotions occur via emotional contagion, there are some important differences between emotional and cognitive contagion. First, the transfer of ideas is qualitatively different from the transfer of feelings. Words are central to understanding ideas yet are least important in understanding emotions, for which nonverbal cues are primary (Mehrabian, 1972). Because of the importance of these nonverbal cues, direct interpersonal contact is important for the transmission of emotions in groups. Conversely, sharing cognitions need not occur face to face (Ilgen and Klein, 1988). There are also some differences in the amount of effortful processing involved in cognitive and emotional contagion. Although emotional contagion can contain elements of purposeful processing found in cognitive contagion—such as the evaluation, interpretation, expectation, and personal goals found in the sharing of ideas (Salancik and Pfeffer, 1978)—emotional contagion research studies show that emotional contagion most often occurs at a significantly less conscious level, based on automatic processes and physiological responses (e.g., Hatfield, Cacioppo, and Rapson, 1994; Neumann and Strack, 2000).

Organizational and psychological researchers have begun to investigate the question of emotional contagion through field studies examining mood convergence in work teams. In a field setting, Totterdell et al. (1998) found evidence that the moods of teams of nurses and accountants were related to each other even after controlling for shared work problems. Totterdell (2000) found the same results in professional cricket teams, controlling for the team's status in the game. In a study of meetings of 70 very diverse work groups, Bartel and Saavedra (2000) also found evidence of mood convergence. Similar to Totterdell and colleagues, Bartel and Saavedra showed that work-group mood is something that can be recognized and reliably measured by members in the work group, as well as by observers external to the group. Bartel and Saavedra also examined antecedents to the mood convergence processes and found positive relationships between mood convergence and stable membership in the group, norms about mood regulation in the group, and task and social interdependence. In Totterdell's studies, being older, along with a complex of factors related to being interdependent and satisfied with the team (i.e., more committed to the team, perceiving a better team climate, being happier and engaging in collective activity) were antecedents to mood congruence.

These group mood studies offer excellent external validity that shared emotions occur in organizational work teams and can be recognized and measured, but they showed only concurrent mood convergence, which makes it difficult to determine causality. What remains to be done is a more causal test of emotional contagion and how its processes operate in groups, as well as an examination of the consequences of emotional contagion on group dynamics, such as cooperation and conflict, as well as on individual attitudes, cognition, and behavior.

A MODEL OF EMOTIONAL CONTAGION

This study focuses on emotional contagion, "a process in which a person or group influences the emotions or behavior of another person or group through the conscious or unconscious induction of emotion states and behavioral attitudes" (Schoenewolf, 1990: 50), in particular, the contagion of everyday moods in work groups. Similar to cognitive contagion, emotional contagion is a type of social influence (Schachter, 1959: 15; Cacioppo and Petty, 1987; Levy and Nail, 1993), and it is a process that can occur at both subconscious and conscious levels (Druckman and Bjork, 1994; Totterdell, 2000; Kelly and Barsade, 2001). What is not at all similar to cognitive contagion is the content of the contagion and, often, the processes by which it is "caught."

Following Hatfield, Cacioppo, and Rapson (1994), I use the term emotion in this paper as a broad label, similar to that of "affect," both of which interchangeably encompass the general phenomenon of subjective feelings (e.g., Ashforth and Humphrey, 1995), and use literature from a variety of feeling states to understand contagion processes, both for semantic ease and to reflect the commonality of the overall affective experience suggested by psychological researchers (e.g., Mayer, 1986; Forgas, 1992: 230). This is not to say that there are not differentiable affective constructs. The three most basic types of affective experiences are dispositional affect, emotions, and moods. Dispositional affect is a long-term, stable variable (Watson, Clark, and Tellegen, 1988) that, by definition, would not be prone to contagion but could influence it. Emotions are intense, relatively short-term affective reactions to a specific environmental stimulus (Reber, 1985). Moods, as compared with emotions, are weaker, more diffuse affective reactions to general environmental stimuli, leading to relatively unstable short-term intra-individual changes (Tellegen, 1985), and can change readily. A mood, or emotional state, as described by Lazarus (1991: 47), "is a transient reaction to specific encounters with the environment, one that comes and goes depending on particular conditions." Because of the more broad-ranging effects that moods have been shown to have as compared with other types of affect (Mayer et al., 1991; Rosenberg, 1998: 253), and as everyday moods seem most representative of the commonplace and malleable affective short-term changes that can occur in groups, I focus on contagion of mood here as a logical place to begin the study of group emotional contagion.

While research examining specific contagion processes has been conducted in dyads rather than groups (e.g., Hsee et

al., 1990; Sullins, 1991; Hatfield, Cacioppo, and Rapson, 1992, 1994), it is still very helpful in constructing a model of how group emotional contagion processes operate. When people enter a group, they are exposed to other group members' emotions, which can be characterized by the valence (positive or negative) of the emotion being displayed and the energy level with which the emotion is expressed. The choice of these two factors is based on the circumplex model of emotion, which has been supported at both the physiological (Nyklicek, Thayer, and van Doornen, 1997) and psychological levels (Larsen and Diener, 1992). The concept behind this model is that emotions are arranged in a circumplex, with the x axis representing the emotional valence (degree of pleasantness) and the y axis representing the energy or activation level (Russell, 1980). Given that contagion and its outcomes may vary depending on the valence of the emotion and the degree of energy with which it is expressed, to understand contagion it is important to examine the differing combinations of all of these factors. For example, while both hostility and depression are unpleasant emotions, the energy level with which this unpleasantness is expressed may lead to different contagion outcomes and group consequences.

The expression of these emotions is then perceived by other group members, primarily via nonverbal signals (facial expression, body language, and tone) rather than words (Mehrabian, 1972). Hatfield, Cacioppo, and Rapson (1992, 1994) posited that the degree to which emotional contagion then occurs is mediated by attentional processes, with greater contagion occurring when more attention is allocated. Attentional processes can be influenced by external factors inherent to the emotion, such as the type and level of energy with which the emotion is expressed, or by internally generated individual differences influencing attention to others' emotion, such as sex (Doherty et al., 1995; Lundqvist, 1995), differences in tendencies toward spontaneous mimicry (Laird et al., 1994), and in the general propensity to catch others' emotions (Doherty, 1997).

The next step in the emotional contagion process involves the actual mechanisms by which emotions are transferred: subconscious, automatic, "primitive emotional contagion" (Hatfield, Cacioppo, and Rapson, 1992), and more conscious emotional comparison processes (e.g., Gump and Kulik, 1997; Sullins, 1991). To date, most evidence for emotional contagion comes from the automatic, primitive contagion approach, which focuses on the subconscious and automatic transfer of emotions from person to person. This primitive contagion occurs through a very fast process of automatic, continuous, synchronous nonverbal mimicry and feedback (Hatfield, Cacioppo, and Rapson, 1992, 1993, 1994). Psychological researchers have found that the first step of this process involves automatic, nonconscious mimicry, in which people spontaneously mimic each others' facial expressions (Dimberg, 1982; Lundqvist and Dimberg, 1995), body language (Bernieri, 1988; Chartrand and Bargh, 1999), speech patterns (e.g., Ekman, Friesen, and Scherer, 1976), and vocal tones (Hatfield et al., 1995; Hietanen, Surakka, and Lin-

nankoski, 1998; Neumann and Strack, 2000). These mimicry effects, which have been found in studies examining infants, some as young as a few days old (e.g., Field et al., 1982; Haviland and Lelwica, 1987), are posited to come from an innate human tendency toward mimicking the behavior of others (Davis, 1985; Levenson, 1996; Wild, Erb, and Bartels, 2001).

The second step of this primitive contagion process comes from the afferent feedback people receive from mimicking others' nonverbal behaviors and expressions—an automatic process. As myriad facial, postural, and vocal feedback studies have shown, once people engage in the mimicking behavior, they then experience the emotion itself (e.g., Duclos et al., 1989) through the physiological feedback from their muscular, visceral, and glandular responses (see Hatfield, Cacioppo, and Rapson, 1994, for a review; Adelman and Zajonc, 1989; Laird and Bresler, 1992). One can ultimately become aware of feeling this emotion, but the initial processes that lead to it are subconscious and automatic (Hatfield, Cacioppo, and Rapson, 1994).

There is some evidence that there is a second, more cognitively effortful set of processes through which emotional contagion can occur. There are social comparison processes in which, after determining the amount of attention to be paid, people compare their moods with those of others in their environment and then respond according to what seems appropriate for the situation (e.g., Schachter, 1959; Adelman and Zajonc, 1989; Sullins, 1991). In this case, the recipient uses the emotion as a type of social information to understand how he or she should be feeling. Empathy, a multifaceted construct (Davis, 1983), has an emotional contagion component—defined as people either seeing or anticipating another person's emotional display and then experiencing it with them—as an explicit component (Stiff et al., 1988). But the cognitive process of perspective taking, which involves putting oneself in the other person's position, is generally posited to come first, with emotional contagion following.

Regardless of the mechanism employed, it is clear that there is strong evidence from dyads to expect emotional contagion to occur in groups and that two factors in the type of emotion emitted will influence the degree of emotional contagion: emotional valence and emotional energy. Given the power of prior laboratory results, as well as the initial evidence in the field studies examining the convergence of mood in groups, it is reasonable to expect these same processes to operate in groups. Thus, as a starting point, I propose the following general hypothesis:

Hypothesis 1: There will be contagion of mood among group members.

Emotional valence. Unpleasant emotions should lead to greater emotional contagion than pleasant emotions. Both psychological and organizational research has shown that people respond differentially to positive and negative stimuli, and negative events tend to elicit stronger and quicker emotional, behavioral, and cognitive responses than neutral or

positive events (see Cacioppo, Gardner, and Berntson, 1997; Rozin and Royzman, 2001, for a review). People also tend to pay more attention to and place more weight on negative information, as shown in impression formation studies (Kanouse and Hanson, 1972) in which subjects perceived negative words or personal attributes as more negative than they perceived equally matched positive words as being positive (e.g., Hamilton and Zanna, 1972; Crandall, 1975). Negative emotions have also been found to be the default value in cases of nonexplained arousal (Marshall and Zimbardo, 1979; Maslach, 1979). When people try to determine their affective state through social comparisons, cues about negative rather than positive emotions have been found to be more relevant to them.

The emphasis on unpleasant versus pleasant affect has also been found in organizational contexts, such as in hiring decisions (Hollmann, 1972; Robbins and DeNisi, 1994) and auditing behavior (Ashton and Ashton, 1990). This negativity has been shown to be self-perpetuating (Kemper, 1984). Once negativity begins between two actors, it can continue to escalate, spiraling into increasingly greater negativity between them (Raush, 1965), which can help explain why Bartel and Saavedra (2000) found that work groups were more likely to converge toward unpleasant moods than they did toward pleasant moods. Given Bartel and Saavedra's findings, the literature supporting greater attention and a tendency to respond to the negative rather than to the positive, and that this attention and response creates an opportunity for both automatic mimicry and social comparison to occur (Rosekrans, 1967), I propose the following hypothesis:

Hypothesis 2: Unpleasant emotions are more likely to lead to mood contagion than are pleasant emotions.

Emotional energy. Emotional energy refers to the intensity with which emotions are expressed and then communicated from one person to another. It involves the pitch level, pitch range, loudness, and tempo with which someone speaks (Scherer, 1981), as well as nonverbal behavior such as gestures and facial patterns (see Wallbott and Scherer, 1986, for a review). The same emotion (in terms of valence or pleasantness) expressed with greater levels of energy should lead to more contagion because of the greater amount of attention, and thus opportunity for contagion, given to a person behaving with high energy. For example, a high-energy expression of unpleasantness (e.g., hostile irritability) should lead to stronger contagion effects than a low-energy expression of unpleasantness (e.g., depressed sluggishness). There are several reasons for this. People who express their emotions more forcefully (Robinson and McArthur, 1982) or expressively (Friedman et al., 1980) are noticed more and thus receive higher levels of exposure, which allows for a better opportunity to transfer their emotions to others (Sullins, 1989, 1991). In a direct test of this concept, Friedman and Riggio (1981) used the Affective Communications Test to rate subjects as either high or low expressors of emotion and then put them in a room, telling them to sit and look at each other, but not speak, for two minutes. Supporting the effect of the forcefulness with which emotions are

expressed, Friedman and Riggio found that there was significantly greater contagion from subjects who were high or strong expressors of emotion to those who were low expressors of emotions than vice versa.

A high-energy display of positive or negative emotion may also transfer emotion more powerfully because it communicates the emotional message more clearly and accurately than a low-energy display. For example, depression, a low-energy display of emotion, has been correlated with low accuracy in its transmission to others, that is, others did not understand the subject was depressed (Prkachin et al., 1977; Gerson and Perlman, 1979). Extroversion, in contrast, which is very similar to highly energetic positive emotion, has been linked to greater accuracy of transmission to others: people understood the type of emotion being conveyed (Buck, 1984: 195). Research conducted by Mehrabian (1972) helps to explain these results. In a study of emotional communication, Mehrabian found that when interacting with others, only 7 percent of subjects' emotional understanding of the other person stemmed from the words spoken, while 38 percent and 55 percent were attributed to verbal tone and facial expression, respectively.

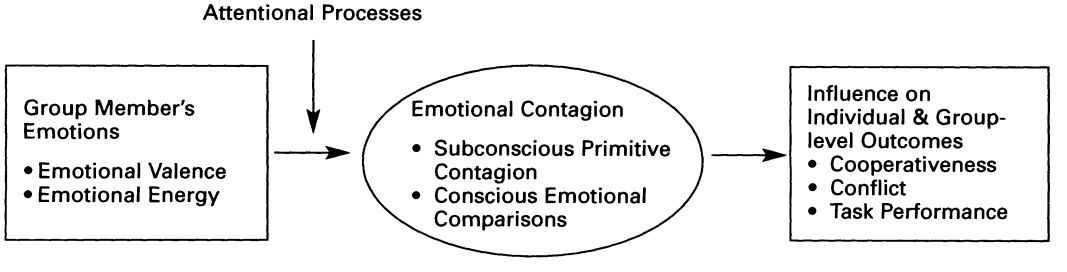
Last, physiological studies of emotion show that energy intensifies emotional experiences. High arousal has been found to lead to an increase in autonomic nervous system responses (e.g., heart rate acceleration, skin conductance, facial activity) and has been shown in longitudinal blood pressure studies to be an important indicator of affective involvement (Jacob et al., 1999). These effects, along with the psychological effects of energy on emotional experiences, leads to the third hypothesis:

Hypothesis 3: The same emotional valence (pleasant or unpleasant) expressed with high energy will lead to more contagion than if expressed with low energy.

Influence of Emotional Contagion on Individual and Group Processes

Figure 1 outlines a model of emotional contagion as developed from the literature reviewed above. The final step is the influence that the emotional contagion processes have on individual- and group-level processes and outcomes. This influence can occur from contagion being a direct source of information in its own right for providing information about how the group is doing (Frijda, 1988). The social affective information (Parkinson, 1996) that is transferred among mem-

Figure 1. A model of group emotional contagion.



bers communicates a type of group appraisal of events influencing the group (Hess and Kirouac, 2000), as well as information about "group cohesion (e.g., smiles as semiotic for acceptance, approval, and bonding) and group survival (e.g., fearful facial displays and vocalizations as a means for alerting other members of the group to imminent danger)" (Levenson, 1996: 186).

Emotional contagion can also serve as a method for infusing individuals and groups with more positive or negative moods, which literature in psychology shows can then influence cognitions, behaviors, and attitudes (Lazarus, 1991; Damasio, 1994). Work by Forgas, Bower, and colleagues has shown that affect can influence people's cognitions (see Bower, 1981; Fiedler and Forgas, 1988; Singer and Salovey, 1988, for a review), particularly regarding social information (Forgas, 1994). This would include social judgments and behavior, with affect playing a powerful role in how people react cognitively and behaviorally to a variety of social situations (see Clark and Isen, 1982, for a review), including influencing cognitions and behavior within (e.g., Forgas, 1990) and between groups (Dovidio, Gaertner, and Loux, 2000).

In terms of behavior particularly important in groups, feeling positive affect has consistently been shown to lead to more helpful and cooperative behavior in adults and children (e.g., Isen and Levin, 1972; Chertock, 1974; Marcus, 1987), a relationship manifested via prosocial behaviors in the workplace as well (George and Brief, 1992). In negotiations, Baron (1990) found that subjects in more positive moods in a negotiating exercise behaved more cooperatively in making concessions, and Forgas (1998) found that being in a good mood led to greater cooperation, and a bad mood led to less cooperation, in a negotiation task. Examining mood and behavior in an organizational context, George (1991) found that positive moods in salespeople led to greater customer-helping behaviors. In discussing their model of the relationship between positive mood and extrarole work behaviors, George and Brief (1992) suggested that positive mood will lead to more extrarole behaviors because there will be greater goodwill spread in the group due to increased social interaction and positive thoughts about the organization. Thus, I hypothesize:

Hypothesis 4: Positive emotional contagion, that is, an increase in positive mood, will lead to greater cooperativeness on both an individual and group level.

The same type of results have been found with the influence of unpleasant moods and conflict. Conflict is generally associated with the existence of negative emotions (e.g., Evans, 1965; Gero, 1985; Jehn, 1995) and can also be escalated by negative moods, particularly as negative moods have been associated with rejection of others, while positive moods are associated with acceptance of others (Carver, Kus, and Scheier, 1994). Thus, if positive emotional contagion occurred in a group, there would be a movement toward positivity and a concurrent decrease in negativity, which would be related to a decrease in internal group conflict. This ameliorative effect of positivity can be seen in an experiment conducted

by Baron (1984) in which a subject and a confederate played the role of executives discussing an organizational problem. The confederate was trained to disagree strongly with the subject in either an aggressive or a reasonable way. After the conflictual encounter, subjects were then either assigned to a control condition or to one of three experimental conditions designed to induce positive states. While all subjects preferred the reasonable to the aggressively disagreeable confederate, subjects who experienced an induction of positive feelings were significantly more likely to favor constructive versus destructive modes of dealing with the conflict (and liked the confederate better) than subjects who were in the control condition. Carnevale and Isen (1986) found a similar result in a negotiation setting in which positive affect was associated with less contentious negotiating tactics. Based on the findings above, positive emotional contagion is likely to have a similar effect on conflict in a group:

Hypothesis 5: Positive emotional contagion, that is, an increase in positive mood, will lead to less group conflict.

Lastly, performance and cognitive activities have also been shown to be influenced by pleasant mood. Although there is some debate about whether being happier leads to better decision making than being less happy (see Staw and Barsade, 1993, for a review), there is much evidence that positive affect is associated with greater cognitive effort and ability to engage in more complex logical reasoning and problem solving (e.g., Sullivan and Conway, 1989; Isen, 2003). Forgas (1998) found that subjects in positive moods were more effective as negotiators than those in negative moods. In organizations, both positive moods and dispositional positive affect have been found to be related to superior job performance ratings in a variety of occupations (e.g., Seligman and Schulman, 1986; George, 1991; Staw, Sutton, and Pelled, 1994; Wright and Staw, 1994). In addition, dispositional positive emotion was found to lead to better managerial decision making, leadership, and managerial potential ratings in an assessment center setting (Staw and Barsade, 1993). Positive affect has also been shown to lead to a perception of better performance and higher self-efficacy on a variety of tasks by individuals (e.g., Kavanagh and Bower, 1985; Saavedra and Earley, 1991) and groups (Heath and Jourden, 1997). Thus, it is expected that people in whom positive emotional contagion occurs will both judge themselves and will be judged by others as having better task performance:

Hypothesis 6: Positive emotional contagion, that is, an increase in positive mood, will lead people to rate their own task performance and that of others in the group more highly.

I tested these hypotheses in a laboratory study in which I used a confederate to transmit mood to a group and used multiple measures and raters to examine whether emotional contagion and its effects occurred. To compare the fleeting but recurrent affective processes of emotional contagion, a lab setting should be ideal.

METHOD

Ninety-four business school undergraduates (59 male, 32 female, and 3 sex not recorded) who were enrolled in two sections of a mandatory organizational behavior class participated in this study as part of their course requirement. The participants were randomly assigned to 29 groups consisting of a mix of students from each class. Group size ranged from two to four participants, plus a confederate, and the average number of study participants per group, not including the confederate, was 3.42 (s.d. = .60). The participants' mean age was 21.47 years (s.d. = 2.11), and 90 percent were U.S. citizens. Forty-one percent of the participants were Asian, 40 percent were white, 12 percent were Hispanic, and 8 percent were black.

Participants participated in a Leaderless Group Discussion (LGD; Development Dimensions International, 1982) that was video-taped. This is a simulated managerial exercise in which all the participants act as managers on a salary committee negotiating the allocation of a limited sum of bonus money to their employees. Each participant was assigned the role of a department head representing a candidate from his or her own department who had been put forth for a merit bonus increase. Participants were told that they needed to give a two-to-three minute presentation about their candidate. They were given two mixed-motive goals: (1) to obtain as large a bonus as possible for their candidate and (2) to aid the committee to make the best use of the available funds and maximize the benefit to the company as a whole. They were also instructed that if after reviewing the material they did not come to agreement within the allotted negotiation time, no employee would receive a bonus. LGD exercises have been found to be reliable and valid measures of interpersonal skills and activity level (Thornton and Byham, 1982: 170–176). They are very engaging and offer a rich setting in which to elicit and maintain emotional reactions.

Experimental Design

The experiment was a two-by-two between-subjects design, with participants randomly assigned to one of four experimental conditions. The two factors were emotional valence (pleasant/unpleasant) and energy level (high/low). The experiment's design and operationalization of affect were chosen because of the widespread use of the circumplex model in the psychological literature as a good descriptor of overarching affective experience (see review by Larsen and Diener, 1992), with two primary factors in the circumplex model being emotional valence and energy/activation level (Russell, 1980). Both factors were manipulated through the affect shown by a trained confederate. The confederate pleasantness conditions were coded 0 = unpleasant and 1 = pleasant, and the confederate energy conditions were coded 0 = low energy and 1 = high energy.

Procedure. Participants arrived at the experimental session knowing that they would be participating in a group managerial exercise to meet an experimental requirement for their organizational behavior class. They were seated around a table in randomly preassigned seats, with a large place card

with a letter (from A to E) in front of them. Participants used these letters to identify each other when giving ratings at the end of the experiment. Around the table were three video cameras. The cameras were aimed at all of the participants, including the confederate, although the confederate could only be seen in one of the cameras, while the other cameras taped up to two participants each. This was done to prevent the confederate from being seen later on the screen so as to lessen the possibility that video-coders would be biased by the confederate in their ratings of participants' mood and behavior. Participants could not tell which camera was recording whom.

Before beginning the negotiation exercise, participants first completed a current mood questionnaire rating how they felt "right now, that is, at the present moment." After all group members completed the questionnaire, the experimenter read them the exercise instructions. Participants were given seven minutes to review the instructions and task materials. No leader was assigned to the group. After the seven-minute review period, participants were instructed to begin their presentations in the alphabetical order of the place cards in front of them (which corresponded to their roles). The confederate always played the same role, representing the same employee's case for a merit bonus in each experimental condition, to keep the task content as similar as possible. He was always letter "A" in the group so that he could give his presentation first to avoid any differences resulting from the timing and sequence of presentation, but the point was made very strongly to participants that the order of presentation was randomly determined according to seating, so that the confederate would not unintentionally be perceived as a task leader.[1] Having the confederate always speak first not only minimized differences in participants' initial exposure to the confederate, it may also have helped to generate the stronger emotional contagion manipulation I was seeking, as research has shown that occurrences early in the life of a group can have a strong influence on subsequent group events (Gersick and Hackman, 1990). After reviewing the materials, groups had 30 minutes to present their case, negotiate, and arrive at a consensus.

Immediately after the exercise, participants completed a questionnaire that included the same mood items they rated prior to the experiment. They were asked to rate how they felt in the first and second halves of the exercise. The questionnaire also asked about group processes and included affective and performance ratings of themselves and the other group members. These ratings were used to test the group dynamics hypotheses and for the manipulation check. Participants were also asked what they believed the purpose of the experiment was.[2] After all participants completed the experiment, they were debriefed orally during a class session and in writing.

Confederate. A confederate was chosen as the means to transmit the desired affective condition (rather than relying on naturally occurring affect) because having a confederate gave greater control, reduced possible task-related variance, and in a relatively brief lab experiment a confederate could be

1
I confirmed empirically that participants did not perceive the confederate as being a differentially powerful leader by comparing leadership ratings participants gave to each other and found no significant difference for the confederate as compared with the other participants.

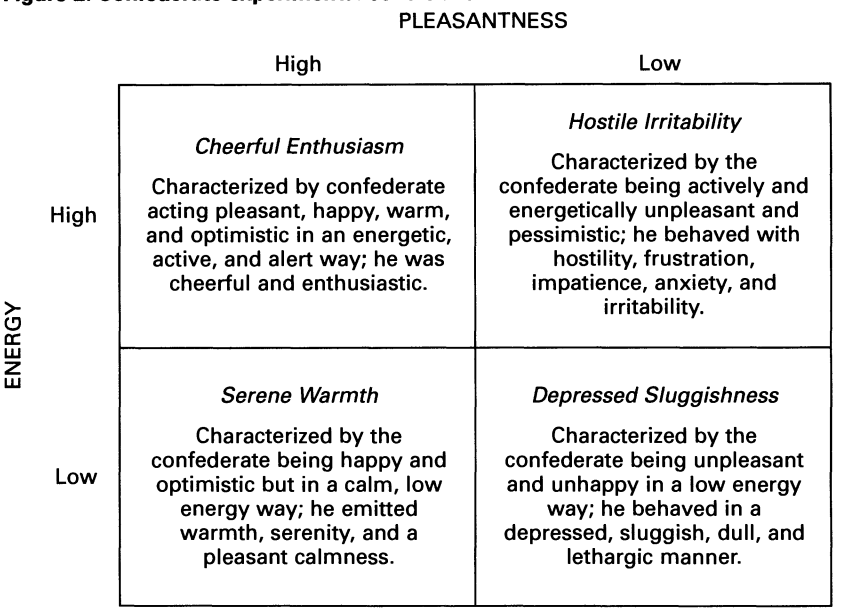
2
Most participants wrote that they thought this was an experiment about group dynamics or negotiation processes, with answers such as "to see how different people react to groups" and "to see if women and men negotiate differently." Only one participant suspected that there may have been a confederate, although she *did* not know for what purpose, and her data were removed from the analyses.

more successful in serving as a stimulus necessary for contagion to occur. I chose a male undergraduate drama student as a confederate because of the acting talent necessary to play the four different types of emotions for the four affective conditions and the need to "hold character" affectively throughout the experiment. A drama student could also dissociate personally from the task and focus completely on the emotional "acting" needed to play the role in each of the four conditions. The confederate had no personal stake in the task. All of his energies were focused on maintaining verbal and nonverbal affective character within the standardized and prescribed task role he was trained for. The same confederate played all four roles across conditions so that there would be less chance of spurious differences due to different confederates. An undergraduate rather than a graduate student was chosen to play the confederate so that he could fit in with the participants. It was not unusual for the participants not to know everyone in the group (including the confederate), as the experiment consisted of students drawn from two large classes, and participants did not know each other well ($x = 1.29$, s.d. = .47, on a scale of 1, "Did not know at all," to 5, "Know extremely well").

The confederate did not know the hypotheses or specific purpose of the study. He was extensively trained in the different nonverbal affective behaviors he needed for each condition and in keeping the more verbal task-oriented behaviors as stable as possible across conditions. For nonverbal displays of emotion, the confederate was given extensive instructions about conveying the pleasantness and energy level of the emotion, following the same classifications and protocols of nonverbal behaviors for each quadrant of the affective circumplex model created by Bartel and Saavedra (2000). For example, in the two pleasantness conditions, the confederate was told to smile frequently, whereas in the two unpleasant conditions, he did not smile at all. In the two high-energy conditions, he was told to make much eye contact, have a strong tone of voice, and speak quite rapidly. He was also instructed to sit up straight in his seat looking very intently at the other participants. He began behaving this way the moment he walked into the room for the experiment. For example, in the high-energy conditions, the confederate was instructed to take copious notes and read intently during the time given to participants to review the material. In the two low-energy conditions, the confederate spoke very slowly and had a low voice tone. He avoided eye contact with the other participants, slouched, or laid back in his seat. When he reviewed his materials, he took very few notes and did not look at the material intently. Figure 2 shows how the confederate enacted the experimental conditions.

In preparation, the confederate memorized all of the LGD exercise materials and a script for the basic verbal exchanges he would have throughout the exercise. This script included the introductory statement about his own candidate, stock responses to arguments against his candidate, and comments to make about other candidates in the exercise. Because of the free-form nature of the exercise, much of what the confederate did and said had to be improvised, but

Figure 2. Confederate experimental conditions.



the experimenter strongly emphasized to him—and monitored his performance—that the informational content of his statements had to remain as constant as possible and that only the *affective* content should change between experimental conditions. For example, the confederate's two-to-three minute speech for his candidate was verbally identical across conditions. It was the nonverbal displays (e.g., affective tone, facial expression, and body language) through which affect was inducted that differed across conditions.

Task behaviors were kept as constant as possible across conditions by also clearly instructing the confederate about task-related issues. For example, he did not volunteer how much of a merit bonus he wanted for his candidate in any condition and, if asked, suggested the same amount of money across conditions (proportionate to the number of people taking part in the exercise). He was also given explicit instructions on the monetary increments to use when he needed to compromise from his position. Additionally, he was instructed not to initiate decisions about the merit bonus allocations, so as to influence group decision-making strategies as little as possible. He was allowed to respond to such questions but was trained to attempt to deflect them back as much as possible without breaking his affective character.

While the confederate was rigorously coached in keeping the task-related nature of his behavior as steady as possible across conditions, there remains the possibility that due to the participants' reactions to the confederate's affect, there could have been perceived or actual differences in his task-related processes across conditions. Group members' and outside video-coders' ratings of the confederate's task behavior were used to control for this possibility across experimental conditions. The group-member task controls came from a one-item rating at the end of the exercise on which every group member rated every other group member (including the confederate, as the group members did not know he was

a confederate) on a 1, "Extremely low," to 9, "Extremely high," scale for the following task-relevant dimensions: contribution to the task (ICC = .59), being prosocial in the group (ICC = .38), and degree of work orientation (ICC = .39). Three video-coders independently rated these same three types of behaviors (ICC = .88 for overall contribution to the group, .95 for prosocial behavior, and .95 for work orientation). I ran all analyses with these variables as controls and found no significant effect of these variables in any of the emotional contagion or group processes analyses. The lack of significant effects of the confederate's more task-related behaviors across conditions gives additional confidence that it is the confederate's affect, and not task behaviors, that caused the changes in individual perceptions and group processes. Group members also rated the confederate (along with everyone else in the group) on degree of pleasantness and energy level displayed on the 1-to-9 scale described above. These ratings were used as the basis for the manipulation check of the confederate's affect as perceived by group members across the experimental conditions.

Emotional Contagion Measures

Emotional contagion was measured by both participants' self-reports and observers' ratings of mood via video-tape ratings of the participants interacting in the group exercise. The use of these dual measures of the emotional contagion construct is necessary for several reasons. First, having access to both types of measures of mood is important, as each has been shown to influence the contagion process (Hsee, Hatfield, and Chemtob, 1992) and yet not always give matching information. For example, Bartel and Saavedra (2000) found that observers' ratings of group mood matched self-report ratings for high-energy affect arousal better than low-energy affect (two of the experimental conditions). Methodologically, the video-coder data allow the benefit of better access to the mood being expressed by participants in real time, while self-report of mood (traditionally used in mood research, Larsen and Diener, 1992) allows a different type of access to participants' internal feeling states. Last, while facial expression is certainly a powerful gauge of emotions (Ekman and Friesen, 1975), significant differences have been found in the emotions employees express versus the emotions they display in organizational settings (e.g., Rafaeli and Sutton, 1991; Pugh, 2001).

Video-coder measures. Four video-coders were extensively trained in coding emotion through facial expression, body language, and verbal tone but were intentionally kept unaware of the experimental conditions or the purpose of the study. Much support has been found for video-coders' abilities to reliably judge facial expression and non-verbal behavior (e.g., Ekman and Friesen, 1975; Gump and Kulik, 1997), overall group mood (e.g., Bartel and Saavedra, 2000), and group dynamics (e.g., Jehn and Shah, 1996).

This set of coders viewed only the participants, not the confederate, so as to lessen the chance of coding bias due to the confederate's behavior. The coders were trained using the same work-group emotion scale created by Bartel and

Saavedra (2000), which provides coders with an extensive list of behaviors indicative of work-group mood and has been shown to be valid and reliable. The coders measured emotional contagion by watching participants' facial expressions, body language, and verbal tone throughout the course of the experiment and rating the level of a participant's pleasant mood every two minutes (at the sound of a beep) on a scale of 1 (very slightly or not at all) to 5 (very much). The two-minute segments were aggregated across coders for the second part of the experiment to create a Time 2 mood scale based on video-coders' ratings. This scale had a mean of 2.56 (s.d. = .50), with a within-rater Cronbach alpha of .82 (each two-minute segment used as an item in the Time 2 participant contagion video-coder scale). The ICC interrater reliability among the video-coders for participants' Time 2 contagion was .77. Given that this was a laboratory experiment with randomly assigned participants, who started out at the same mood level across groups (no significant difference in participants' self-reported pre-experiment Time 1 mood across experimental conditions; F = .87, n.s.), it is possible to infer that the experimental conditions caused the differences in participants' mood at Time 2. On a group level, video-coders also rated their perceptions of each group's overall level of pleasant mood on a 1–7 scale (mean = 3.75, s.d. = 1.22; ICC = .72).

Self-report measures. Participants' self-report of pleasant emotional contagion was measured as the increase between their self-reported pleasant mood right before the start of the experiment and their self-reported pleasant mood for the last half of the experiment. *Time 1 mood* is the pre-experimental mood, taken from a self-report of ten adjectives measuring participants' levels of pleasant mood immediately before the experiment. Participants were instructed to describe "to what extent do you feel this way right now, that is, at the present moment" for each adjective. This was measured on a 9-point Likert-type scale (1 = "Not at all," to 9 = "Extremely much"). The adjectives, from the pleasantness dimension of the affective circumplex model, were as follows: pleasant, happy, optimistic, and warm; unhappy, pessimistic, gloomy, lethargic, depressed, and sad, which were reversed coded. The mean of this scale was 6.78 (s.d. = 1.02), with a Cronbach alpha of .84.

The pleasantness adjectives described above, rated on a 1–9 scale, were also used to measure participants' mood during the second half of the experiment, *Time 2 mood*. At the end of the experiment, participants reported how they felt during both the first and second half of the group exercise. This differentiation was made because the first part of the discussion primarily involved preparing for and listening to presentations about each of the candidates. The participants began to negotiate actively only toward the end of the first half of the exercise. Since the majority of the social interaction occurred during the second half of the exercise, this time period was used for measuring contagion. Also, as Time 2 mood involved participants' recall over only the last 15 minutes, this measure is less prone to bias than a longer-term retrospective rating. The mean pleasant mood for participants during this

Time 2 period was 6.85 (s.d. = .98), with a Cronbach alpha reliability of .80. On a group level, at the end of the exercise, each group member also used a 1–7 scale to rate the overall level of pleasant group mood during the exercise (mean = 5.04, s.d. = .96; ICC = .31).

Individual Task Behavior

Performance. Performance ratings were obtained at the conclusion of the group exercise. The self-assessment of task performance was a standardized z-scale comprising participants' self-ratings on the following seven items: (1) their effectiveness during the group discussion, (2) their satisfaction with their performance during the group discussion, (3) their rating of their performance as compared with their perception of the average student's performance, (4) their feeling of centrality to their group, (5) their assessment of the group's level of regard for them, (6) their orderliness, responsibility, deliberation, and hard work during the group discussion, and (7) their overall contribution to group effectiveness. Items 1–6 were rated on a 1–7 scale, and item 7 was measured on a 1–100 scale. All of the items were standardized and then averaged to create one self-assessment of task performance scale, with a mean of .01 (s.d. = 71) and a Cronbach alpha of .83.

Group members also rated each other on overall contribution made to the group on a 1–100 scale. The mean (65.42, s.d. = 16.54) of the group members' rating of the participant on the 1–100 overall contribution scale was used to operationalize group members' perceptions of a participant's task performance (ICC = .30).

Cooperativeness. Participants' self-report of cooperativeness was a one-item measure, rated from 1 to 9, asking to what degree individual participants believed themselves to be affiliative, cooperative, flexible, and likable (mean = 6.23; s.d. = 1.58). Cooperativeness was also assessed by other group members' ratings of the participant. The mean of this 1–9 peer cooperativeness scale was 6.11 (s.d. = 1.32, with an ICC interrater reliability of .63).

Group Dynamics

Video-coders' ratings were used to rate group-level dynamics. After watching the entire group interaction, four coders rated group processes and dynamics on a 1 ("Not at all") to 7 ("Very much so") scale. They rated group cooperativeness and group competitiveness (reverse coded); the mean of this two-item scale was 4.07 (s.d. = .85), with an ICC of .83. Group cooperation was also measured behaviorally through the standard deviation of the percentage of funds distributed to the group members (mean = .06; s.d. = .04). The greater the cooperation, the smaller the expected standard deviation of distributed funds (i.e., there would not be large differences between group members in the amount of funds they received). The group conflict measure was the mean of the video-coders' ratings of group task and emotional conflict (one-item measures intercorrelated at $r = .84$, $p < .001$). This scale has a mean of 3.71 (s.d. = .97) and an ICC of .83.

Control variables. To control for demographic or task variables that might have influenced the process of contagion and its subsequent influence on group processes, demographic variables (participant's sex, age, and race) and task variables (percentage of the funds the participant's employee received and which employee the participant represented) were entered into the analyses.

Analysis

As group emotional contagion involves analyzing the behavior of individuals nested within groups, analyses of this phenomenon need to simultaneously take into account the individual-level factors being examined as well as differences that may occur as a result of study participants being members of different groups. Following the recommendations of statistical (e.g., Bryk and Raudenbush, 1992; Kreft and de Leeuw, 1998), group (Hoyle et al., 2001), and organizational (Hofmann, Griffin, and Gavin, 2000) researchers, the data in this study were analyzed with a series of multilevel random coefficient models using the program HLM (Hierarchical Linear Modeling; Raudenbush, Bryk, and Congdon, 2000). Multilevel random coefficient modeling is the best way to analyze grouped data (sometimes called hierarchical or nested data) because it takes into account the mathematical independence of the variances and covariances at each level of analysis (i.e., the group and the individual) and provides more accurate parameter estimates (e.g., estimates of the relationship between two variables) than comparable multilevel ordinary least squares (OLS) techniques such as within-group regression or ANOVAs (Nezlek and Zyzniewski, 1998). This ability to take the reliability of the coefficients into account becomes even more important when data structures have small numbers of observations in units (Nezlek, 2001).

There were two sets of analyses for each hypothesis, one set conducted with individual-level mood rated by video-coders as the dependent variable and the other with differences in self-reported pre- and post-experiment moods. The analyses were primarily conducted with two-level models. For each group, parameters describing the individual-level phenomena (i.e., means and covariances) were estimated, and group-level differences among these parameters were then analyzed. The basic individual-level (level 1) model was

$$y_{ij} = \beta_{0j} + \beta_{1j} + r_{ij}.$$

In this model, y_{ij} is a measure of individual level mood as rated by video-coders (or self-reported change in mood) for person i in group j; β_{0j} is a random coefficient representing emotional contagion (operationalized as the video-coders' ratings of individual-level moods, in the video-coder models, and self-reported change in individual moods, in the self-report models) of people in group j (across the i persons in the group); β_{1j} is also a random coefficient representing the mean of pre-experimental moods of people in group j (across the i persons in the group), important as a covariate controlling for participants' mood before entering the experiment; r_{ij} repre-

sents the error associated with the mood measure; and the variance of r_{ij} constitutes the individual-level residual (or error) variance. No additional covariates were found to be significantly related to individual-level mood, or mood change, but had there been, they would have been included at the individual level by including additional terms on the right-hand side of this equation (e.g., β_{2j}, β_{3j}, etc.). All covariates should initially be modeled as random effects, and fixed effects should be used only when the random error term cannot be estimated reliably (Nezlek, 2001).

In multilevel modeling, coefficients from one level of analysis are passed on to the next. As such, in the two-level models, group differences in individual-level mood as rated by videocoders (or change in mood for self-report data) were analyzed at a group level (level 2). The group-level model was:

$$\beta_{0j} = \gamma_{01}(C1) + \gamma_{02}(C2) + \gamma_{03}(C3) + \gamma_{04}(C4) + u_{0j}.$$

In this model, experimental conditions were represented by four dummy-coded (0, 1) variables. C1 was coded 1 for high-pleasant/high-energy condition groups and 0 for the other three conditions, C2 was coded 1 for the high-pleasant/low-energy condition, C3 was the high-unpleasant/high-energy condition, and C4 was the high-unpleasant/low-energy condition, and u_{0j} represented the error of β_{0j}. Differences among the groups were examined using comparisons of fixed effects (Bryk and Raudenbush, 1992: 49–52). For example, C1 and C2 represented the two pleasant-affect groups, and C3 and C4 represented the two unpleasant-affect groups, and so the "main effect" for valence of affect was examined using a contrast code of 1, 1, –1, –1. These zero-intercept, dummy-coded analyses provided the functional equivalent of the comparisons provided by a traditional ANOVA while retaining the benefits of MRCM.

RESULTS

Manipulation check. As shown in table 1, analyses of participants' perceptions of the confederate showed that the confederate successfully enacted the affective behavior required for each experimental condition. Participants who were with the pleasant confederate perceived the confederate as more pleasant than participants who were with the unpleasant confederate [overall means = 6.59 versus 3.89; $\chi^2(1) = 42.67$, $p < .001$]. Moreover, there was no significant effect of the confederate's energy level on ratings of his pleasantness, nor was there an interaction of energy and pleasantness on these ratings. With regard to energy, participants who were with the high-energy confederate perceived the confederate as more energetic than participants who were with the low-energy confederate [means = 7.68 versus 3.27; $\chi^2(1) = 152.52$, $p < .001$]. Although there was no main effect for pleasantness in the analysis of confederate energy, there was an interaction of pleasantness and energy such that both differences were significant: the difference between the high- and low-energy confederate was greater when the confederate was unpleasant (8.38 vs. 2.65) than when the con-

Table 1

Manipulation Check of Perceptions of Confederate's Pleasantness by Experimental Condition*

Confederate Affective Behavior	High Pleasantness Conditions: High pleasant high energy Group 1 (N = 23)	High Pleasantness Conditions: High pleasant low energy Group 2 (N = 21)	Low Pleasantness Conditions: Low pleasant high energy Group 3 (N = 24)	Low Pleasantness Conditions: Low pleasant low energy Group 4 (N = 23)	Chi-squared test: High vs. low pleasantness conditions	Chi-squared test: High vs. low energy conditions	Chi-squared test: Interaction between conditions
1. Participant's perceptions of confederate's pleasantness	6.95	6.29	4.13	3.65	42.67•••	1.85	.04
2. Participant's perceptions of confederate's energy level	6.98	4.14	8.38	2.65	.02	152.52•••	17.31•••

•$p < .05$; ••$p < .01$; •••$p < .001$; two-tailed test.
* Means in table are ratings given by subjects and video-coders of the confederate's level of pleasantness.

federate was pleasant (6.98 vs. 4.14). Because this difference in perceptions of the confederate's energy was unexpected, I controlled for it in all of the hypothesis-testing analyses by including it as a covariate at the individual level, and it did not change the results. Table 2 reports the means and standard deviations of each of the variables and their correlations.

Emotional contagion.[3] Hypothesis 1 examined whether emotional contagion would occur in the groups at the individual level and at the group level. Video-coder ratings of participants' Time 2 mood and participants' self-reported change in mood were used to operationalize participants' emotional contagion.

Hypothesis 1 was first tested by comparing video-coders' ratings of participants' Time 2 pleasant mood across the experimental conditions. Participants were not video-taped before beginning the experiment (Time 1), so change scores could not be analyzed; nonetheless, because participants were randomly assigned to experimental conditions, differences in Time 2 video-coders' ratings of participants' pleasant mood can be inferred to represent differences due to the experimental manipulations. To be more conservative, preexisting differences in Time 1 self-reported pleasant mood was included as a covariate at the individual level (none of the demographic or task control variables were significant covariates). Supporting hypothesis 1, this analysis showed a main effect of confederate pleasantness on ratings of participants' pleasant mood, as shown in table 3. Video-coders rated the mood of participants who were with a pleasant confederate as more positive than the mood of participants who were with a negative confederate (means = 2.75 versus 2.33). Neither confederate energy level nor the interaction of confederate pleasantness and energy significantly influenced participants' displayed pleasant mood.

Hypothesis 1 was also tested with participants' self-reported contagion, and for clarity of presentation, self-reports of contagion were operationalized as the change in participants'

3
The results reported here have experimental condition as the independent variable. The same results were found using subjects' perceptions of the confederate's valence and energy as the predictor variables.

Table 2

Correlations, Means, and Standard Deviations*

Variable	Mean	S.D.	1	2	3	4
1. Exp. condition: Confederate pleasantness	.49	.50	—			
2. Exp. condition: Confederate energy	.50	.50	—	—		
3. Confederate pleasantness rated by participants	5.20	2.29	.59**** (91)	.14 (91)	—	
4. Confederate energy rated by participants	5.55	2.70	−.01 (91)	.82**** (91)	.19* (91)	—
5. Time 1 pleasant mood (self-report)	6.78	1.02	−.14 (93)	.10 (93)	.03 (91)	.15 (91)
6. Time 2 pleasant mood (self-report)	6.85	.98	.20* (93)	−.13 (93)	.24** (91)	−.17 (91)
7. Time 2 pleasant mood minus Time 1 pleasant mood (self-report)	.08	1.07	.31*** (93)	−.21** (93)	.19* (91)	−.30*** (91)
8. Video-coder rating of participant Time 2 pleasant mood	2.56	.50	.45**** (93)	.06 (93)	.36**** (90)	−.01 (90)
9. Participant's rating of own cooperative behavior	6.23	1.58	.09 (93)	.13 (93)	.17* (91)	.11 (91)
10. Others' ratings of participant's cooperative behavior	6.11	1.32	−.06 (93)	−.08 (93)	−.03 (90)	−.04 (90)
11. Participant's rating of own performance (z-score)	.01	.71	.21** (93)	−.19 (93)	.18* (91)	−.27*** (91)
12. Others' ratings of participant's task performance	65.42	16.54	.01 (93)	−.21** (93)	−.05 (90)	−.35**** (90)

Variable	5	6	7	8	9	10	11
5. Time 1 pleasant mood (self-report)	—						
6. Time 2 pleasant mood (self-report)	.43**** (93)	—					
7. Time 2 pleasant mood minus Time 1 pleasant mood (self-report)	−.56**** (93)	.51**** (93)	—				
8. Video-coder rating of participant Time 2 pleasant mood	.02 (92)	.25** (92)	.21** (92)	—			
9. Participant's rating of own cooperative behavior	.19* (93)	.39**** (93)	.18* (93)	.22** (92)			
10. Others' ratings of participant's cooperative behavior	−.11 (92)	.11 (92)	.21** (92)	.23** (92)	.30*** (90)		
11. Participant's rating of own performance (z-score)	.08 (93)	.55*** (93)	.43**** (93)	.17 (92)	.23** (91)	.18* (93)	
12. Others' ratings of participant's task performance	−.03 (92)	.16 (92)	.17* (92)	.17* (92)	.03 (92)	.40**** (93)	.40**** (92)

$^{*}p < .10$; $^{**}p < .05$; $^{***}p < .01$; $^{****}p < .001$; two-tailed test.
* Number of subjects in parentheses. These correlations are based on single-level analysis, pooled estimates of variance.

mood from Time 1 to Time 2.[4] To control for possible relationships between amount of change and initial mood, participants' Time 1 mood was included as a covariate at the individual level (none of the demographic or task control variables were found to be significant covariates). Table 3 shows that the self-report results support the video-coder results. The mood of participants who were with the pleasant confederate became more positive over time (mean change = +.41), whereas the mood of participants who were with the unpleasant confederate became more negative over time (mean change = −.26), and these changes were significantly different from each other. In addition, there was an unexpected main effect for energy in the analysis of mood change. Low-energy groups tended to become more positive over time (mean change = +.30) compared with high-energy groups (mean change = .14). There was no interaction of

4
All the analyses were also conducted using Time 2 pleasant mood as the outcome variable predicted by Time 1 pleasant mood and experimental condition, and the results were the same as those reported here.

Table 3

Hierarchical Linear Modeling of Effect of Confederate's Emotion on Subjects' Individual-level Contagion of Pleasant Mood*

Variable	High Confederate Pleasantness: Low energy (N = 23)	High Confederate Pleasantness: High energy (N = 23)	Low Confederate Pleasantness: Low energy (N = 22)	Low Confederate Pleasantness: High energy (N = 24)	Chi-square Test: Confederate pleasantness	Chi-square Test: Confederate energy	Chi-square Test: Interaction
Video-coder ratings of participant's emotional contagion	2.76 (.51)	2.75 (.51)	2.25 (.37)	2.41 (.40)	10.30•••	.33	.40
Self-ratings of emotional contagion	.66 (1.16)	.16 (1.11)	−.07 (.99)	−.44 (1.04)	9.97•••	4.24•	.10

•$p < .05$; ••$p < .01$; •••$p < .005$; two-tailed test.
* Unstandardized beta coefficients. Standard errors are in parentheses. All analyses control for participants' self-reported Time 1 pleasant mood.

energy and pleasantness in the analysis of this measure. Thus, on the individual level, support for hypothesis 1 was found using both the video-coder and self-report measures of emotional contagion.

Hypothesis 1 was also strongly supported at the group level, using aggregated self-report and video-coder ratings of individuals' emotional contagion, as well as overall ratings of group pleasantness made by both video-coders and members of the group. First, as shown in table 4, significant differences across experimental conditions in emotional contagion were found as operationalized by the aggregated video-coder ratings of participants' emotional contagion in each group and the aggregated group mean of participants' self-reports of contagion. For the aggregated video-coder ratings, there was

Table 4

ANCOVA Results of Effects of Confederate's Emotion on Subjects' Group-level Contagion of Pleasant Mood*

Variable	High Confederate Pleasantness: Low energy (N = 7)	High Confederate Pleasantness: High energy (N = 7)	Low Confederate Pleasantness: Low energy (N = 8)	Low Confederate Pleasantness: High energy (N = 7)	F - test: Confederate pleasantness	F - test: Confederate energy	F - test: Interaction
Aggregated video-coder ratings of participants' emotional contagion (mean of the video-coder's aggregated group rating of participants' Time 2 pleasant mood)	2.70 (.42)	2.75 (.37)	2.24 (.31)	2.43 (.30)	10.30•••	.33	.40
Aggregated self-ratings of emotion contagion (mean of the groups' participants' Time 2 pleasant mood minus Time 1 pleasant mood)	.57 (.72)	.17 (.26)	.03 (.42)	−.39 (.63)	8.41•••	5.36•	.00
Video-coders' ratings of overall group pleasantness	4.31 (.93)	4.83 (.98)	3.14 (.79)	2.81 (.98)	20.68•••	.08	1.51
Group members' ratings of overall group pleasantness	5.73 (.62)	5.42 (.67)	4.61 (.94)	4.45 (1.05)	10.10•••	.47	.09

•$p < .05$; ••$p < .01$; •••$p < .005$; two-tailed test.
* Unstandardized beta coefficients. Standard errors are in parentheses. All analyses control for participants' self-reported Time 1 pleasant mood.

no significant effect of experimental condition on ratings of confederate energy and no interaction effect. For the self-report ratings, there was a significant effect of confederate energy on self-reported contagion in pleasant mood.

I then examined the effect of the experimental condition on overall group ratings of pleasantness as rated by outside video-coders, as well as the overall group ratings of pleasantness by members of the group themselves. As shown in table 4, both measures were significantly influenced by experimental condition, with ratings of group mood being higher in the high-versus-low-confederate-pleasantness conditions, no significant effect of confederate energy, and no interaction effect. There were no significant effects of the demographic or task control variables in any of these group-level analyses. In sum, hypothesis 1, that there would be contagion of mood among group members, was strongly supported at both the individual and group level, using both video-coder and self-report data.

I first tested hypothesis 2, that unpleasant emotion would lead to greater contagion than would pleasant emotion, by examining the linear trend of video-coders' ratings of participants' mood (rated every two minutes) across the second half of the experiment, comparing the slopes of change in pleasant mood. Using a three-level model (observations nested within people and people nested within groups), a coefficient representing the linear trend between time of assessment and pleasantness was estimated for each person, and group differences in this relationship were examined across experimental conditions. These analyses showed no significant difference between the degree of contagion in the two pleasantness conditions as compared with the two unpleasantness conditions ($\chi^2 < 1$). Non-significant results were also found in analyses of the self-report data, taking into account both individual- and group-level effects and controlling for Time 1 mood, comparing the absolute value of the change in pleasant emotion (contagion) in the second half of the pleasantness conditions (x = .41) versus the unpleasantness (x = –.57) conditions ($\chi^2 < 1$).

The same HLM three-level multilevel models used to analyze the video-coder ratings to test hypothesis 2 were used to test hypothesis 3, on the effect on contagion of the energy level with which the emotion was expressed. I examined whether the emotional contagion trend in the two-minute video-coders' ratings of participants' mood across the second half of the experiment would be significantly greater when the same valenced emotion was expressed with more energy and found no significant difference in comparing high-vs.-low-energy/pleasantness conditions and high-vs.-low-energy/unpleasantness conditions ($\chi^2 < 1$). There were also no significant differences due to energy level on contagion found with the self-report data. Thus hypothesis 3 was not supported.

Influence of emotional contagion on group processes. I next examined the influence of participants' emotional contagion on a variety of individual and group-level processes, using both video-coder and self-report operationalizations of

emotional contagion. I also used video-coder, self-report, and other group members' assessments as the dependent variables. I first tested hypothesis 4, that positive emotional contagion will lead to greater cooperativeness, on an individual level. As shown in table 5, controlling for a participant's self-report of mood at Time 1 and percentage of funds received (other control variables were not significant), a participant's self-report ratings of emotional contagion were significantly related to self and other group members' assessments of his or her cooperative behavior in the group (models 2 and 4). Video-coder ratings were significantly related to other group members' assessments of the participant's cooperative behavior (model 3), but not to a participant's own assessment of his or her cooperative behavior (model 1).

I next tested hypothesis 4 at the group level. The multilevel HLM framework tests cross-level relationships but not exclusively group-level relationships. To do so, I calculated group-level summary measures for the predictor variables (i.e., an aggregate of participants' self-reported pleasant mood contagion and an aggregate of video-coders' ratings of participants' pleasant mood contagion). As no demographic or task variables were significantly related to the group-process ratings, I conducted zero-order correlations between the two group-level contagion measures and group processes, which are displayed in table 6. Aggregated video-coder ratings of the groups' contagion correlated significantly with video-coder ratings of group-level cooperativeness, and aggregated self-reports of group contagion correlated marginally significantly with these ratings as well. Cooperativeness, operationalized as having a smaller standard deviation of percentage of funds distributed, was also significantly related to video-coders' ratings of group contagion in the predicted direction: the greater the contagion, the smaller the standard deviation of distributed funds. Overall, individual- and group-level findings support hypothesis 4.

Table 5

HLM Regression of Subjects' Emotional Contagion on Individual Cooperation and Task Performance*

	Subject's rating of own cooperative behavior		Group members' rating of subject's cooperative behavior		Subject's rating of own performance		Group members' rating of subject's performance	
Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Controls								
Participant mood at Time 1	0.27	.76$^{\bullet\bullet\bullet\bullet}$	−.18	.22	.03	.27$^{\bullet\bullet\bullet}$	−1.38	1.85
	(.20)	(.20)	(.10)	(.19)	(.10)	(.10)	(1.34)	(1.64)
Percentage of funds participant received	−1.20	−1.51	2.24	1.79	2.88$^{\bullet\bullet}$	2.39$^{\bullet\bullet\bullet}$	4.34	10.28
	(3.22)	(3.23)	(1.49)	(1.62)	(1.24)	(1.14)	(22.52)	(18.27)
Emotional contagion								
Video-coder ratings of participant's Time 2 mood	1.09	—	1.41$^{\bullet\bullet}$	—	.31	—	12.08$^{\bullet\bullet}$	—
	(.79)		(.57)		(.30)		(4.90)	
Participant's self-rating of Time 2 minus Time 1 mood	—	.73$^{\bullet\bullet\bullet}$	—	.47$^{\bullet\bullet}$	—	.38$^{\bullet\bullet\bullet\bullet}$	—	3.96$^{\bullet}$
		(.30)		(.22)		(.13)		(2.17)
Overall model R^2	.04	.12	.53	.43	.04	.20	.04	.02

$^{\bullet}p < .10$; $^{\bullet\bullet}p < .05$; $^{\bullet\bullet\bullet}p < .01$; $^{\bullet\bullet\bullet\bullet}p < .005$; two-tailed tests.
* Unstandardized beta coefficients. Standard errors are in parentheses.

Table 6

Means, Standard Deviations, and Intercorrelations of Group-level Contagion Measures and Group-level Processes (N = 26)*

Variable	Mean	S.D.	1	2	3	4
1. Group contagion: Video-coder ratings (aggregated group mean of video-coder ratings of participants' contagion)	2.52	.40				
2. Group contagion: Self-report (aggregated group mean of participants' self-reported contagion)	.12	.67	.29			
3. Video-coder ratings of group cooperativeness	4.07	.85	.44••	.34•		
4. Standard deviation of percentage of funds distributed in group	.06	.04	−.37••	−.19	−.26	
5. Video-coder ratings of group conflict	3.71	.97	−.42••	−.48••	−.92••••	.30

•$p < .10$; ••$p < .05$; •••$p < .01$; ••••$p < .001$; two-tailed tests.
* Correlations are based on pooled estimates of variance.

The results also support hypothesis 5, that positive emotional contagion will lead to less group conflict. As seen in table 6, both aggregated video-coders' ratings of positive emotional contagion and aggregated self-reported positive emotional contagion were significantly negatively correlated with video-coders' ratings of group conflict.

Lastly, I tested hypothesis 6, that positive emotional contagion would lead to greater individual task performance. Controlling for the participant's pleasant mood at Time 1 and the percentage of money received in the exercise (none of the other task or demographic control variables were significant), regression analyses showed there was a significant relationship between video-coder ratings of emotional contagion and other group members' assessments of a participant's task performance (table 5, model 7), but not participants' own assessments of their task performance (table 5, model 5). The same analyses, with self-reported emotional contagion as a predictor showed a significant positive relationship between participants' own assessments of performance (table 5, model 6) and a marginally significant positive relationship with other group members' assessments of the participant's task performance (see table 5, model 8). Thus, overall support was found for hypothesis 6 across self- and other ratings of performance.

DISCUSSION

This study showed that emotional contagion does occur in groups and inasmuch as emotional contagion changes people's moods and serves as affective information, people are "walking mood inductors," continuously influencing the moods and then the judgments and behaviors of others. There was a robust finding of group contagion, with support for the existence of contagion coming from both outside video-coders' ratings and participants' self-reports of mood. No support was found, however, for the hypothesized differences in degree of contagion as a function of the emotional valence and the energy level with which this valence is displayed: contagion of positive mood was as powerful as contagion of negative mood, and energy had either mixed or no effects on contagion. Examining the influence of social con-

text may help to determine why the predicted valence and energy hypotheses were not supported. With regard to emotional valence, unpleasant emotions may not have been as powerful as expected because of the non-normative nature of unpleasant behavior, particularly in this student task. Although the confederate behaved within the realm of plausible behavior, participants may have found his behavior inappropriately hostile and thus paid less attention to his behavior than would usually occur (given that there was still a main effect of emotional contagion).

The low-energy/unpleasant, or depressive, condition may also not have had as powerful a negative effect as expected because the type of negative emotion expressed here also led to less attention being paid, but for different reasons. Given that work in personality research has shown that a low-energy, unpleasant-affect personality is typically associated with being less socially oriented (Watson et al., 1992), it may be that when people are feeling low energy, and unpleasant, they become more internally oriented, withdrawn from the group, with less opportunity to influence other group members. Relatedly, Safran and Safran (1987), in a study of behavioral contagion among elementary school children, also found lack of a strong contagion effect for low-energy/unpleasant mood. They found that although socially withdrawn behavior was rated as the most difficult to manage, it was rated as the least contagious of all behaviors in the classroom.

Although differential effects of valence and energy were not found here, this issue remains to be tested and explored, perhaps in a different context or with different methods. Physiological methods could be particularly effective for catching subtle differences. Another possible way to investigate differential effects would be to conduct a study of controlled contradictory emotions within the same group, rather than in different groups, as was done here. One of the goals of testing these hypotheses was to begin to understand the power of varying types of emotions, which would help to answer the intriguing question of what happens to contagion processes when different group members convey different or even contradictory emotions.

With regard to outcomes for group dynamics due to emotional contagion, there was overall support from both outside video-coder ratings and participants' self-reports for the influence of positive emotional contagion on cooperativeness, conflict, and perceptions of task performance. Emotional contagion was shown not only to influence people's moods in the group but, important to group life, it was also shown to influence subsequent group dynamics among group members, both at an individual and group level.

Future Directions

As this study took place in a laboratory setting using short-term experimental groups, there are factors that inherently could not be well explored. Future research should focus on longitudinal studies of emotional contagion in ongoing work teams. For example, emotional contagion may be influenced by a group's stage of formation, its emotional history, and

affective culture and norms (Kelly and Barsade, 2001). Contagion may play out differently in ongoing work groups in which employees are well acquainted and must continue working together. It would be interesting for future research to examine the degree to which people know that contagion is occurring. Prior theoretical work indicates that, given its automaticity, people do not necessarily know that emotional contagion is happening nor how it is influencing them (Hatfield, Cacioppo, and Rapson, 1994). This lack of awareness of the mood-process/performance connection could have serious ramifications for organizations. For example, a negative effect of unrecognized positive mood contagion could be seemingly task-related but unrealistic euphoria spread through a group. This could lead to overconfidence and a group-think-like feeling of invulnerability (Janis, 1982), and subsequent pressures for group uniformity (Levine and Russo, 1987), which can then lead to poor performance or expectations of performance that the group may not be able to meet. Conversely, a group could unknowingly be affected by a particular negative group member, the proverbial "bad apple" who causes the entire group to feel apprehensive, angry, or dejected, leading to possible morale and cohesion problems, unrealistic cautiousness, or the tendency to disregard creative ideas, thus "spoiling the barrel." A practical outcome of this study is that group members need to be aware that contagion is occurring and understand its possible ramifications for their group dynamics and decision making.

Other contextual issues that should be explored in the future include specific organizational situations in which contagion may be particularly pervasive, such as in customer service or care-giving. For instance, customer service jobs may be very stressful, not only because of overt conflict but because of the continuous low-grade effect of catching customers' negative moods, particularly in service jobs in which many of the interactions involve some sort of problem or negative feedback. This negative contagion can lead to long-term burnout in a sales environment (Verbeke, 1997) or in healthcare jobs in which healthcare providers are in constant contact with people who are ill or depressed (Omdahl and O'Donnell, 1999). Moreover, the contagion process can work in the opposite direction as well: if a customer service worker is in a bad mood, he or she may transfer this negativity to the customer, leading the customer to feel dissatisfied, even if the employee was successful in the cognitive aspects of the encounter (Pugh, 2001). As implied by these findings, emotional contagion may not always have positive effects. Sometimes one does not want to catch the emotions of others, particularly if they are negative or if one needs to maintain emotional equilibrium (e.g., Milner, Halsey, and Fultz, 1996).

In this study, I focused on the mainly subconscious processes involved in being a recipient of emotional contagion, but an interesting research area is the deliberate use of emotional contagion in many organizational culture, socialization, and leadership processes. Leaders in general, and charismatic or transformational leaders especially (e.g., Conger, 1989), make particularly strong and explicit use of emotions. For example, when Lou Gerstner was brought in as the chief executive

officer of IBM, he recognized the importance of the transfer of emotions in leading organizations when he talked about the culture change needed at IBM and stated, "It's not something you do by writing memos. You've got to appeal to people's emotions. They've got to buy in with their hearts and their bellies, not just their minds" (Lohr, 1994: 1). On a more day-to-day and perhaps less conscious level, there is empirical evidence showing that leaders' and managers' positive work moods are positively associated with employees' work performance (George, 1995) and that people are attracted to emotionally expressive others (Friedman, Riggio, and Casella, 1988).

With regard to organizational culture and socialization, some organizational cultures, particularly sales cultures, use emotional contagion as a conscious corporate culture strategy. For example, Mary Kay Cosmetics focuses on the transfer of enthusiasm and uses songs, recognition dinners, and national meetings in which positive emotions are intentionally spread (Ash, 1981). The AMWAY Corporation not only uses emotional contagion to further its business practices, it even has a name for it: "positive programming." This positive programming involves the company constantly exhorting its members to stay positive and to transfer that positivity to others (Pratt, 2000).

Organizational power relations may also play a role in the spread of emotional contagion. Since power holders, such as supervisors, are very important in employees' work lives, it may be that they would be more effective senders and less effective receivers of emotional contagion. Interestingly, though, in a lab experiment examining emotional contagion and dyadic power relations, Hsee et al. (1990) found that the power holder was more prone to receive contagion from the subordinates than the reverse. Perhaps this is one of the ways that leaders are empowered by their followers (e.g., Barnard, 1938); that is, it is important not only that leaders be able to impart their emotions to followers but that they be emotionally attuned to and influenced by their followers, so as to truly understand, empower, and lead them.

Emotional contagion has been shown here to play a significant role in work-group dynamics. A better understanding of the conditions and concepts of emotional contagion can lead to greater insight into and understanding of employees' workplace behavior. The results of this research confirm that people do not live on emotional islands but, rather, that group members experience moods at work, these moods ripple out and, in the process, influence not only other group members' emotions but their group dynamics and individual cognitions, attitudes, and behaviors as well. Thus, emotional contagion, through its direct and indirect influence on employees' and work teams' emotions, judgments, and behaviors, can lead to subtle but important ripple effects in groups and organizations.

REFERENCES

Adelman, P. K., and R. Zajonc
1989 "Facial efference and the experience of emotion." Annual Review of Psychology, 40: 249–280.

Ash, M. K.
1981 Mary Kay. New York: Harper and Row.

Ashforth, B. E., and R. H. Humphrey
1995 "Emotion in the workplace: A reappraisal." Human Relations, 48: 97–125.

Ashton, A. H., and R. H. Ashton
1990 "Evidence-responsiveness in professional judgment: Effect of positive versus negative evidence presentation mode." Organizational Behavior and Human Decision Processes, 46: 1–19.

Barnard, C. I.
1938 The Functions of the Executive. Cambridge, MA: Harvard University Press.

Baron, R.
1984 "Reducing organizational conflict: An incompatible response approach." Journal of Applied Psychology, 69: 272–279.
1990 "Environmentally induced positive affect: Its impact on self-efficacy, task performance, negotiation and conflict." Journal of Applied Social Psychology, 20: 368–384.

Barsade, S. G., and D. E. Gibson
1998 "Group emotion: A view from top and bottom." In D. Gruenfeld, E. A. Mannix, and M. A. Neale (eds.), Research on Managing Groups and Teams, 1: 81–102. Stamford, CT: JAI Press.

Barsade, S. G., A. J. Ward, J. D. F. Turner, and J. A. Sonnenfeld
2000 "To your heart's content: The influence of affective diversity in top management teams." Administrative Science Quarterly, 45: 802–836.

Bartel, C. A., and R. Saavedra
2000 "The collective construction of workgroup moods." Administrative Science Quarterly, 45: 197–231.

Bateman, T. S., R. W. Griffin, and D. Rubinstein
1987 "Social information processing and group-induced shifts in responses to task design." Group and Organization Studies, 12: 88–108.

Bernieri, F. J.
1988 "Coordinated movement and rapport in student-teacher interactions." Journal of Nonverbal Behavior, 12: 120–138.

Bower, G. H.
1981 "Mood and memory." American Psychologist, 36: 129–148.

Brief, A. P., and H. M. Weiss
2002 "Organizational behavior: Affect in the workplace." Annual Review of Psychology, 53: 279–307.

Bryk, A. S., and S. W. Raudenbush
1992 Hierarchical Linear Models: Applications and Data Analysis Methods. Newbury Park, CA: Sage.

Buck, R. P.
1984 The Communication of Emotion. New York: Guilford Press.

Cacioppo, J. T., W. L. Gardner, and G. G. Berntson
1997 "Beyond bipolar conceptualizations and measures: The case of attitudes and evaluative space." Personality and Social Psychology Review, 1: 3–25.

Cacioppo, J. T., and R. E. Petty
1987 "Stalking rudimentary processes of social influence: A psychophysiological approach." In M. P. Zanna, J. M. Olson, and C. P. Herman (eds.), Social Influence: The Ontario Symposium: Ontario Symposium on Personality and Social Psychology, 5: 41–74. Hillsdale, NJ: Erlbaum.

Cannon-Bowers, J. A., and E. Salas
2001 "Reflections on shared cognition." Journal of Organizational Behavior, 22: 195–202.

Carnevale, P. J. D., and A. M. Isen
1986 "The influence of positive affect and visual access on the discovery of integrative solutions in bilateral negotiation." Organizational Behavior and Human Decision Processes, 37: 1–13.

Carver, C. S., A. Kus, and M. F. Scheier
1994 "Effects of good versus bad mood and optimistic versus pessimistic outlook on social acceptance versus rejection." Journal of Social and Clinical Psychology, 13: 138–151.

Chartrand, T. L., and J. A. Bargh
1999 "The chameleon effect: The perception-behavior link and social interaction." Journal of Personality and Social Psychology, 76: 893–910.

Chertock, S. L.
1974 "Effect of music on cooperative problem solving by children." Perceptual and Motor Skills, 39: 986.

Clark, M. S., and A. M. Isen
1982 "Towards understanding the relationship between feeling states and social behavior." In A. H. Hastorf and A. M. Isen (eds.), Cognitive Social Psychology: 73–108. New York: Elsevier-North Holland.

Conger, J. A.
1989 The Charismatic Leader: Behind the Mystique of Exceptional Leadership. San Francisco: Jossey-Bass.

Crandall, J. E.
1975 "Negativity bias in evaluative ratings." Journal of Social Psychology, 95: 109–116.

Damasio, A. R.
1994 Descartes' Error: Emotion, Reason, and the Human Brain. New York: Avon Books.

Davis, M. H.
1983 "Measuring individual differences in empathy: Evidence for a multidimensional approach." Journal of Personality and Social Psychology, 44: 113–126.
1985 "Perceptual and affective reverberation components." In A. B. Goldstein and G. Y. Michaels (eds.), Empathy: Development, Training and Consequences: 62–108. Hillsdale, NJ: Erlbaum.

Development Dimensions International
1982 Leaderless Group Discussion Exercise. Pittsburgh: Development Dimensions International.

Dimberg, U.
1982 "Facial reactions to facial expressions." Psychophysiology, 26: 643–647.

Doherty, R. W.
1997 "The emotional contagion scale: A measure of individual differences." Journal of Nonverbal Behavior, 21: 131–154.

Doherty, R. W., L. Orimoto, T. M. Singelis, E. Hatfield, and J. Hebb
1995 "Emotional contagion: Gender and occupational differences." Psychology of Women Quarterly, 19: 355–371.

Dovidio, J. F., S. L. Gaertner, and S. Loux
2000 "Subjective experiences and intergroup relations: The role of positive affect." In H. Bless and J. P. Forgas (eds.), The Message Within: The Role of Subjective Experience in Social Cognition and Behavior: 340–371. Philadelphia: Psychology Press/Taylor & Francis.

Druckman, D., and R. A. Bjork
1994 Learning, Remembering, Believing: Enhancing Human Performance. Washington, DC: National Academy Press.

Duclos, S. E., J. D. Laird, E. Scheider, M. Sexter, L. Stern, and O. Van Lighten
1989 "Emotion-specific effects of facial expressions and postures on emotional experiences." Journal of Personality and Social Psychology, 57: 100–108.

Ekman, P., and W. V. Friesen
1975 Unmasking the Face: A Guide to Recognizing Emotions from Facial Clues. Englewood Cliffs, NJ: Prentice-Hall.

Ekman, P., W. V. Friesen, and K. Scherer
1976 "Body movement and voice pitch in deceptive interaction." Semiotica, 16: 23–27.

Evans, W.
1965 "Conflict and performance in R and D organizations." Industrial Management Review, 7: 37–46.

Fiedler, K., and J. P. Forgas (eds.)
1988 Affect, Cognition and Social Behavior. Toronto: Hogrefe.

Field, T. M., R. Woodson, R. Greenberg, and D. Cohen
1982 "Discrimination and imitation of facial expressions by neonates." Science, 218: 179–181.

Forgas, J. P.
1990 "Affective influences on individual and group judgments." European Journal of Social Psychology, 20: 441–453.
1992 "Affect in social judgments and decisions: A multiprocess model." Advances in Experimental Social Psychology, 25: 227–275.
1994 "Sad and guilty? Affective influences on the explanation of conflict in close relationships." Journal of Personality and Social Psychology, 66: 56–68.
1998 "On feeling good and getting your way: Mood effects on negotiator cognition and bargaining strategies." Journal of Personality and Social Psychology, 74: 565–577.

Friedman, H. S., L. M. Prince, R. E. Riggio, and M. R. DiMatteo
1980 "Understanding and assessing non-verbal expressiveness: The affective communication test." Journal of Personality and Social Psychology, 39: 333–351.

Friedman, H. S., and R. E. Riggio
1981 "Effect of individual differences in nonverbal expressiveness on transmission of emotion." Journal of Nonverbal Behavior, 6: 96–107.

Friedman, H. S., R. E. Riggio, and D. F. Casella
1988 "Nonverbal skill, personal charisma, and initial attraction." Personality and Social Psychology Bulletin, 14: 203–211.

Frijda, N. H..
1988 "The laws of emotion." American Psychologist, 43: 349–358.

George, J. M.
1989 "Mood and absence." Journal of Applied Psychology, 74: 317–324.
1990 "Personality, affect, and behavior in groups." Journal of Applied Psychology, 75: 107–116.
1991 "State or trait: Effects of positive mood on prosocial behaviors at work." Journal of Applied Psychology, 76: 299–307.
1995 "Leader positive mood and group performance: The case of customer service." Journal of Applied Social Psychology, 25: 778–794.
2002 "Affect regulation in groups and teams." In R. G. Lord, R. Klimoski, and R. Kanfer (eds.), Emotions in the Workplace: Understanding the Structure and Role of Emotions in Organizational Behavior: 183–217. San Francisco: Jossey-Bass.

George, J. M., and A. P. Brief
1992 "Feeling good—doing good: A conceptual analysis of the mood at work-organizational spontaneity relationship." Psychological Bulletin, 112: 310–329.

Gero, A.
1985 "Conflict avoidance in consensual decision processes." Small Group Behavior, 16: 487–499.

Gersick, C. J., and R. J. Hackman
1990 "Habitual routines in task-performing groups." Organizational Behavior and Human Decision Processes, 47: 65–97.

Gerson, A. C., and D. Perlman
1979 "Loneliness and expressive communication." Journal of Abnormal Psychology, 88: 258–261.

Gump, B. B., and J. A. Kulik
1997 "Stress, affiliation, and emotional contagion." Journal of Personality and Social Psychology, 72: 305–319.

Hamilton, D. L., and M. P. Zanna
1972 "Differential weighting of favorable and unfavorable attributes in impressions of personality." Journal of Experimental Research in Personality, 6: 204–212.

Hatfield, E., J. Cacioppo, and R. L. Rapson
1992 "Primitive emotional contagion." In M. S. Clark (ed.), Review of Personality and Social Psychology: Emotion and Social Behavior, 14: 151–177. Newbury Park, CA: Sage.
1993 "Emotional contagion." Current Directions in Psychological Science, 2: 96–99.
1994 Emotional Contagion. New York: Cambridge University Press.

Hatfield, E. J., C. K. Hsee, J. Costello, and M. S. Weisman
1995 "The impact of vocal feedback on emotional experience and expression." Journal of Social Behavior and Personality, 10: 293–312.

Haviland, J. M., and M. Lelwica
1987 "The induced affect response: 10-week-old infants' responses to three emotion expressions." Developmental Psychology, 23: 97–104.

Heath, C., and F. J. Jourden
1997 "Illusion, disillusion, and the buffering effect of groups." Organizational Behavior and Human Decision Processes, 69: 103–116.

Hess, U., and G. Kirouac
2000 "Emotion in groups." In M. Lewis and J. M. Haviland-Jones (eds.), Handbook of Emotions, 2: 368–381. New York: Guilford Press.

Hietanen, J. K., V. Surakka, and I. Linnankoski
1998 "Facial electromyographic responses to vocal affect expressions." Psychophysiology, 35: 530–536.

Hofmann, D. A., M. A. Griffin, and M. B. Gavin
2000 "The application of hierarchical linear modeling to organizational research. " In K. J. Klein and S. W. J. Kozlowski (eds.), Multilevel Theory, Research, and Methods in Organizations: 467–511. San Francisco: Jossey-Bass.

Hollmann, T. D.
1972 "Employment interviewers' errors in processing positive and negative information." Journal of Applied Psychology, 56: 130–134.

Hoyle, R. H., J. C. Georgesen, and J. M. Webster
2001 "Analyzing data from individuals in groups: The past, the present, and the future." Group Dynamics, 5: 41–47.

Hsee, C., E. Hatfield, J. G. Carlson, and C. Chemtob
1990 "The effect of power on susceptibility to emotional contagion." Cognition and Emotion, 4: 327–340.

Hsee, C. K., E. Hatfield, and C. Chemtob
1992 "Assessments of the emotional states of others: Conscious judgments versus emotional contagion." Journal of Social and Clinical Psychology, 11: 119–128.

Ilgen, D. R., and H. J. Klein
1988 "Organizational behavior." Annual Review of Psychology, 40: 327–351.

Isen, A. M.
2003 "Positive affect and decision making." In M. Lewis and J. Haviland-Jones (eds.), Handbook of Emotions, 3rd ed. New York: Guilford Press (forthcoming).

Isen, A. M., and P. F. Levin
1972 "The effect of feeling good on helping: Cookies and kindness." Journal of Personality and Social Psychology, 21: 384–388.

Jacob, R. G., J. F. Thayer, S. B. Mauck, M. F. Muldoon, L. K. Tamres, D. M. Williams, Y. Ding, and C. Gatsonis
1999 "Ambulatory blood pressure responses and the circumplex model of mood: A 4-day study." Psychosomatic Medicine, 61: 319–333.

Janis, I. L.
1982 Groupthink: Psychological Studies of Policy Decisions and Fiascoes, 2d ed. Boston: Houghton Mifflin.

Jehn, K. A.
1995 "A multimethod examination of the benefits and detriments of intragroup conflict." Administrative Science Quarterly, 40: 256–282.

Jehn, K. A., and P. P. Shah
1996 "Interpersonal relationships and task performance: An examination of mediating processes in friendship and acquaintance groups." Academy of Management Best Paper Proceedings: 279–283.

Kanouse, D. E., and L. R. Hanson, Jr.
1972 Negativity in Evaluations. Morristown, NJ: General Learning Press.

Kavanagh, D. J., and G. H. Bower
1985 "Mood and self-efficacy: Impact of joy and sadness on perceived capabilities." Cognitive Therapy and Research, 9: 507–525.

Kelly, J. R., and S. G. Barsade
2001 "Mood and emotions in small groups and work teams." Organizational Behavior and Human Decision Processes, 86: 99–130.

Kemper, T. D.
1984 "Power, status and emotions: A sociological contribution to a psychophysiological domain." In K. R. Scherer and P. Ekman (eds.), Approaches to Emotion: 377–378. Hillsdale, NJ: Erlbaum.

Kreft, I., and J. de Leeuw
1998 Introducing Multilevel Modeling. Thousand Oaks, CA: Sage.

Laird, J. D., T. Alibozak, D. Davainis, K. Deignan, K. Fontanella, J. Hong, B. Levy, and C. Pacheco
1994 "Individual differences in the effects of spontaneous mimicry on emotional contagion." Motivation and Emotion, 18: 231–247.

Laird, J. D., and S. Bresler
1992 "The process of emotional experience: A self-perception theory." In M. S. Clark (ed.), Emotion: Review of Personality and Social Psychology, 13: 213–234. Newbury Park, CA: Sage.

Larsen, R. J., and E. Diener
1992 "Promises and problems with the circumplex model of emotions." Review of Personality and Social Psychology, 13: 25–29.

Lazarus, R. S.
1991 Emotion and Adaptation. New York: Oxford University Press.

Levenson, R. W.
1996 "Biological substrates of empathy and facial modulation of emotion: Two facets of the scientific legacy of John Lanzetta." Motivation and Emotion, 20: 185–204.

Levine, J. M., and E. M. Russo
1987 "Majority and minority influence." In C. Hendrik (ed.), Group Processes: Review of Personality and Social Psychology, 8: 13–54. Newbury Park, CA: Sage.

Levy, D. A., and P. R. Nail
1993 "Contagion: A theoretical and empirical review and reconceptualization." Genetic, Social, and General Psychology Monographs, 119: 233–284.

Lohr, S.
1994 "On the road with Chairman Lou." New York Times, June 26, C2, p. 1.

Lundqvist, L. O.
1995 "Facial EMG reactions to facial expressions: A case of facial emotional contagion?" Scandinavian Journal of Psychology, 36: 130–141.

Lundqvist, L. O., and U. Dimberg
1995 "Facial expressions are contagious." Journal of Psychophysiology, 9: 203–211.

Marcus, R. F.
1987 "The role of affect in children's cooperation." Child Study Journal, 17: 153–168.

Marshall, G. D., and P. G. Zimbardo
1979 "The affective consequences of inadequately explained physiological arousal. " Journal of Personality and Social Psychology, 37: 970–988.

Maslach, C.
1979 "Negative emotional biasing of unexplained arousal." Journal of Personality and Social Psychology, 37: 953–969.

Mayer, J. D.
1986 "How mood influences cognition." In N. E. Sharkey (ed.), Advances in Cognitive Science, 1: 290–314. Chichester, UK: Ellis Horwood.

Mayer, J. D., P. Salovey, S. Gomberg-Kaufman, and K. Blainey
1991 "A broader conception of mood experience." Journal of Personality and Social Psychology, 26: 465–480.

Mehrabian, A.
1972 Nonverbal Communication. Chicago: Aldine-Atherton.

Milner, J. S., L. B. Halsey, and J. Fultz
1996 "Empathic responsiveness and affective reactivity to infant stimuli in high- and low-risk for physical child abuse mothers." Image Journal Nursing School, 28: 9.

Moreland, R. L., L. Argote, and R. Krishnan
1996 "Socially shared cognition at work: Transactive memory and group performance." In J. L. Nye and A. M. Brower (eds.), What's Social about Social Cognition? Research on Socially Shared Cognition in Small Groups: 57–84. Thousand Oaks, CA: Sage.

Neumann, R., and F. Strack
2000 "Mood contagion: The automatic transfer of mood between persons." Journal of Personality and Social Psychology, 79: 211–223.

Nezlek, J. B.
2001 "Multilevel random coefficient analyses of event and interval contingent data in social and personality psychology research." Personality and Social Psychology Bulletin, 27: 771–785.

Nezlek, J. B., and L. E. Zyzniewski
1998 "Using hierarchical linear modeling to analyze grouped data." Group Dynamics: Theory, Research and Practice, 2: 313–320.

Nyklicek, I., J. F. Thayer, and L. J. P. van Doornen
1997 "Cardiorespiratory differentiation of musically-induced emotions." Journal of Psychophysiology, 11: 304–321.

Omdahl, B. L., and C. O'Donnell
1999 "Emotional contagion, empathic concern and communicative responsiveness as variables affecting nurses' stress and occupational commitment." Journal of Advanced Nursing, 29: 1351–1359.

Parkinson, B.
1996 "Emotions are social." British Journal of Psychology, 87: 663–683.

Pratt, M.
2000 "The good, the bad, and the ambivalent: Managing identification among Amway distributors." Administrative Science Quarterly, 45: 456–493.

Prkachin, K. M., K. D. Craig, D. Papageorgis, and G. Reith
1977 "Nonverbal communication deficits and response to performance feedback in depression." Journal of Abnormal Psychology, 86: 224–234.

Pugh, S. D.
2001 "Service with a smile: Emotional contagion in the service encounter." Academy of Management Journal, 44: 1018–1027.

Rafaeli, A., and R. I. Sutton
1991 "Emotional contrast strategies as means of social influence: Lessons from criminal interrogators and bill collectors." Academy of Management Journal, 34: 749–775.

Raudenbush, S. W., A. S. Bryk, and R. Congdon
2000 Hierarchical Linear and Nonlinear Modeling with HLM/5.02. Chicago: Scientific Software International.

Raush, H. L.
1965 "Interaction sequences." Journal of Personality and Social Psychology, 2: 487–499.

Reber, A. S.
1985 Dictionary of Psychology. New York: Penguin.

Robbins, T. L., and A. S. DeNisi
1994 "A closer look at interpersonal affect as a distinct influence on cognitive processing in performance evaluations." Journal of Applied Psychology, 79: 341–353.

Robinson, J. E., and L. Z. McArthur
1982 "Impact of salient vocal qualities on causal attribution for a speaker's behavior." Journal of Personality and Social Psychology, 43: 236–247.

Rosekrans, M. A.
1967 "Imitation in children as a function of perceived similarity to a social model and vicarious reinforcement." Journal of Personality and Social Psychology, 7: 307–315.

Rosenberg, E. L.
1998 "Levels of analysis and the organization of affect." Review of General Psychology, 2: 247–270.

Rozin, P., and E. B. Royzman
2001 "Negativity bias, negativity dominance, and contagion." Personality and Social Psychology Review, 5: 296–320.

Russell, J. A.
1980 "A circumplex model of affect." Journal of Personality and Social Psychology, 3: 1161–1178.

Saavedra, R., and P. C. Earley
1991 "Choice of task and goal under conditions of general and specific affective inducement." Motivation and Emotion, 15: 45–65.

Safran, S. P., and J. Safran
1987 "Behavioral contagion and manageability: Learning disability and regular education teachers' perspectives." Journal of Learning Disabilities, 20: 439–440, 447.

Salancik, G. R., and J. Pfeffer
1978 "A social information processing approach to job attitudes and task design." Administrative Science Quarterly, 23: 224–253.

Sandelands, L., and L. St. Clair
1993 "Toward an empirical concept of group. " Journal for the Theory of Social Behavior, 23: 423–458.

Schachter, S.
1959 The Psychology of Affiliation. Stanford, CA: Stanford University Press.

Scherer, K. R.
1981 "Speech and emotional states." In J. K. Darby (ed.), Speech Evaluation in Psychiatry: 189–220. New York: Grune and Stratton.

Schoenewolf, G.
1990 "Emotional contagion: Behavioral induction in individuals and groups." Modern Psychoanalysis, 15: 49–61.

Seligman, M. E., and P. Schulman
1986 "Explanatory style as a predictor of productivity and quitting among life insurance sales agents." Journal of Personality and Social Psychology, 50: 832–838.

Shetzer, L.
1993 "A social information processing model of employee participation." Organization Science, 4: 252–268.

Singer, J. A., and P. Salovey
1988 "Mood and memory: Evaluating the network theory of affect." Clinical Psychology Review, 8: 211–251.

Staw, B. M., and S. G. Barsade
1993 "Affect and managerial performance: A test of the sadder-but-wiser vs. happier-and-smarter hypotheses." Administrative Science Quarterly, 38: 304–331.

Staw, B. M., R. I. Sutton, and L. H. Pelled
1994 "Employee positive emotion and favorable outcomes at the workplace." Organization Science, 5: 51–71.

Stiff, J. B., J. P. Dillard, L. Somera, H. Kim, and C. Sleight
1988 "Empathy, communication, and prosocial behavior." Communication Monographs, 55: 198–213.

Sullins, E. S.
1989 "Perceptual salience as a function of nonverbal expressiveness." Personality and Social Psychology Bulletin, 15: 584–595.
1991 "Emotional contagion revisited: Effects of social comparison and expressive style on mood convergence." Personality and Social Psychology Bulletin, 17: 166–174.

Sullivan, M. J., and M. Conway
1989 "Negative affect leads to low-effort cognition: Attributional processing for observed social behavior." Social Cognition, 7: 315–337.

Tellegen, A.
1985 "Structure of mood and personality and their relevance to assessing anxiety, with an emphasis on self-report." In A. H. Tuma and J. D. Maser (eds.), Anxiety and the Anxiety Disorders: 681–706. Hillsdale, NJ: Erlbaum.

Thornton, G. C., and W. C. Byham
1982 Assessment Centers and Managerial Performance. New York: Academic Press.

Tickle-Degnen, L., and R. Rosenthal
1987 "Group rapport and nonverbal behavior." In C. Hendrick et al. (eds.), Group Processes and Intergroup Relations: Review of Personality and Social Psychology, 9: 113–136. Beverly Hills, CA: Sage.

Totterdell, P.
2000 "Catching moods and hitting runs: Mood linkage and subjective performance in professional sport teams." Journal of Applied Psychology, 85: 848–859.

Totterdell, P., S. Kellet, K. Teuchmann, and R. B. Briner
1998 "Evidence of mood linkage in work groups." Journal of Personality and Social Psychology, 74: 1504–1515.

Verbeke, W.
1997 "Individual differences in emotional contagion of salespersons: Its effect on performance and burnout." Psychology and Marketing, 14: 617–636.

Wallbott, H. G., and K. R. Scherer
1986 "The antecedents of emotional experiences." In K. R. Scherer, H. G. Wallbott, and A. B. Summerfield (eds.), Experiencing Emotion: A Cross-Cultural Study: 69–97. Cambridge: Cambridge University Press.

Watson, D., L. A. Clark, and A. Tellegen
1988 "Development and validation of brief measures of positive and negative affect: The PANAS Scales." Journal of Personality and Social Psychology, 54: 1063–1070.

Watson, D., L. A. Clark, C. W. McIntyre, and S. Hamaker
1992 "Affect, personality, and social activity." Journal of Personality and Social Psychology, 63: 1011–1025.

Wild, B., M. Erb, and M. Bartels
2001 "Are emotions contagious? Evoked emotions while viewing emotionally expressive faces: Quality, quantity, time course and gender differences." Psychiatry Research, 102: 109–124.

Wright, T. A., and B. M. Staw
1994 "In search of the happy/productive worker: A longitudinal study of affect and performance." Proceedings of the National Academy of Management Meetings: 274–278.