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"The Ripple Effect: Emotional Contagion In Groups"

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THE RIPPLE EFFECT: EMOTIONAL CONTAGION AND ITS INFLUENCE ON GROUP BEHAVIOR[i]

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Revise and Resubmit, ASQ; Comments Welcome

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THE RIPPLE EFFECT:

EMOTIONAL CONTAGION AND ITS INFLUENCE ON GROUP BEHAVIOR

Emotional contagion, the transfer of emotion between individuals, and its influence on work group dynamics was examined in two managerial simulations using multiple, convergent measures of emotions and group dynamics. The studies tested hypotheses on differential contagion effects due to the degree of pleasantness of the emotion, and the energy with which this pleasantness was conveyed. After determining that emotional contagion existed in groups, I then examined the influence of emotional contagion on individual-level attitudes and group processes. As predicted, group members experienced positive emotional contagion, and this contagion improved cooperation, decreased conflict, and increased perceptions of task performance (as rated by self, other group members, and outside video-coders). Theoretical implications and practical ramifications of emotional contagion in groups and organizations are discussed.

Understanding team behavior, particularly the ability to foster cooperation and social integration among employees, is becoming increasingly important as firms move toward a greater team orientation. A team's ability to cooperate and work well together is critical to its success. But although the beneficial outcomes of cooperation are clear, the processes through which people interact and influence each other to obtain this cooperation are still unclear. Research examining work behavior has shown the general importance of group processes (see Levine & Moreland, 1990 for a review*),* focusing primarily on the cognitive aspects of those processes. For example, research using social information processing theory has shown that employees' social environments influence their cognitions and behaviors (Salancik & Pfeffer, 1978; Robinson & O'Leary-Kelly, 1998). Similarly, organizational network theorists have recognized the importance of interrelationships in a work context in terms of the cognitive components of these networks (e.g., Krackhardt & Brass, 1994).

While the cognitive realm of organizational life is certainly important, until recently less attention has been focused on the processes and consequences of shared emotions at work, processes that can influence a group's work. Unless proscribed from doing so (e.g., Rafaeli & Sutton, 1989), employees entering an organizational setting generally do not keep their moods or affective dispositions to themselves. Rather, emotions can become an integral component of how people respond to their surroundings. The importance of affect in organizational behavior, particularly at the individual level, has been solidly established (see Brief & Weiss, 2002 for a review), but how affect operates and influences groups of people has been a topic of only recent interest to organizational and psychological researchers (see Barsade & Gibson, 1998; Kelly & Barsade, 2000; George, forthcoming**,** for a review).

Researchers have begun to turn their attention toward understanding collective emotion (Barsade & Gibson, 1988). Some have gone so far as to say that "feelings may be the way group entities are known" (Sandelands and St. Clair, 1993: 445), that the development of group emotion is what defines a group and distinguishes it from merely a collection of individuals. There has always been implicit

attention to collective emotion, as many organizational processes seem to be grounded in the affective relations of group members, such as morale, cohesion and rapport (Tickle-Degnen & Rosenthal, 1987). The advancement of the emotions literature in psychology has also enabled a more focused and explicit examination of collective emotion. For example, George and colleagues showed that not only do group emotions exist (George 1990, calling this "group affective tone") but that these emotions can influence various work outcomes, such as organizational spontaneity (George & Brief, 1992) and absenteeism (George, 1989). In a study of senior management teams, Barsade et al. (2000) found that a group's level of affective diversity had a negative effect on team dynamics, power-relationships between the chief executive officer (CEO) and the team, employee satisfaction, and corporate financial performance. But the question remains, how do these effects occur?

An initial answer to this question has come from several important field studies examining mood convergence in work teams. First, in methodological studies using experience sampling, Totterdell and colleagues have found evidence that the moods of team members were related to each other in teams of nurses, accountants (Totterdell et al., 1998), and professional cricket teams (Totterdell, 2000), even after controlling for shared work problems and, in the case of sports teams, the team's status in the game. In a study of 70 very diverse work group teams in short-term meetings, Bartel and Saavedra (2000) also found convergence of mood. Similar to Totterdell and colleagues, Bartel and Saavedra showed that work group mood is something that can be recognized and reliably measured by members within the work group and added to this by showing that group mood can also be reliably rated by observers external to the group. They also focused on work-group antecedents to the mood convergence processes and found positive relationships between mood convergence and stability in membership in the group, norms about mood regulation in the group, and task and social interdependence. In Totterdell's studies, being an older group member and a complex of factors related to being interdependent with 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 that these emotions 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 within groups. Also of interest to organizational theorists, and yet unexplored, is the effect group emotional contagion may have on group dynamics, such as cooperation and conflict, as well as on individual attitudes and outcomes, such as satisfaction and perceptions of performance in the group. Through a set of two laboratory experiments, using raters internal and external to the group, I examined both these questions in groups engaging in a managerial task. To compare the fleeting but recurrent affective processes of emotional contagion, a lab setting should be ideal.

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; emphasis added), in particular, the contagion of "everyday" moods in work groups. Similar to Hatfied and colleagues, in their pioneering work on emotional contagion (e.g. Hatfield, Cacioppo & Rapson, 1994), I use the term emotion in this paper as a broad label, similar to that of affect, to interchangeably to encompass the general phenomenon of subjective feelings (e.g., Ashforth & Humphrey, 1995), and use literature from a variety of feelings states to understand contagion processes. This is done both for semantic ease and to reflect the commonality of the overall affective experience suggested by psychological researchers (e.g., Forgas, 1992: 230, Petty, Gleicher & Baker, 1991; Mayer, 1986; Lovaglia & Houser, 1996). 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 & 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), that is, the ability to 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 to other types of affect (Rosenberg, 1998: 253; Mayer et al., 1991), and as everyday moods seem most representative of the common-place and malleable affective short-term changes that can occur, I focus on contagion of mood here as a logical place to begin the study of group emotional contagion.

Studies of people influencing each other affectively have a long history (see Levy & Nail, 1993 for a review). Contagion of emotions has been examined as far back as 400 B.C., when Hippocrates coined the term "hysteria" to refer to the passing of an agitated state from unmarried women to other unmarried women (Veith, 1965). Current psychological contagion research examines less dramatic yet more prevalent day-to-day contagion effects (e.g., Hsee et al., 1990; Sullins, 1991; Hatfield, Cacioppo and Rapson, 1992, 1994) Emotional contagion has long been viewed as a type of social influence (Schacter, 1959: 15; Levy & Nail, 1993) that can occur at both the conscious and unconscious levels (Kelly & Barsade, 2001; Druckman & Bjork, 1994; Totterdell, 2000).

On the subconscious level, Hatfield and colleagues have offered evidence that primitive emotional contagion occurs through a quick, fleeting process of automatic, continuous, synchronous nonverbal mimicry and feedback (Hatfield, Cacioppo & Rapson, 1994). Psychological researchers have found that the first step of this process involves the process of people spontaneously mimicking each others' facial expressions (Lundqvist & Dimberg, 1995), body language (Chartrand & Bargh), speech patterns (Ekman, Friesen & Scherer, 1976), and verbal tones (Hietanen, Surakka & Linnankosko, 1998; Neumann & 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 & Lelwica, 1987), are posited to come from an innate human tendency toward mimicking the behavior of others (Levenson, 1996; Doherty, 1998). The second step in the contagion process comes from the self-feedback people receive from mimicking others' nonverbal behaviors and expressions. As myriad facial, postural, and vocal feedback

studies have shown, once people have mimicked, they then experience the emotion itself by inferring how they are feeling from their muscular, visceral, and glandular responses (see Hatfield, Cacioppo & Rapson, 1994 for a review). An example of how this process could lead to emotional contagion is as follows: I see a smiling happy person, which leads to my automatic subconscious mimicry of her smile, leading to a self-perception and feeling of happiness, which leads to my actually feeling happy (e.g., Hatfield, Cacioppo and Rapson, 1992, 1993, 1994). As Gladwell (2000: 85) pointed out, we usually think of emotion as originating only from the inside out: I feel happy, so I show this by smiling outwardly. Emotional contagion shows that emotions can also be produced from the outside in: When you see someone smile, it makes you smile and then makes you happy.

Emotional contagion has also been shown to occur at a conscious level through social comparison processes in which people look around and compare their affective moods to those of others in their environment and then respond accordingly (e.g., Sullins, 1991; Adelman & Zajonc, 1989; Schacter, 1959). Kelly & Barsade (2000) reviewed a variety of explicitly conscious (at least on the part of the originator of contagion) affective induction processes intentionally meant to induce contagion, and thus change mood and behavior.

The findings on emotional contagion to date have shown contagion in dyads or have implied emotional contagion through examining the convergence of mood in groups, but the causal process of emotional contagion in groups has not been established. As a starting point, therefore, I propose the following hypothesis:

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

Factors in Emotional Contagion

Two factors are likely to influence the process of contagion: (1) the valence (positive or negative) of the emotion, and (2) the energy with which the emotion is expressed. This is based on the circumplex model of emotion, which has been supported at both the physiological (Nyklicek, Thayer, and vanDoornen, 1997), and psychological levels (Larsen & Diener, 1992). The concept behind this model is that emotions are arranged in a circumplex, with the x axis representing emotional valence (degree of

pleasantness) and the y axis representing energy/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.

Emotional valence. Overall, unpleasant emotions are likely to 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 & Berntson, 1997 for a review). People also tend to pay more attention to and place more weight on negative information. This emphasis on the negative has been found in impression formation studies (Kanouse & 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 & Zanna, 1972; Crandall, 1975). Negative emotions have also been found to be the default value in cases of nonexplained arousal (Marshall & 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 & DeNisi, 1994) and auditing behavior (Ashton & 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 tendency toward responding 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 & Scherer, 1986 for a review). The same emotion (in terms of valence or pleasantness) expressed with greater levels of energy is likely to 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 in a more forceful (Robinson & McArthur 1982) or clearly expressive manner (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. Arguments made by Levine & Moreland (1992) about how group members attain status may help explain the energy phenomenon as well. Levine & Moreland posit that determinants of who will have most impact within a group can be based on signaling mechanisms such as appearance or physical dominance. In this case the signaling could be a type of dominance that comes from affect expressed with greater energy that would lead to greater status in the group and, per Levine & Moreland, this status then leads to greater attention and possibly greater

accountability in the group. In this case, it would be greater emotional accountability.

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 & 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% of subjects' emotional understanding of the other person stemmed from the words spoken, while 38% and 55% were attributed to verbal tone and facial expression, respectively. If verbal tone and facial expression are relatively flat, it is less clear to others how to interpret and incorporate the expressed emotions. Because of the greater salience, attention, and clarity of the affective message, it will be noticed more, which will then make it likelier that emotional contagion will occur.

People have also been shown to be more likely to actively share intense emotions than less intense emotions. Rime & Christophe (1997) reported a study by Bouts et al. (1995) in which emotion was induced in subjects by having them watch a low, moderate, or highly emotional movie excerpt. The subjects were then left alone for five minutes with a friend who had not seen the movie. Recordings of the conversations showed that subjects in the high emotional movie condition, who were most highly emotionally aroused by the movie, shared their emotions about it significantly more than those in the other conditions. High intensity emotions leading to more frequent and extensive social sharing has also been found in diary and recall studies (Rime & Christophe, 1997).

Lastly, physiological studies of emotion show that energy intensifies emotional experiences. For example, high arousal has been found to be an important indicator of affective involvement in longitudinal blood pressure studies (Jacob et al., 1999), as well as leading to an increase of autonomic nervous system responses (e.g., heart rate acceleration, skin conductance, facial activity). 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.

The Influence of Emotional Contagion on Individual and Group Processes

Positive emotional contagion, that is, catching someone else's good mood and experiencing an increase in pleasant mood as a result, is likely to influence a variety of group processes and individual reactions within groups through several mechanisms. First, mood contagion can be a direct source of information in its own right for providing information about the how the group is doing (Frijda, 1988). The affective information that is transferred among members communicates a type of group appraisal of events influencing the group (Hess & Kirouac, 2000), as well as direct 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 greater positive affect, which a vast and long-standing literature in psychology shows can then influence cognitions, behaviors, and attitudes (Damasio, 1994, Lazarus, 1991**)** Extensive work by Forgas, Bower, and colleagues has shown that affect can influence people's cognitions (see Fiedler & Forgas, 1988; Bower, 1981; Singer & Salovey, 1988 for a review)*,* particularly regarding social information (Forgas, 1994). Fundamentally, Forgas (1992**)** has identified four ways in which an emotional state elicited before a particular cognitive task (known as "affect priming") influences that task. First, when one is trying to recall information, entering an emotional state that matches the one in which that information was first learned improves memory. Second, any information that is consistent with the current emotional state has a better chance of being stored efficiently. Third, the current emotional state helps to focus any information that is consistent with that state. Fourth, the greater the consistency between the information and the emotional state, the better able the subject is to assess "complex, and ambiguous" aspects of that

information. Thus, not only does an emotional state influence memory and information processing, it also plays a role in making judgments based on that information. This would also 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 & Isen, 1982 for a review), including affect influencing cognitions and behavior within (e.g., Forgas, 1990) and between groups (Dovidio et al., 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. Marcus, 1987; Chertock, 1974). Isen & Levin (1972) showed in two classic field experiments that positive moods led to greater helping behavior, and a relationship has been found between affect and prosocial behaviors at work (e.g., George & Brief, 1992). In negotiation contexts, 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 a 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 extra-role work behaviors, George and Brief (1992) suggested that positive mood will lead to more extra-role 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 & 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 strongly disagree 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 less happy leads to better decisions, than being more happy (see Staw and Barsade, 1993 for a review of this debate), 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 (Sullivan & Conway, 1989). Forgas (1998) found that subjects in positive moods were more effective as negotiators than those in negative moods. In organizational settings, both positive moods and dispositional positive affect have been found to be related to superior job performance ratings for customer service workers (George, 1991), hospital and manufacturing workers (Staw, Sutton & Pelled, 1994), and corrections officers (Wright & Staw, 1994), as well as to the level of persistence and sales of life insurance agents (Seligman and Schulman, 1986). 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 & 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 (e.g., Kavanagh & Bower, 1985; Saavedra & Earley, 1991). Heath and Jourden (1997) found that the greater amount of positive affect they found that came from being in a group (the enthusiasm effect) actually served as a buffer between the naturally occurring negative illusions that people have while performing a task (a buffering effect) and that they therefore rated their performance higher than individuals doing the same task. Thus, it is expected that subjects 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 to more highly rated task performance by oneself and others in the group.

In summary, as pleasant mood contagion can serve the function of infusing more pleasant affect into a group setting and serve as positive information about the group's dynamic in its own right, I predict that pleasant mood contagion will be associated with greater cooperation, less conflict, and more individual satisfaction with performance. I tested these hypotheses in a laboratory study in which I used a confederate to transmit emotion to a group and used multiple raters to examine whether emotional contagion and its effects occurred. A second study examined emotional contagion without a confederate, to replicate the findings found by other field researchers and to bolster the idea that the phenomenon was occurring at a group, not dyadic level.

STUDY 1

Method.

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

Subjects 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 subjects act as managers on a salary committee negotiating the allocation of a limited sum of bonus money to their employees. Each subject 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. Subjects were told that they needed to give a 2-to-3 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 & 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 2-by-2 between-subjects design. The two factors were the valence of emotion shown by a confederate (pleasant/unpleasant) and the confederate's energy level (high/low). The experiment's design and operationalization of affect was 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 & Diener, 1992).[ii] Of the factors in the circumplex model of emotion, two primary ones are emotional valence (degree of pleasantness) and energy/activation level (Russell, 1980), both of which were manipulated through the use of a confederate in this two-by-two between-subjects design. Given that the type of contagion and its outcomes may vary depending on the type of affect and the amount of energy with which it is expressed, it is important to examine the differing combinations of all of these factors.

[ii] There are other descriptors in the literature as well, such as that of discrete emotions, proposed by Lazarus and Cohen, 2000, but the affective circumplex model is a higher-order construct. Also, the emphasis in this paper is on the contagion of pleasant and unpleasant moods, and moods, as compared with specific emotions, tend to be labeled across this more global pleasantness/unpleasantness dimension (Nowlis, 1960).

Subjects were randomly assigned to one of the four experimental conditions. Each experimental condition involved a confederate's display of affective behavior in the task described above. 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 setting a confederate could be more successful in sparking the affect necessary for contagion to take place. Thus, the confederate served as the stimulus initiating the emotional contagion process.

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. I used an undergraduate rather than a graduate student, so that he could fit in with the subjects. It was not unusual for the subjects not to know everyone in the group (including the confederate), as the experiment consisted of students drawn from two large classes and subjects 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, using the same classifications of nonverbal behaviors for each quadrant of the affective circumplex model that Bartel and Saavedra (2000) used. 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 subjects. 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 subjects 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.

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 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 2-3 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, of course, 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.

As described above, the confederate was rigorously coached in keeping the task-related nature of his behavior as steady as possible across conditions. Still, due to the subjects' reactions to the confederate's emotions, there could have been both perceived and actual differences in task-related processes across conditions. Thus, as each group member rated each of the other group members on task-relevant dimensions such as contribution to the task, being prosocial in the group, and degree of work-orientation (how orderly, responsible, deliberate, and hard-working), I used group members' , and outside video-coders' ratings of the confederate's task behavior as controls across conditions. Intraclass correlations (Shrout & Fleiss, 1979) are used to measure the group members' inter-rater reliability in judging the confederate's behavior. This type of reliability measure is particularly appropriate for getting the reliability of multiple judges of others' behaviors, as it measures to what degree judges agree with one another, as compared to how much agreement would occur by chance (as based on the variability across groups in the rated behavior). As such, ICCs were calculated for all reliabilities between video-coder judges, and within-group member "judges" in this paper. Group member inter-rater reliability for these measures is ICC = .59 for overall contribution to the group, .38 for prosocial behavior, and .39 for work-orientation. All of these ICCs yielded a significant F-test, indicating acceptable level of agreement in assessments, which in this case is the group member inter-rater reliability. All ICCs reported in the paper are significant unless stated otherwise. Three video-coders (separate from the coders rating group affect and processes) also watched the confederate's behavior in each group and 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). All analyses were run with these variables as controls, but as no significant effect of these variables in any of the emotional contagion or group processes results was found, they are not reported further. The lack of significant effects on contagion of the more task-related measures across conditions gives additional confidence that it is the confederate's affect that caused the changes in individual perceptions and group processes.

Lastly, 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. While he was always the first to give the presentation, to avoid variance resulting from the timing and sequence of presentation, this was done in a way that made it seem to subjects that the confederate was randomly assigned to go first, and across conditions there was no significant difference in leadership ratings for the confederate as compared with other subjects. The manipulation check described in the results section successfully verified the confederate's ability to display the specific affect necessary across the various experimental conditions. The four experimental affective conditions can be seen in Figure 1.

Please place Figure 1 about here

Procedures. Subjects arrived at the experimental session itself knowing that they would be participating in an group managerial exercise that was to be the basis of meeting an experimental requirement for their organizational behavior class. They were seated around a table in randomly preassigned seats. Around the table were three video cameras. The cameras were aimed at all of the subjects, including the confederate, although the confederate could only be seen in one of the cameras, while the other cameras taped up to two subjects each. This was done to lessen the possibility that seeing the confederate over would bias videocoders in their coding of subject emotion and behavior. Before beginning the negotiation exercise, subjects first completed a current mood questionnaire rating how they felt "right now, that is, at the present moment." This questionnaire is described in greater detail below.

After all of the group members completed the questionnaire, the experimenter read them the exercise instructions. They were given seven minutes to review the instructions and task materials. No leader was assigned to the group. After the seven-minute review period, subjects 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 was always letter "A" so he could give his presentation first. Having the confederate always go first helped to minimize differences in subjects' initial exposure to the confederate

and 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 & Hackman, 1990). After reviewing the materials, groups had 30 minutes to present their case, negotiate, and arrive at a consensus.

After the exercise, the subjects completed a questionnaire that included the same mood items subjects rated prior to the experiment. Subjects 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, personality, and performance ratings of themselves and the other group members. These were the ratings used to test the group dynamics hypotheses and in the manipulation check. Subjects were also asked what they believed the purpose of the experiment was. Most 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 subject suspected that there may have been a confederate - although she did not know for what exact purpose. This subject's data were removed from the analyses. After all subjects in the course completed the experiment, they were debriefed both orally during a class session and in writing.

Control variables. The following variables that might influence the process of contagion and its subsequent influence on group processes were all entered into the initial analyses: (1) demographic variables, including the subject's age, citizenship, sex (particularly as Doherty et al., 1995, found women somewhat more susceptible to emotional contagion than men), and race, and similarity in age, citizenship, gender, and race to the rest of the group (their relational demography, see Tsui, Egan & O'Reilly, 1992); (2) task variables (which employee the subject represented and what percentage of the funds the subjects' employee received); (3) group-level control variables (number of subjects in group, mean demographic composition of the group); (4) subjects' ratings of the confederate's contribution to the task, pro-social and work-orientation, as well as video-coders' ratings of the confederate's same three factors. Only the significant control variables were retained in the analyses; they are reported in the results section.

Emotional contagion measures.

Self-report measures. Subjects' 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 by the end of the experiment. Time 1 mood came from a self-report of ten adjectives measuring subjects' levels of pleasant mood immediately before the experiment. Subjects 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 = Very Much). The adjectives, from the pleasantness dimension of the affective circumplex model, were as follows: pleasant, happy, optimistic, and warm, as well as 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 subjects' mood at the end of the experiment (Time 2 mood). Subjects recollected how they felt during both the first and second half of the discussion. 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 subjects 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. The mean pleasant mood for subjects during this period was 6.85 (s.d. = .98), with a Cronbach alpha reliability of .80.

Video-coder measures. The experiment was video-taped with three cameras. 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. Extensive support has been found for video-coders' abilities to reliably judge facial expression and non-verbal behavior (e.g. Gump & Kulik, 1997; Ekman & Friesen, 1975), overall group mood (e.g., Bartel & Saavedra, 2000), and group dynamics (e.g., Jehn & Shah, 1996).

This set of coders also saw only the subjects, 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 Bartel & Saavedra's (2000) used, 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 subjects' facial expressions, body language and verbal tone throughout the course of the experiment, and rating the level of subject'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 Subject Contagion Video-Coder scale) . The ICC rater reliability among the videocoders for Subject Time 2 Contagion was .77. Given this was a laboratory experiment with randomly assigned subjects, who started out at the same mood level across groups (no significant difference in subject's self-reported Time 1 mood across experimental conditions; F=.87, n.s.) it is possible to infer that the experimental conditions caused the differences in subjects mood at Time 2 .

Individual task behavior. Ratings of the subjects' individual-level task performance and cooperative behavior (as rated by both self and other members of the group) were obtained at the end of the experiment. The self-assessment of task performance was a standardized z-scale comprising subjects' 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 of the group members' rating of the subject on the 1-100 overall contribution scale was used to

operationalize group members' perceptions of subject task performance (ICC = .30). Subjects' self-report of cooperativeness was a one-item measure, rated from 1-9, asking to what degree individual subjects 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 about the subject. The mean of this 1-9 peer cooperativeness scale was 6.11 (s.d. = 1.32 with an ICC rater reliability of .63).

Group dynamics. Video-coder data were also used to code 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.

Analysis

Group emotional contagion is a multilevel phenomenon, with observations at one level of analysis (people) nested within another level of analysis (groups), and so the data were analyzed with a series of multilevel random coefficient models (MRCM) using the program HLM (Hierarchical Linear Modeling; Raudenbush, Bryk & Congdon, 2000) MRCM was used instead of an ordinary least squares (OLS) analysis because, for nested designs, MRCM provides more accurate estimates of group and individual-level relationships than comparable OLS techniques (e.g., Bryk & Raudenbush, 1992).[iii] The primary analyses were two-level models. For each group, parameters describing individual-level phenomena (i.e., means and covariances) were estimated, and group level differences among these parameters were then analyzed. The basic individual-level model was

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

In this model, y_{ij} is a measure for person i in group j, β_{0j} is a random coefficient representing the mean of group j (across the i persons in the group), r_{ij} represents the error associated with each measure, and the variance of r_{ij} constitutes the individual-level residual (or error) variance. Covariates were included at the individual level by including terms on the right hand side of this equation (e.g., β_{1j}, β_{2j}, etc.). Initially, all such covariates were modeled as random effects, and effects were fixed only when the random error term could not be estimated reliably. See Nezlek (2001) for guidelines regarding modeling effects as random or fixed.

In multilevel modeling, coefficients from one level of analysis are passed on to the next. For present purposes, this meant that group differences in individual-level phenomena were analyzed at level 2. The basic level 2 (or group level) model was:

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

In this model, C1, C2, C3, and C4 were dummy-coded variables representing the experimental condition of each group (i.e., positive-negative crossed with active-inactive), and u_{0j} represented the error of β_{0j}.

[iii] A rationale for and descriptions of using MRCM to analyze data collected in groups can be found in Nezlek and Zyzniewski (1998) and Pollak (1998), and the applicability of this technique to organizational behavior in particular is discussed by Hofmann, Griffin, and Gavin (2000).

Differences among the groups were examined using contrast code comparisons of fixed effects (Bryk & Raudenbush, 1992: 49-52). For example, C1 and C2 represented the two positive affect groups, and C3 and C4 represented the two negative 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 of experimental conditions. As shown in table 1, analyses of subjects' perceptions of the confederate revealed that the confederate emitted the affective behavior required for each experimental condition. Subjects who were with the pleasant confederate perceived the confederate as more pleasant than subjects who were with the unpleasant confederate (Ms = 6.59, 3.89; $\chi^2(1) = 42.67$, $p < .001$). Moreover, there was no significant effect of confederate energy level on ratings of confederate pleasantness ($\chi^2(1) = 1.85$, $p > .15$), nor was there an interaction of energy and pleasantness on these ratings ($\chi^2(1) = .04$, n.s.). Subjects who were with the high-energy confederate perceived the confederate as more energetic than subjects who were with the low-energy confederate (Ms = 7.68, 3.27; $\chi^2(1)=$ 152.52, $p < .001$). Although there was no main effect for pleasantness in the analysis of confederate energy ($\chi^2(1) = .01$), there was an interaction of pleasantness and energy ($\chi^2(1) = 17.31$, $p < .001$). While 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 confederate 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 (i.e., by including it as a covariate at the individual level), and it did not change the significance levels or means of the results.

Table 2 reports the means and standard deviations of each of the variables and their correlations.

Please place Tables 1 & 2 about here

Emotional contagion [iv]. Hypothesis 1 examined whether emotional contagion would occur within the groups at the individual level and at the group level. Videocoder ratings of Time 2 mood were used an operationliazation of subject's emotional contagion, as was their self-reports of contagion. For clarity of presentation, self-reports of contagion were operationalized as the change from in subjects' mood from Time 1 to Time 2[v]. To control for possible relationships between amount of change and initial mood, subjects' mood before the exercise (Time 1) was included as a covariate at the individual level. Table 3a shows that the results on the individual level support hypothesis 1. The mood of subjects who were with the pleasant confederate became more positive over time (mean change = +.41), whereas the mood of subjects who were with the unpleasant confederate became more negative over time (mean change = -.26), and these changes were significantly different from each other ($\chi^2(1) = 9.97$, $\underline{p} < .005$). In addition, there was an unexpected main effect for energy in the analysis of mood change ($\chi^2(1) = 4.24$, $\underline{p} < .05$). 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 energy and pleasantness in the analysis of this measure.

Please place Table 3 about here

Hypothesis 1 was also tested by comparing video-coders' ratings of subjects' Time 2 pleasant mood across the experimental conditions. Subjects were not video-taped at Time 1, so change scores could not be analyzed; nonetheless, because subjects were randomly assigned to experimental conditions, differences in Time 2 video-coders' ratings of subjects' pleasant mood can be inferred to represent differences due to the experimental manipulations. To be more conservative, preexisting differences in

[iv] 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 variable.
[v] 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.

mood, Time 1 (self-reported) pleasant mood was still included as a covariate at the individual level. Duplicating the results of analyses of self-reported mood reported above and supporting hypothesis 1, this analysis showed a main effect of confederate pleasantness on ratings of subjects' pleasant mood ($\chi^2(1) = 10.30$, $p < .005$). Coders rated the mood of subjects who were with a pleasant confederate as more positive than the mood of subjects who were with a negative confederate (Ms = 2.75 versus 2.33). Neither confederate energy level nor the interaction of confederate pleasantness and energy significantly influenced subjects' displayed pleasant mood.

Hypothesis 1 was also strongly supported at the group level as can be seen by the results in Table 3b. First, I tested whether the experimental conditions would influence contagion as operationalized by aggregated self-ratings and video coder ratings - both of which were significantly influenced by confederate pleasantness, with no significant relationship to confederate energy, and no interaction for the video coder ratings, and a significant effect of energy for the self-ratings. I then followed up on this analysis by examining the effect of experimental condition on overall group ratings of pleasantness as rated by outside videocoders , as well as group members overall ratings of group pleasantness, both of which showed a significant effect of confederate pleasantness, and no effect of confederate energy and no interaction.

Hypothesis 2 predicted that unpleasant emotion would lead to greater contagion than pleasant emotion. Only self-report data were used for this test because pre- and post-experiment scores were needed to compare changes. The contrast codes conducted in HLM, taking into account both individual- and group-level effects, compared the absolute value of the change in pleasant emotion (contagion) in the two pleasantness conditions with the contagion in the two unpleasantness conditions. The results of this analysis did not support the hypothesis. The absolute values of the positive and negative contagion, or changes, were not significantly different ($\chi^2 < 1$).

Hypothesis 3 predicted that the same valenced emotion (e.g., pleasantness) would lead to more contagion effects if expressed with greater energy. Again, only self-report data were used for this test, as

pre- and post-experiment scores were necessary to compare the changes. HLM analysis of contrast codes, taking into account both individual- and group-level effects, compared the contagion of negative mood in the unpleasant-energetic condition (e.g., hostile irritability; mean drop in pleasant mood = -.44) with the contagion of negative mood in the unpleasant/low-energy condition (e.g., sluggish melancholy, mean drop in pleasant mood = -.07). This comparison marginally was significant in the predicted direction ($\chi^2(1) = 2.81$, $p < .10$; two-tailed test). When examining the influence of energy on the contagion of pleasant mood, there was also a marginally significant difference between contagion of pleasant mood in the pleasant/energetic condition (e.g., cheerful enthusiasm; mean rise in pleasant mood = .16), versus the pleasant/low-energy condition (e.g., serene warmth; mean rise in pleasant mood = .66; $F=2.67$, $p<.10$; two-tailed test). In this case, however, the low-energy/pleasantness condition led to greater contagion than did the high-energy/pleasantness condition. Thus, although there is evidence that energy level influences contagion processes, given the bidirectionality of the results, hypothesis 3 remains suggestive.

Influence of emotional contagion on group processes. Hypothesis 4, which predicted that positive emotional contagion would lead to greater cooperativeness, was supported at both the individual and group levels. As is seen Table 4[vi], on the individual level, controlling for a significant effect of subject's mood at Time 1, , HLM regression analyses (table 4, model 1) showed that subjects' self-report of positive emotional contagion significantly predicted their assessments of their own cooperative behavior. In model 2, this result was replicated using the other group members' assessments of subjects' cooperative behavior.

Please place Tables 4 and 5 about here

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

[vi] All analyses in Table 4 were replicated significantly using videocoder ratings of contagion as the predictor variable.

measures for the predictor variables (i.e., an aggregate of subjects' self-reported pleasant mood contagion and an aggregate of video-coders' ratings of subjects' pleasant mood contagion) and criterion variables (i.e., video-coder ratings of group-level cooperativeness and collectivism) and examined the relationships among them. As in the individual-level analysis, I used both a self-report score and a video-coder score to minimize common-method bias. As no control variables were found to be significantly related to the group-process ratings, I conducted zero-order correlations between the two group-level contagion measures and group processes. As shown in table 5, hypothesis 4, that emotional contagion will lead to greater cooperativeness is fully supported at the group level. Both self-rated and video-coder-rated group contagion correlate significantly with video-coders' ratings of the group's cooperativeness . Cooperativeness, operationalized using the standard deviation of percentage of funds distributed in the group direction, was also found to be significantly related to videocoders' ratings of group contagion in the predicted direction - the greater the contagion, the smaller standard deviation of distributed funds. The aggregate of the groups' self-report of pleasant contagion was correlated with the percentage distribution of funds in the predicted negative direction as well, but not significantly so.

The results also support hypothesis 5, that positive emotional contagion would lead to less group conflict. Table 5 shows that both aggregated self-reported positive emotional contagion and video-coders' ratings of positive emotional contagion were significantly negatively correlated with video-coders' ratings of group conflict.

Lastly, hypothesis 6, which predicted that positive emotional contagion would lead to greater individual task performance, was also supported (table 4, models 3 and 4). Controlling for the subject's pleasant mood at Time 1 and the percentage of money received in the exercise, this individual-level HLM regression showed pleasant emotional contagion to be significantly related to higher levels of a subject's assessment of his or her task performance , and marginally significantly related to other group members' assessments of subjects' task performance.

Discussion

The processes of emotional contagion. This study provided strong support for the existence of

emotional contagion, using both self-reported and outside video-coders' ratings of subjects' contagion. The specific influence of affective valence, however, and the energy level with which this valence was displayed were not supported. Examining the influence of social context may help to determine why some of the predicted valence and energy hypotheses were not supported. With regard to emotional valence, the unpleasant emotion 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, subjects may have found his behavior inappropriately hostile and thus attempted to ignore or dismiss his negativity. Some support for this explanation can be found in Hinsz and Tomhave's (1991) study, in which they found that people who were approached by a smiling confederate tended to respond with a corresponding smile more often than they responded with a frown in response to a frowning confederate.

Similarly, task effects may have influenced the unexpected relative strength of emotional contagion in the pleasant/low-energy condition (i.e., calm/serene) as compared with the pleasant/high-energy condition (i.e., cheerful/energetic). Because this task had a definite competitive component, subjects may have interpreted the confederate's pleasant but high energy level as overzealousness in the exercise. The subjects may have found this to be more distracting or annoying than the "laid-back" pleasantness of the pleasant/low-energy confederate, who was less of a threat to them in the competitive part of the task. Thus, while emotional contagion of moods can occur without conscious processing (Hatfield, Caccioppo, and Rapson, 1992), when stronger emotions are on display, the social appropriateness of those emotions may then become more important. Also, as discussed at the beginning of this paper, while contagion can certainly be a subconscious process (McHugo et al., 1985), it need not be, and it can be influenced by both internal and external cues (e.g., Laird & Bresler, 1990). Lanzetta and Englis (1989) found that if subjects were led to believe they were having a cooperative interaction with a person, then convergent contagion occurred, that is, smiles led to smiles and autonomic relaxation, and grimaces led to grimaces and autonomic activation. In contrast, if subjects were led to believe that they were having a competitive interaction, then the findings reversed, with smiles leading to grimaces and

autonomic activation, and grimaces leading to smiles and autonomic relaxation. Context made a difference.

Contrary to expectations, the low energy,/unpleasant, or depressive, condition did not show significant contagion effects, although subjects' moods were lowered in the predicted direction. Safran and Safran (1987), in a study of behavioral contagion among elementary school children, also found this lack of effect of 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. 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, thus less open to paying attention to the emotional influence of others. From the perspective of transmitting mood to others, it may be that low-energy, sluggish people are so withdrawn from the group that they have no opportunity to influence other group members or that even when they do participate, they are rejected by others (Carver, Kus & Scheier, 1994). It should be noted, however, that although the confederate's depressive mood did not transmit to others, this effect was not predicted a priori, and thus the results should be viewed as exploratory and evaluated with caution.

Lastly, one of the goals behind the between-subjects test of contagion as a result of the pleasant versus unpleasant confederate was to understand the power of varying, and possibly contradictory, emotions. While there was no effect in this study, as I discuss above, this may be due to the context in which the experiment occurred, and this issue remains to be tested and explored, perhaps with different methods or statistical techniques. It is an important issue, because it helps to answer the very intriguing question of what happens to contagion processes when different group members convey differing or even contradicting emotions. To investigate this, it would be fascinating to conduct a study studying controlled contradictory emotions within the same groups.

With regard to the influence of mood contagion on group dynamics, this study showed that both self-ratings and video-coders' ratings of mood contagion were related to greater self-ratings of

cooperativeness, perceptions of performance, and lesser levels of conflict - all as recognized by the subjects themselves, other group members, and video-coders. Emotional contagion definitely influenced what subsequently happened in the group: both at an individual and group process level.

I included a variety of individual-level variables, such as age, sex, race, and nationality in this study, none of which had a significant effect, as well as the personality variable of self-monitoring which I thought would be particularly relevant to contagion. High self-monitors are those people who pay more conscious attention to their environment, and care about influencing it, and its influence on them than do low self-monitors. Friedman and Miller-Herringer (1991) showed that self-monitoring explicitly translates to the emotional realm, with high self-monitors being more sensitive to others' emotional expressions than low self-monitors. I found support for this here, in that high self-monitors in this study had greater amounts of contagion than low self–monitors did, offering support that the search outward for clues about social appropriateness include affective cues.

The benefit of this laboratory study is in the control it offered and the causal inferences inherent to the experimental method, allowing a clear test of mood contagion and its mechanism. This is particularly important for a construct such as mood contagion, in which micro-processes are so difficult to observe and measure. The use of a confederate helps in being sure about which emotions are being emitted and that they are being emitted reliably across conditions. But while this laboratory study gives us greater clarity, causality, and strength, having a confederate who is consistently and intentionally emitting a strong version of whatever affective condition is being tested may lead to an overly artificial situation that is not replicable in real work teams. More significantly, the strength of the confederate manipulation across the experiment may have overwhelmed the affective influence of the other group members. Thus, to be able to say more confidently that the results found here are group-level effects, and not a series of dyadic interactions between the confederate and each of the group members, I conducted a second study to meet the following goals: (1) to see whether the emotional contagion effect can be found in a situation in which there is no confederate to intentionally and continuously emit a particular affect and (2) to replicate the results showing that emotional contagion is associated with greater cooperation,

higher assessments of task performance, and reduced conflict. To do so, I conducted exactly the same group exercise described above, but without a confederate. This second study also took place with a different sample (MBA students) and across the country (East Coast, rather than West Coast). This helps ensure replicability of the results, particularly relating to norms about emotion in different geographic locations. While voluminous work by Ekman and colleagues has offered a strong case for the universality of basic facial expressions (Ekman 1999), research about displayed emotions show that there may be cultural, organizational, or group norms about expressing emotions (Rafaeli & Sutton, 1989; Kelly & Barsade, 2001), so testing these effects in a different geographic setting can help confirm the breadth of the phenomenon.

STUDY 2

Method

Subjects were 113 MBA students (74 male and 39 female) enrolled in a required organizational behavior class who took part in this study in class as part of their course. The subjects were randomly assigned to 26 groups. Group size ranged from 4 to 5 subjects, and the average number of subjects per group was 4.89 (s.d. = .31). The subjects' mean age was 26.92 (s.d. = 2.52), and 72% were U.S. citizens. Seventy-four percent of the subjects were white, 14% were Asian, 5% were Hispanic , 5% were Black, and 2% were listed as "other."

The MBA subjects participated in the same Leaderless Group Discussion (LGD; Development Dimensions International, 1982) used in Study 1. Subjects participated in the exercise as part of a groups and negotiation segment in their core MBA organizational behavior course. Upon arriving in class, they were randomly assigned to a group and began completing the pre-exercise mood questionnaire. The exercise procedure, materials, and instructions were identical to those used in Study 1, except that there was no confederate. After the exercise, subjects completed the same post-exercise questionnaire as in the laboratory study, rating individual performance of themselves and others, as well as their perception of group dynamics overall.

Control variables. The same control variables used in Study 1 were used here (except for the control variables related to the confederate): age, citizenship, and sex and subject's similarity in age, citizenship, gender, and race to the rest of the group (Tsui, Egan & O'Reilly 1992); task variables (which employee the subject represented and what percentage of the merit bonus funds the subject's employee received); and group-level control variables (number of subjects in group; mean demographic composition of the group). Only the significant control variables were retained in the analyses; they are reported in the results section.

Group emotional contagion. Group-level emotional contagion was operationalized as the degree to which subjects converged in their pleasant mood during the second half of the exercise, as compared with their similarities in mood before the exercise. The self-report of MBA subjects' pre-exercise level of pleasant mood immediately before the experiment was measured with the same adjectives and instructions as in the laboratory experiment. The mean of this scale was 6.73 (s.d. = 1.07), with a Cronbach alpha of .83. Similarly, MBA subjects reported their mood for both the first and second half of the discussion at the end of the exercise. Their scores from the second half of the discussion (Time 2 mood) were used for the same reason as described in the laboratory experiment. The mean of this scale was 6.77 (s.d. = 1.14), with a Cronbach alpha reliability of .84.

Individual task behavior. MBA subjects' self-ratings of individual task performance consisted of the same standardized z-scale used in Study 1, with a mean of .00 (s.d. = .74) and a Cronbach alpha of .74. There were six items on this scale, rather than the seven used in Study 1, as there was no rating available in this version of the questionnaire of the subject's view of his or her performance as compared with his or her perception of the average student's performance. As in the laboratory study, group members rated each other member on a scale of 1-100 on overall contribution to the group. The rating given to the subject by all the other members of the group was used as the operationalization of other group members' perceptions of the subjects' task performance (ICC=.24).

. Subjects' self-report of cooperativeness consisted of the same one item used in the laboratory study, which measured to what degree subjects perceived themselves as affiliative, cooperative, flexible,

and likable (x= 6.55, s.d. = 1.34). As the ICC was too low to use this item for how other group members thought of the subject's cooperativeness (ICC = .14), this analysis was not included in the paper.

Group dynamics: Cooperativeness and conflict. Group-level processes were measured by asking each of the subjects to rate their group experience as a whole on various aspects of cooperation. This was measured through a four-item, 1-7 Likert-style rating scale, consisting of subjects' ratings of the groups' cooperativeness, its consensus, the degree of fairness of the process by which the group negotiated, and how fair the overall solution was at which the group arrived (x= 5.05, s.d. = 1.08, Cronbach alpha = .90; inter-rater ICC = .32). Subjects also used a one-item measure to rate the group's overall conflict on a 1-7 scale (x = 3.73, s.d. = 1.15), inter-rater ICC = .40.

Results

Hypothesis 1 was tested at the group level by examining the degree to which emotions converged in the group at Time 2 as compared with Time 1 (pre-experiment). To do so, intraclass correlations (ICCs) were computed for each Time 1 and Time 2 group pleasantness variable. As discussed earlier in the paper, ICCs indicate of the amount of variation between groups relative to the amount of variation within groups. As would be expected due to the random of assignments of subjects to groups, the ICC for group pleasant mood at Time 1 is .00 - indicating absolutely no convergence of mood at the start of the experiment. At Time 2, however, after the experiment, the group members' moods converged, raising the ICC to .24 , that is, 24% of the variance in mood was due to being part of the group, supporting Hypothesis 1. Because the groups were randomly assigned, and there were thus no controlled experimental conditions (via a confederate) to divide the teams into positive or negative, the tests of hypotheses 2 and 3 conducted in Study 1 could not be done in Study 2.

Hypothesis 4 received some support in this second study. At the individual level, using the same multilevel random coefficient models (MRCM) (Raudenbush, Bryk, & Congdon, 2000) as in Study 1, to

take account multilevel effects in groups, HLM regressions conducted to examine emotional contagion and assessment's of the subjects' cooperative behavior and performance. As Table 7, Model shows, there is a significant relationship between subjects' positive emotional contagion and their self-assessments of cooperative behavior. At the group level, results in table 8 show that there is a significant relationship between positive emotional contagion and group members' perceptions of the cooperation level in the group. There was no significant relationship between the standard deviation of the percentage of funds given and positive emotional contagion. Hypothesis 5, that greater contagion of pleasant mood would lead to less group conflict was also supported at the group level (see Table 8).

Please place Tables 7 and 8 about here

Hypothesis 6, which predicted that positive emotional contagion would be associated with better perceptions of individual task performance, was supported for self-perceptions of performance as Table 7, model 2 shows. It was not supported for other group members' perceptions of the person's performance (Table 7, Model 3). Thus, there was partial support for hypothesis 6 here, offering support for the results of Study 1.

This study showed a strong convergence of group members' moods, indicating emotional contagion, and that, overall, this contagion was positively related to cooperativeness and perceptions of performance (by self, though not others) and negatively related to group conflict. Because the study did not have the manipulated affective conditions, it did not allow the same kind of causal tests as Study 1, but it helps to show that mood contagion is a group phenomenon and not due to the dyadic nature of the relationship between the confederate and the group member. This gives support for the findings in Study 1, and shows that contagion effects with the confederate can occur in naturally occurring groups, with the mood convergence offering evidence that contagion is occurring among all group members.

GENERAL DISCUSSION

These two studies, one with a confederate and one with naturally occurring group affect, showed that emotional contagion takes place consistently among group members. Thus, inasmuch as emotional contagion changes people's mood level and serves as affective information, people are "walking mood inductors," continuously influencing the moods and then the judgments and behaviors of others. The process is a subtle one, however, in terms of people's awareness of both its occurrence and its effects, which makes it both a powerful and possibly problematic process in organizational life. Thus, there is a combinatory effect of organization members not realizing that their seemingly cognitive and rational consideration of the facts is actually a product of other people influencing their mood and that this mood, in turn, is influencing their cognitive processes. An examination of the attribution processes in this study shows exactly this effect. Subjects in both studies were asked to what degree certain factors influenced their perception of the mood they were in during the experiment and how those factors influenced their effectiveness during the group discussion. Subjects reported no significant relationship between the mood they were in and the degree of pleasantness in the exercise, although they did significantly relate how pleasantly they behaved in the experiment to the way other group members acted as well as to their own personalities. Despite this recognition that other group members could influence the degree of pleasantness they felt during the discussion, they then indicated absolutely no awareness of the relationship between the mood they were in and their attributions for their degree of effectiveness in the group discussion. In fact, the only two factors that predicted subjects' self-perceived degree of effectiveness were the amount of merit bonus money they received for their candidate--more money was related to higher self-perceptions of effectiveness (showing that they focused more on the competition aspect of the mixed-motive part of this exercise)--and their own intellectual abilities. Money had interesting effects in this study. As subjects were given two equally weighted, mixed-motive goals (get the most money for their employee and do the best for the company as a whole), it is inappropriate to use money received in the exercise as a test for effectiveness –money can only be cleanly used as a measure of cooperativeness via the standard deviation analyses. I still thought it interesting, however, to do an exploratory analysis of how contagion influenced individual-level monetary outcomes. Looking at this

relationship in the laboratory study I found no effects, but in the MBA study I did find a significant positive relationship between pleasant mood contagion and receiving a greater percentage of the funds for their candidate (β=23, $p<.05$) . Given that subjects' attributions of their own effectiveness in the exercise correlated with how much money they received, as did that of others in ratings of them, it would seem that at least in the MBA context, getting more money for one's own employee was perceived as being more effective in the exercise, which was related to positive emotional contagion..

It is ironic that while subjects clearly felt the emotions and experienced contagion from others in their groups, they did not realize this was occurring, even though emotional contagion had a strong effect on both pleasant behavior and feelings of effectiveness in the task. This phenomenon can also have serious ramifications for organizations. If people feel the emotion and do not realize that they have caught it as a result of someone else's emotion, they will experience the origin of the feeling as coming from themselves. This can lead to behaviors based on an erroneous search for internal or external attributions or justifications to explain why they feel this way. In fact, a negative effect of unrecognized positive mood contagion could be groups in which seemingly task-related but unrealistic euphoria is spread through the group, leading to overconfidence and a group-think-like feeling of invulnerability (Janis, 1982), and subsequent pressures for group uniformity (Levine & Russo, 1987) which can then lead to poor performance, or promises/expectations of performance that the group may not be able to keep. Conversely, a group could unknowingly be infected 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 bunch." A practical outcome of this study is that group members need to be more aware that contagion is occurring and of its possible ramifications on their group dynamics and decision- making.

As these studies took place in a laboratory setting using short-term experimental groups, there are interesting factors that inherently could not be well explored. Future research should focus on longitudinal studies of emotional contagion in on-going work teams. For example, emotional contagion may be

influenced by a group's emotional history or affective culture and norms (Kelly & Barsade, 2001). Contagion may play out differently in ongoing work groups in which employees are well acquainted and must continue working together. On the one hand, group members may habituate to each other's emotions, or cognitively mediate the emotional contagion effect (e.g., "I will ignore this person's unpleasantness because I have to work with him or her"). On the other hand, group members may become even more keenly sensitive to and prone to react to others' emotional states. This could lead to a situation in which emotions that may seem trivial to an outsider can greatly influence insiders due to a buildup of continuously dealing with the other group members' emotions ("If he comes into this meeting sullen one more time, I'm just going to explode"). There is even some indication of these processes already occurring within the MBA teams in study 2, who through their classes, had a chance to know and form opinions about each other prior to this negotiation exercise. In study 2, the mean degree of friendship reported among group members was significantly positively correlated to the amount of contagion ($r=.44$, $p<.05$), supporting the idea that prior group member interpersonal history influences contagion processes.

There are also specific organizational situations in which contagion may be particularly pervasive, such as the customer service or care-giving process. For instance, customer service jobs may be very stressful, not only due to overt conflict, but because of the continuous low-grade effect of catching customers' negative moods, particularly in service jobs in which many of the calls 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 & 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 burnout 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 & Fultz, 1996).

Deliberate use of emotional contagion seems to occur in many organizational culture, socialization, and leadership processes. Leaders in general, and charismatic or transformational leaders especially (see, e.g., Conger, 1989), make particularly strong and explicit use of emotions. For example, when Lou Gerstner was brought in as the CEO of IBM, he explicitly 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 more attracted to emotionally expressive others (Friedman, Riggio & Casella, 1988) -- a perfect place to start contagion.

With regard to organizational culture and socialization, some organizational cultures, particularly sales cultures, use emotional contagion as a conscious corporate culture strategy. For example, the Mary Kay Cosmetics company 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, 1994). This positivity, or affective impression can start as early as a prospective employee's first encounter with an organization. In a job interview setting, it has been shown that raters remember more positive information about candidates and rate the candidate more highly when the raters are in a good versus bad a mood (Baron, 1987). Thus, if a job applicant can "infect" an interviewer with positive emotion, the job application may be looked upon more favorably. From the interviewees' perspective, an interviewer who is emitting negative affect may turn off a perspective job applicant, independent of the actual information about the job and company the interviewer is representing

Organizational power relations may also play a role in the spread of emotional contagion. For

example, 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 employee and work team emotions, judgments, and behaviors can lead to subtle but important ripple effects in groups and organizations.

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Figure 1: Confederate Experimental Conditions

PLEASANTNESS

ENERGY	**High**	**Low**
High	**Cheerful enthusiasm** Characterized by Confederate acting pleasant, happy, warm, and optimistic in an energetic, active, and alert way; he was cheerful and enthusiastic	**Hostile irritability** Characterized by the confederate being actively and energetically unpleasant and pessimistic; he behaved with hostility, frustration, impatience, anxiety, and irritability.
Low	**Serene warmth** Characterized by the confederate being happy and optimistic but in a calm, low energy way; he emitted warmth, serenity, and a pleasant calmness.	**Depressed sluggishness** Characterized by the confederate being unpleasant and unhappy in a low energy way; he behaved in a depressed, sluggish, dull, and lethargic manner.

Table 1

STUDY 1 - Manipulation Check: Perceptions of Confederate Pleasantness By Experimental Condition

	High Pleasantness Conditions		Low Pleasantness Conditions				
Confederate Affective Behavior	High Pleasant High Energy Group 1 n=23	High Pleasant Low Energy Group 2 n=21	Low Pleasant High Energy Group 3 n=24	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 of Interaction between Conditions
1.Subjects' perceptions of Confederate Pleasantness	6.95	6.29	4.13	3.65	42.67***	1.85	.04
2.Subjects' perceptions of Confederate Energy Level (operationalized as self-assertion)	6.98	4.14	8.38	2.65	.02	152.52***	17.31***

Notes: 1. Means in table are ratings given by subjects and videocoders of the confederate's level of pleasantness.
2. ***p<.001, two-tailed test.

Table 2

STUDY 1 - Correlation Table

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11
1. Experimental Condition: Confederate Pleasantness (0 = low, 1 = high)	.49	.50	-										
2. Experimental Condition: Confederate Ene (0 = low, 1 = high)	.50	.50	-	-									
3. Confederate pleasantness as rated by subjects	5.20	2.29	.59*** (91)	.14 (91)	-								
4. Confederate energy as rated by subjects	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)	.43*** (93)	-					
7. Time 2 Pleasant Mood minus Time 1 Pleasant Mood (self-report)	.08	1.07	.31** (93)	-.21* (93)	.19+ (91)	-.30** (91)	-.56*** (93)	.51*** (93)	-				
8. Video-Coder Rating of Subject Time 2 Pleasant Mood	2.56	.50	.45*** (93)	.06 (93)	.36*** (90)	-.01 (90)	.02 (92)	.25* (92)	.21* (92)	-			
9. Subject's own assessment of his/her cooperative behavior	6.23	1.58	.09 (93)	.13 (93)	.17+ (91)	.11 (91)	.19+ (93)	.39*** (93)	.18+ (93)	.22* (92)			
10. Other group member assessments of subject's cooperative behavior	6.11	1.32	-.06 (93)	-.08 (93)	-.03 (90)	-.04 (90)	-.11 (92)	.11 (92)	.21* (92)	.23* (92)	.30** (90)		
11. Subject's own assessment of his/her task performance (z-score)	.01	.71	.21* (93)	-.19 (93)	.18+ (91)	-.27** (91)	.08 (93)	.55** (93)	.43*** (93)	.17 (92)	.23* (91)	.18+ (93)	
12. Other group member assessments of subject's task performance (1-100)	65.42	16.54	.01 (93)	-.21* (93)	-.05 (90)	-.35*** (90)	-.03 (92)	.16 (92)	.17+ (92)	.17+ (92)	.03 (92)	.40*** (93)	.40*** (92)

Notes: 1. Number of subjects in parentheses

2. *p<.05;**p<.01;***p<.001;+p<.10 two-tailed test. These correlations are based on single-level analysis, pooled estimates of variance.

Table 3a

STUDY 1: Hierarchical Linear Modeling of Confederate Emotion on Subjects' Individual Level Contagion of Pleasant Mood

	High Confederate Pleasantness		Low Confederate Pleasantness				
Subjects' Pleasant Moods	Low Energy	High Energy	Low Energy	High Energy	Chi-square test for Confederate Pleasantness[2]	Chi-square test for Confederate Energy[3]	Chi-Square test for Interaction
Self-Ratings of Emotion Contagion:							
Subject Time 2 Pleasant Mood minus Preexperimental Pleasant Mood (adjusting for pre-experimental pleasant mood)	.66 (1.16) N=23	.16 (1.11) N=23	-.07 (.99) N=23	-.44 (1.04) N=24	9.97***	4.24*	.10
Video-Coder Ratings of Subjects' Emotional Contagion:							
Video-Coder's aggregated rating of 2 minute intervals of Subjects' Pleasant Mood through Time 2 (adjusting for pre-experimental pleasant mood)	2.76 (.51) N=23	2.75 (.51) N=23	2.25 (.37) N=22	2.41 (.40) N=24	10.30***	.33	.40

Notes: 1. *p<.05, ***p<.005, two-tailed test.

2. 0=low pleasantness condition; 1=high pleasantness condition.

3. 0=low energy condition, 1=high energy condition.

Table 3b

STUDY 1: Confederate Emotion on Subjects' Group Level Contagion of Pleasant Mood - ANCOVA results

Subjects' Pleasant Moods	High Confederate Pleasantness: Low Energy	High Confederate Pleasantness: High Energy	Low Confederate Pleasantness: Low Energy	Low Confederate Pleasantness: High Energy	F - test for Confederate Pleasantness[2]	F - test for Confederate Energy[3]	F - test test for Interaction
Aggregated Self-Ratings of Emotion Contagion:	.57	.17	.03	-.39	8.41***	5.36*	.00
Mean of the group's Subject Time 2 Pleasant Mood minus Preexperimental Pleasant Mood (adjusting for pre-experimental pleasant mood)	(.72) N=7	(.26) N=7	(.42) N=8	(.63) N=7			
Aggregated Video-Coder Ratings of Subjects' Emotional Contagion:	2.70	2.75	2.24	2.43	10.30***	.33	.40
Mean of the Video-Coder's aggregated rating of Subjects' Pleasant Mood through Time 2 (adjusting for pre-experimental pleasant mood)	(.42) N=7	(.37) N=7	(.31) N=8	(.30) N=7			
Video- Coders ratings of overall group pleasantness	4.31	4.83	3.14	2.81	20.68***	.08	1.51
Rating Scale 1-5 (adjusting for pre-experimental pleasant mood)	(.93) N=7	(.98) N=7	(.79) N=8	(.98) N=7			
Group Members ratings of overall group pleasantness	5.73	5.42	4.61	4.45	10.10***	.47	.09
Rating Scale 1-5 (adjusting for pre-experimental pleasant mood)	(.62) N=7	(.67) N=7	(.94) N=8	(1.05) N=7			

Notes: 1. *p<.05, ***p<.005, two-tailed test.
2. 0=low pleasantness condition; 1=high pleasantness condition.
3. 0=low energy condition, 1=high energy condition.

Table4

STUDY 1: HLM Regression of Subjects' Emotional Contagion On Individual Cooperation and Task Performance (both self and other group member assessments)

Variable		Model 1 Subject's assessment of his/her task cooperative behavior	Model 2 Other group members' assessment of subject's cooperative behavior	Model 3 Subject's assessment of his/her task performance	Model 4 Other group members' assessment of subject's task performance
Control Variables					
Subject Mood at Time 1		.96***	-0.10	.05	-.30
		(.17)	(.18)	(.06)	(1.25)
Percentage of Funds Subject Received		-2.26	2.37	3.21**	19.37
		(2.31)	(2.19)	(1.08)	(24.45)
	R2	.10	.08	.06	.00
Subject's Emotional Contagion					
Subject's Self-rating of Time 2 Mood		.89***	.47*	.44***	3.96+
minus Time 1 Mood		(.28)	(.22)	(.11)	(2.17)
	R2	.16	.48	0.34	.04
	Overall Model R2	.26	.55	.40	.02

Notes: 1. Unstandardized beta coefficients. Standard errors are in parentheses.
2.*p<.05; **p<.01; ***p<.001; + p < .10, two-tailed tests.

Table 5

STUDY 1: Means, Standard Deviations, and Intercorrelations of Group-Level Contagion Measures and Group-Level Processes

Variable	Mean	S.D.	1	2	3	4	5
1. Group Contagion: Self-report (Group Mean of Subjects' Self Reported Contagion)	.12	.67	-				
2. Group Contagion: Video Coder Ratings (Group Mean of Video Coders' Ratings of Subjects' Contagion)	2.52	.40	.29	-			
3. Video Coder Ratings of Group Cooperativeness	4.07	.85	.34+	.44*	-		
4. Standard Deviation of Percentage of Funds Distributed in the Group	.06	.04	-.19	-.37*	-.26	-	
5. Video Coder Ratings of Group Conflict	3.71	.97	-.48*	-.42*	-.92***	.30	-

Notes: N=26. *p<.05;**p<.01;***p<.001;+p<.10 two-tailed tests. Correlations are based on pooled estimates of variance.

Table 6

STUDY 2: Correlation Table

Variable	Mean	S.D.	1	2	3	4	5
1. Time 1 Pleasant Mood (self-report)	6.73	1.08	-	-	-	-	-
2. Time 2 Pleasant Mood (self-report)	6.80	1.11	.51*** (114)	-	-	-	-
3. Time 2 Pleasant Mood minus Time 1 Pleasant Mood (self-report)	.07	1.06	-.44*** (114)	.549*** (114)	-	-	-
4. Subject's own assessment of his/her cooperative behavior	6.54	1.33	.04 (113)	.242** (103)	.19+ (102)	-	-
5. Subject's own assessment of his/her task performance (z-score)	-.01	.74	.21* (119)	.370*** (107)	.13 (106)	.26** (117)	-
6. Other group member assessments of subject's task performance (z-score)	69.1	13.07	-.06 (111)	.16 (105)	.15 (104)	.09 (105)	.27*** (110)

Notes: 1. Number of subjects in parentheses

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

Table 7

STUDY 2: HLM Regression of Subjects' Emotional Contagion On Individual Cooperation and Task Performance (both self and other group member assessments)

Variable		Model 1 Subject's assessment of his/her task cooperative behavior	Model 2 Subject's assessment of his/her task performance	Model 3 Other group members' assessment of subject's task performance
Control Variables				
Subject Mood at Time 1		-.02	.16**	-1.81
		(.14)	(.07)	(1.47)
Percentage of Funds Subject Received		-1.47	2.86**	8.17
for Own Candidate		(1.83)	(1.14)	(19.11)
	R2	.00	0.12	.00
Subject's Emotional Contagion				
Subject's Self-rating of Time 2 Mood		.48**	.19*	.16
minus Time 1 Mood		(.19)	(.10)	(1.73)
	R2	.05	.02	.00

Notes: 1. Unstandardized beta coefficients. Standard errors are in parentheses.
2.*p<.05; **p<.01; ***p<.001; + p < .10, one-tailed test; control variables are two-tailed tests.

Table 8

Means, Standard Deviations, and Intercorrelations of Group-Level Contagion Measures and Group-Level Processes

Variable	Mean	S.D.	1	2	3
1. Group Pleasant Emotional Contagion: Group Mean of Subjects' Self Reported Contagion	.01	.73	-		
2. Group Cooperativeness	5.03	1.06	.49**	-	
3. Standard Deviation of Percentage of Funds Distributed in the Group	.06	.02	-.06	.10	-
4. Group Conflict	3.73	1.16	-.49**	-.65***	-.32

Notes: N=26. *p<.05;**p<.01;***p<.001;+p<.10 two-tailed tests. Correlations are based on pooled estimates of variance.