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Emotional Contagion or Emotional Convergence?

An Analysis of Two Explanations for Emotional Assimilation in Groups

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Abstract

The emotions of others can have a powerful influence on our own emotions. Emotional sharing in social contexts can be as benign as the shared enthusiasm of sporting events and as menacing as shared hatred that fuels radical terrorist movements. Despite the important implications for interpersonal and group behavior, there is little understanding of how observed emotional states come to be internally represented and experienced, and research is only beginning to explore the mechanisms supporting emotional assimilation. Several automatic and elaborated mechanisms are suggested support this capacity. One widely examined theoretical explanation, emotional contagion, proposes that emotional assimilation results from automatic mimicry where the re-enactment of observed emotional behavior leads to concordant emotional feeling. However research on group identification and self-categorization suggests that emotional assimilation may also occur through normative social influence where salient emotion norms impact convergence to the norm. This study examined emotional contagion and normative social influence as competing explanations for emotional assimilation in an ambiguous social context. An experiment utilizing confederate actors as stimuli for emotional contagion and emotion norms disseminated through verbal instruction, demonstrated tentative support for normative emotional convergence but not for emotional contagion based on mimicry.

Keywords: emotional assimilation, affective sharing, emotional contagion, emotion norms, normative social influence
Emotional Contagion or Emotional Convergence?  
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When Rodney King was brutally assaulted by police officers and the ensuing riots wreaked havoc on the city of Los Angeles, the widespread murder, looting, and crime were demonstrative of the anger and outrage felt by the minority community of Los Angeles. The acquittal of four police officers, most of whom were White, in the brutal beating of an African-American man, was a reminder of the marginalization faced by an entire ethnic community. This lynchpin in already volatile race relations led to chaos and rampant crime. The ensuing chaos and aggressive retaliation to this injustice resulted from the intense outrage the minority community shared.

The emotions of others can exert a powerful influence on our own emotions, and human beings have long demonstrated the propensity to model the emotions of others in social environments. However, social psychological research concerning the mechanisms driving social-emotional modeling is laden with theoretical conjecture as to the developmental, social, and contextual activation of each, or several of the proposed automatic, elaborated, and social processes governing emotional assimilation in group settings (Lishner, 2008). One theory, emotional contagion, suggests that modeling the emotions of others may result from a general tendency to behave in accordance with those in proximity (Hatfield, Cacioppo, & Rapson, 1993). This theory proposes that individuals inadvertently mimic the emotional expressions of individuals in proximity, causing a target individual’s emotion to be expressed and subsequently subsumed by observers (Hatfield et al., 1993). In thinking of the example of Rodney King, the theory of emotional contagion would suggest that a shared sense of outrage was propagated by the mimicry of palpable emotional expression (e.g. screaming, shouting, looting) that may have been viewed in the media or in other community members. Thus while a select few may have
initially expressed outrage through violent behavior, emotional contagion suggests that observers would have followed suit, coming to experience outrage as a result of these emotional expressions and propagating the sense of shared emotion that fueled chaotic mob behavior.

The phenomenon of emotional contagion is well established in the literature, however research in this domain suggests that other mechanisms may contribute to emotional assimilation in groups. An emerging area of research suggests that emotional modeling in social contexts may also be borne out of the allegiance that individuals feel to groups with which they identify. This theory of normative emotional convergence proposes that individuals use the emotional behavior of others as a standard comparison for their own emotional behavior to infer the proper emotion for a group member group-relevant situation. In thinking again of the example of Rodney King, it is possible that the proliferation of outrage resulted from the perception that others in the minority community felt angry or ought to feel angry about an attack committed against a fellow group member. In this view, homogenous emotion, informed by self-categorization, may have resulted from normative social influence, or the tendency to abide by shared group rules or standards (Leonard, Moons, Mackie, & Smith, 2011).

**Theories of Emotional Assimilation: Emotional Contagion**

Emotional contagion is proposed to be an automatic, unelaborated route to emotional assimilation that results from a primitive, implicit tendency to mimic facial (McIntosh, 1996), vocal (Neumann & Strack, 2000), and postural (Duclos et al., 1989, Stepper & Strack, 1993, Flack, Laird & Cavallaro, 1999, Flack, 2006) expressions of emotion (Hatfield, Cacioppo, & Rapson, 1993). This theoretical account of emotional assimilation is suggested to explain the spreading of emotions among individuals in physical proximity. When the feeling of happiness
results in smiling, emotional contagion proposes that the observation results in automatic mimicry, and that the mirrored expression creates a parallel state of happiness in the observer.

Integrating facial-feedback theory (McIntosh, 1996) and affect-as-information theory (Clore & Storbeck, 2006), emotional contagion proposes that emotional expression creates somatoviseral feedback specific to mimicked emotion. The pattern of feedback provides the observer or mimicker with cues to the target’s internal emotional state (facial-feedback theory) (McIntosh, 1996, Zajonc, Murphy, & Ingleheart, 1989). Affect-as-information theory proposes that observers utilize this emotional information in order to make judgments about the target, such as how the target is feeling, and subsequently about how they, the observer, are feeling (Clore & Storbeck, 2006). For an observer, the parallel re-enactment of an observed smile or a frown creates patterns of bodily feedback specific to those emotional states that subsequently inform convergent feelings of happiness and sadness. The emotional experience of the observer is then utilized to understand the target’s feelings.

Model of Emotional Contagion (Falkenberg et al., 2008):
Perception → Mimicry → (Afferent) Feedback → Emotion

Perception-action model (PAM) and automatic social behavior. Like other forms of automatic social behavior, emotional contagion and the matched motor mimicry proposed to be central to the contagion model, are believed to result from the common neural coding between perception and action (Prinz, 1990). According to the perception-action model (PAM), perceptions and the associated behavioral responses are coded with the same representations (Prinz, 1990). Dual coding is believed to result in an automatic linkage between perception and behavior, such that perception is sufficient for the performance of the associated behavior (Dijkstra & Bargh, 2001, Prinz, 1990, Preston & de Waal, 2002). The tendency to mimic and
imitate others is thought to result from this perception-behavior overlap and the organization of this automatic response system is suggested to have laid the foundation for all state matching and social facilitation phenomena, including emotional contagion (Preston & De Waal, 2002). According to the PAM model and the model of emotional contagion, perceived emotional expression is overtly re-created in observers because the perception of emotional expression elicits the same behavioral tendency in the observer, automatically and without conscious elaboration.

Proponents of emotional contagion generally cite two points of supporting evidence. First, research demonstrates a robust tendency for observers of discrete emotional facial expression to report parallel changes in emotion (Lundqvist & Dimberg, 1995). Exposure to pictures of happy facial expressions is demonstrated to influence parallel changes in happiness, and exposure to sad facial expressions is demonstrated to influence corresponding changes in sadness (McIntosh, 1996). In addition to parallel changes in emotion, exposure to emotional facial expressions also initiates parallel changes in facial musculature within milliseconds of exposure to emotional stimuli (Dimburg & Thunburg, 1998, Dimburg, 2000). Exposure to happy faces consistently activates the *Zygomaticus major* muscle (the muscle that pulls the corners of the lips back to smile) and exposure to angry faces is demonstrated to induce activation of *Corrugator supercilli* (the muscle used to wrinkle the brow) muscle. Mimetic activation of facial musculature has even been found to occur in response to subliminally presented pictures of emotional facial expressions where recognition of the facial expression fails to reach consciousness (Dimburg & Lundquist, 1990, Dimburg & Karlsson, 1997, Dimburg & Thunburg, 1998, Blairy et al., 1999, Lishner, 2008, Dimburg, Thunburg, & Elmhead, 2000).
Research examining clinical impairments in mimicry and emotional assimilation illustrate that mimicry plays a crucial role in propagating shared emotional states. Research has firmly established a relationship between impairments in spontaneous mimicry and a lack of emotional integration in autistic populations (McIntosh, Reichmann-Decker, Winkielman & Wailbarger, 2006). For instance, McIntosh (2006) found that patients with Autism Spectrum Disorder (ASD) showed impaired automatic mimicry when presented with happy and angry faces. Conversely, a normal control group demonstrated typical, automatic mimicry in response to pictures of emotional facial expressions. However, when instructed to intentionally mimic the presented facial expressions, the autistic group performed equally as well as the control group, indicating that the lack of automatic mimicry did not result from deficits in perception, task understanding, or motivation to complete the task (McIntosh, 2006). The lack of mimicry in the autistic group for whom lack of emotional assimilation is characteristic, combined with the recognition that automatic mimicry is important for state matching phenomena, suggests that mimicry is a crucial factor in understanding and matching the emotional states of others, as emotional contagion would suggest.

While emotional contagion has received support in the literature, studies suggest that mimicry does not mediate all instances of affective transfer between individuals and that other social processes may contribute to emotional assimilation in social contexts (Blairy, Herrera & Hess, 1999; Hess & Blairy, 2001). Furthermore, research suggests that mimicry has a weak impact on subjective emotion (Parkinson, Fischer, & Manstead, 2005). Many studies have demonstrated that facial and postural feedback modulate current emotional experience rather than drive it (Blairy et al., 1999; Hess, 2001), suggesting that facial, postural, and vocal
expressions of emotion may occur in parallel or as the result of the subjective changes brought about by the observation of emotional expression (Lishner et al., 2008).

Research on group emotion proposes that a comprehensive understanding of emotional assimilation in social contexts should consider not only the influences of individuals on one another, as has typically been the focus of research in this domain (a so termed bottom-up approach), but should also acknowledge the influences of the group on the individual (Barsade & Donald, 1998; see Figure 1). The top-down approach to group emotion views emotion as an overwhelming force, emanating from the group level and diffusing to individual members. Unlike the bottom-up approach, emotional influence emanating from the group does not require physical proximity between nor explicit interaction between group members. Rather this type of emotional influence is viewed as dependent on perceptions of group standards and expectations for emotion. For example, an individual belonging to a marginalized group may view discrimination against a fellow member with outrage, even though he or she may not be personally involved in the discriminatory situation (Moons, Leonard, Mackie & Smith, 2009). Simply belonging to the group of a perceived attack is sufficient to invoke the emotion, in this case outrage, perceived as characteristic of the group. This top-down approach proposes that group emotion norms influence group members’ emotions in a manner similar to other normative influences on attitudes and behavior (Seger, Smith, & Mackie, 2009).

Feeling Emotion on Behalf of a Group: Emotions Norms, Self-Categorization, and Emotional Convergence

Several social and cognitive mechanisms, proposed to operate independently of the direct emotional simulation theorized to produce emotional convergence in face-to-face interaction, have been documented to inform emotional assimilation in groups (Hoffman, 2002; Moons et al.,
At the group level, emotion norms are suggested to play an important role in the emotional convergence of individual group members. In the past decade, research on collective emotion (Thomas, McGarty & Mavor, 2009; Reysen & Branscombe, 2008; Moons et al., 2009) and Intergroup Emotions Theory (Mackie & Smith, 1998), suggests that injunctive and descriptive emotion norms have the potential to incite emotional convergence.

**Social Norms.** Typically defined as shared group rules or standards that guide and constrain behavior without lawful force (Cialdini & Trost, 1998), social norms are known to incite many types of behavioral conformity including recycling behavior (Schultz, 1999), littering behavior (Kallgren et al., 2000), energy conservation (Schultz et al., 2007), and drug and alcohol use (Perkins, 2002). Norms are powerful social motivators for several reasons. First, members of social groups are generally motivated to behave in ways that are consistent with other group members’ behavior and achieve favorable social standing from the group (Cialdini & Trost, 1998). Second, socially normative behavior creates a sense of belonging to the group (Smith & Mackie, 2000). Emotional conformity, or adhering to an emotional standard, either perceived or real, is a way in which individuals behave consistently with their social identities as ‘good’ group members (Reysen & Branscombe 2008).

Descriptive norms specify what most people do in a given situation (Cialdini & Trost, 1998; Thomas et al., 2009). These norms are based in perceptions of typical group member behavior and can be derived from behavior that is observed most in a given situation or simply derived from knowledge about the likely emotional reaction of a group member (Cialdini & Trost, 1998). For example, at a funeral the predominant emotional response is sorrow. This descriptive norm for emotion can be derived from observing other individuals at a funeral, but is also socialized throughout learning and development, making this the expected behavioral
response for this particular situation. Conversely, \textit{injunctive norms} describe what individual group members ought to do. These norms are derived from perceptions of endorsed group behavior and are based on perceptions of moral and appropriate group behavior (Thomas et al., 2009). For example, an injunctive outrage norm exists for antisocial behaviors like murder. A socially incongruent emotional response to such a crime, is likely to characterize the expresser as an outcast.

Normative influence on emotion is suggested to operate on the basis of self-categorization and self-stereotyping (Moons et al., 2009, Leonard et al., 2011). Self-identified “Americans” feel the same sense of pride watching their nation’s team win Olympic events, whether they are at the Olympics, in a foreign country watching the Olympics on TV, or reading about Olympic victory in a newspaper. In this case physical mimicry of proximate others is not thought to drive emotional assimilation. Instead, the sense of pride individuals shared across disparate geographic regions is predicated on a shared identity and belonging to a self-relevant group.

According to \textit{Intergroup Emotions Theory (IET)} self-categorization incites emotional assimilation, in the face of events and situations appraised as affecting an in-group, even when an individual is not personally involved (Mackie, Devos & Smith, 2000, Smith, 1993, Smith, Seger & Mackie, 2007). For example, an individual may feel incensed upon reading about discrimination against someone of the same race or ethnicity. Although not personally involved in the outrage-eliciting event, or even witnessing the discrimination first-hand, outrage can be propagated in the individual out of the sense of belonging to the marginalized group. Convergent emotional experience is likely to occur among any member of this group and has the potential to be elicited in the absence of physical proximity.
According to IET, individual self-categorization triggers common emotional experiences in isolated group members in the face of group-relevant events or situations (Gordjin, Yzerbyt, Wigboldus, & Dumont, 2006, Kessler & Hollbach, 2005, Mackie, Devos, & Smith, 2000, Mackie, Silver, & Smith, 2004). Self-Categorization occurs when people think of themselves in terms of their memberships to social groups, instead of thinking of themselves in terms of individual or unique characteristics (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987; Turner & Oaks, 1989; Turner, Oaks, Haslam, & McGarty, 1994). When individuals self-categorize, they view themselves as exemplars of the relevant, salient social identity (Turner, 1985; Turner et al., 1987), highlighting the perceived similarities between themselves and other in-group members (Mackie, Devos, Smith, 2000) and mistaking group characteristics for their own (Smith & Henry, 1996). The propensity to take on group characteristics as a result of self-categorization suggests that individual group members are motivated to express emotions they view as exemplary or descriptive of their membership and will often result in normative emotional responses (Smith et al., 2007).

Self-categorization is activated both explicitly and implicitly, via relevant group and contextual information. Individual characteristics like gender and ethnicity are sufficient in priming group membership, as are environmental cues, like seeing a church or a flag (Moons et al., 2009). Furthermore, salient out-group information, like passing a foreign monument, being the only ethnic minority in a group, is likely to activate self-categorization. The activation of self-categorization, either through implicit or explicit, in-group or out-group, individual or contextual information is proposed to activate normative influence processes, also termed self-stereotyping (Moons et al., 2009). Both social identity theory and self-categorization suggest that the activation of a salient group membership leads to the adoption of the in-groups perceived
characteristics, attitudes, and behaviors (Hogg & Turner, 1987, Simon & Hamilton, 1994)

When people think of themselves in terms of group membership they are self-categorized (Moons et al., 2009). The inclusion of group membership as part of the self renders events that harm or favor an in-group, harmful or favorable to the self, thereby infusing group-relevant occurrences with personal significance. The process of self-categorization and subsequent self-stereotyping, suggests that individuals come to experience affect and emotion on behalf of the in-group, according to normative expectation or rule (what is viewed as stereotypical for the group). Individuals may not be personally involved in an emotion eliciting situation or event, but to the degree that it affects a salient or personally relevant group, it becomes personally significant (Mackie, Devos, Smith, 2000).

Several studies have shown the tendency for self-categorization to instigate normative emotional convergence. Gordjin and colleagues (2006) asked participants to consider a fake newspaper article that suggested a proposal to raise the tuition of out-of-state university students. Students showed a similar angry response to the proposal of tuition increases when the similarities between themselves and the victims were salient and when their identification with the victimized group was high. Furthermore, high identification with the victimized group was predictive of greater behavioral intention to fight the proposal. Yet, when individuals identified more with the perpetrators of the tuition increase, the proposal was seen as less wrong and these individuals experienced less anger when identification with the perpetrators was higher. These findings highlight the importance of salient social categorization on normative emotional experience.

In a similar study, Smith, Seger, and Mackie (2007) found that physically isolated individuals reported individual emotions, like happiness, fear, and anger when thinking of
themselves as unique individuals, but that these same individuals reported emotion that was closer to a prototypical group profile for emotion when primed to think of themselves as members of a specific group, like Americans. Variability in emotional reporting that was present in participants’ individual emotion ratings was reduced once participants were categorized, leading to emotional convergence. Emotional assimilation importantly occurred in the absence of physically present others and in the absence of contextual or situational cues that would potentially signal group relevant emotion; it was only based on self-categorization and presented normative information for specific emotional states. A follow up study by Seger et al. (2009) showed similar results, but attested to the subtle nature of self-categorization priming in instigating emotional assimilation among group members. Participants in this study were primed with American identity after listening to the Star Spangled Banner and when asked about their emotional state as ‘Americans’ participants reported emotions they viewed as stereotypic or normative for their group, anger and pride. Together, the converging evidence suggests that self-categorization and self-stereotyping serve as important instigators in group emotion, that are similar to the role of self-categorization and self-stereotyping of attitudes, norms, and traits in producing the internalization and incorporation of group characteristics as part of the self (Smith et al, 2007).

While an abundance of evidence demonstrates categorization and stereotyping as important factors in emotional convergence among group members, and the role of descriptive norms is implied in this process, only a few studies have explicitly examined the power of descriptive norms for emotion to incite emotional convergence. In one such test of the power of descriptive norms for emotion to incite emotional convergence, Moons and colleagues (2009) conducted an experiment that examined the power of emotional convergence based on self-
categorization to follow an emotion norm, or what he termed an ‘emotion stereotype’ (p. 761). Participants were asked to rate their levels of anger and fear as individuals and as ‘Americans’, after receiving false normative information about how ‘most Americans’ rate their levels of anger and fear. Participant ratings of anger, as ‘Americans’ covaried with the emotion stereotype, such that both ratings of fear and anger were low when the stereotype was reported as low and significantly higher when the stereotype reported higher levels of these emotions. This study demonstrated that the process of self-stereotyping was influential of normative convergence towards a group prototypical emotion among isolated in-group members. This finding parallels research demonstrating the power of self-stereotyping to produce convergence in group-prototypical attitudes, norms, and traits (Leonard et al., 2011).

In a series of experiments aimed at exploring group anger in predicting appraisals of discrimination and behavioral tendencies towards collective action in response to discrimination, Leonard et al. (2011) further explored the role of self-stereotyping and normative influence on emotion. The results of these studies demonstrated that a norm of anger predicted higher levels of anger among participants and normatively based anger in turn predicted perceptions of discrimination and the propensity to respond to hypothetical situations of discrimination against women.

**The Current Research**

The outlined research suggests that both interpersonal and social processes govern emotional sharing in groups. Where emotional contagion proposes that convergent emotions are *induced* in individual members via a process of mimicked, emotional expression, the social norms perspective suggests that convergent emotions are *deduced*, from salient group memberships and corresponding group expectations or standards for emotional expression.
Given the literature, the presentation of an emotional norm for a relevant in-group is expected to produce emotional conformity to the group emotion norm (Moons et al., 2009; Leonard et al., 2011). Alternatively, physically present emotional expression and explicit emotional stimuli have the potential to influence online emotional assimilation in social interaction. The following experiment attempted to test each of these explanations in the emergence of group emotion and determine the relative strength of these mechanisms in explaining emotional assimilation in an ambiguous social context.

To effectively test these explanations for emotional assimilation and the relative power of each theory in a competing experimental framework, it was necessary to alternate contagious affect and normative affect within each experimental condition. The recognition that a fully crossed 2 (Happy Norm/Sad Norm) x 2 (Positive Contagion/ Negative Contagion) experimental framework could not clearly indicate when contagion and normative influence was influencing participant affect (i.e. positive affect contagion with positive norm and negative affect contagion with a negative norm) resulted in testing only those conditions in which the norm and contagious affect were discriminant (see Figure 2). Therefore in the experimental conditions, contagious affective states, portrayed by a confederate actor, and emotion norms, disseminated by the experimenter, were alternated so that the resulting evidence could draw clear delineations as to the influence of each of these processes on emotional assimilation in the experimental context. These considerations resulted in two experimental conditions. The first condition was inclusive of a happy confederate and sad norm (HC/SN), while the second experimental condition included a sad confederate and a happy norm (SC/HN). Finally, a control condition was employed as a baseline comparison for the two experimental groups.
Research Questions & Hypotheses:

**Research Question:** Is emotional assimilation between group members the product of emotional contagion or adherence to group emotion norm?

**Hypothesis 1 (Emotional Contagion - Positive Affect):** If *emotional contagion* is driving affective convergence, participants should report more positive affect when confederates display positive affect (HC/SN) compared to when confederates display neutral affect (Control). Furthermore, participants’ self-rated positive affect should correlate with ratings of confederate positive affect and this relationship should be driven, or mediated, by mimicry.

**Hypothesis 2 (Emotional Contagion - Negative Affect):** If *emotional contagion* is driving affective convergence, participants should report more sadness when confederates display negative affect (SC/HN) compared to when confederates display neutral affect (Control). Furthermore, participants’ self-rated negative affect should correlate with ratings of confederate negative affect and this relationship should be driven, or mediated, by mimicry.

**Hypothesis 3 (Normative Social Influence - Positive Affect):** If *normative social influence* is driving affective convergence participants should report more happiness when the descriptive norm sets an expectation for happiness (SC/HN) compared to when there is no descriptive norm for emotion (Control). Furthermore endorsement of the norm of happiness should predict participant’s self-rated positive affect.

**Hypothesis 4 (Normative Social Influence - Negative Affect):** If *normative social influence* is driving affective convergence participants should report more sadness when the descriptive norm sets an expectation for sadness (HC/SN) compared to when there is no
descriptive norm for emotion (Control). Furthermore endorsement of the norm of sadness should predict participant’s self-rated negative affect.

**Pilot Study**

Materials and procedures were piloted on a sample of 31 female participants from California State University San Marcos ($M_{\text{age}} = 21.58$, $SD_{\text{age}} = 5.09$, $N=31$). The pilot study was utilized to refine and test the methodology of the experimental framework. Specifically, the pilot was utilized to: 1) establish the room configuration, 2) test the confederates’ affective displays, 3) ensure that the video cameras could accurately record emotion and mimicry during the participant-confederate interaction without influencing reactive emotional response.

**Room Configuration.** The room configuration was important to establishing emotional contagion, as contagion is demonstrated to occur most when individuals look at one another (Hess, Adams, & Kleck, 2007). Each participant was expected to attend to a video monitor while simultaneously attending to the confederate. It was therefore important to establish that participants were looking at both the computer monitor and the confederate actor during the experimental manipulation. Initial testing, revealed that the confederate was often ignored in favor of attending to the computer monitor. The lack of attention to the confederate was not surprising as the task overtly concerned memory for details in the film clips and not interaction with the ‘other participant’. The experimental space was altered so that the participant was made to sit farther back in the room than the confederate (see Figure 3) giving the participant a better view of the confederate during the experiment and making it difficult for participants to avoid looking at the confederate as they attempted to attend to their own film displays (the final experimental diagram is schematized in Figure 4).
Confederate Affective Display. Ensuring the accuracy of confederate emotional portrayals was important in the piloting phase of the experiment, as these portrayals were to serve as the basis for the elicitation of a contagion response. Pilot testing ensured that participants interpreted confederates’ affective portrayals as they were intended. Post-experimental interviews with participants in the pilot revealed that happy and sad confederate displays were accurately received, however the confederates’ neutral emotional expressions were often interpreted as angry or negative. This finding influenced the change from completely relaxed, neutral facial expression, to a relaxed, partial smile in the neutral condition. Confederates were asked to turn the corners of their lips up slightly, to avoid a negative interpretation. This relaxed smiling expression with upright posture and folded hands was found to successfully alter the participant’s negative perceptions of the neutral confederate expression.

Video Camera Utilization. Finally, the pilot phase of the experiment was utilized to ensure that video cameras accurately captured the facial and bodily emotional expressions of the participant and confederate, while remaining covert. Post-experimental interviewing revealed that participants were not aware of the hidden camera in the experimental space, nor did they pay attention to the more overt ceiling mounted camera, to which their backs were facing, as the experiment progressed.

Method

Participants

Female participants from California State University San Marcos ($M_{age} = 20.52, SD_{age} = 3.14, N=116, 10$ missing) were recruited through the Human Participant Pool (HPP). All participants were asked to participate in a study concerning the effect of emotions on memory in
exchange for class credit. Participants were mostly White (41%) and Hispanic (27%), with Asian (15%), Mixed (12%), African-American (2%), and Other (3%) ethnicities comprising a smaller proportion of the sample (see Table 1). The sample included mostly college freshman (32%) and sophomores (29%), with juniors (25%) and seniors (14%) comprising a smaller proportion of the sample. A measure of familial generation employed in the demographic section of the pretest survey, revealed that most of the sample self-identified as second generation Americans (32%), fourth generation Americans (21%), or fifth generation or greater (28%), with a smaller proportion identifying as first generation Americans (7%) and third generation Americans (15%)

Participants were randomly assigned to one of three experimental conditions: 1) Happy Confederate/Sad Norm; HC/SN, 2) Sad Confederate/Happy Norm; SC/HN; 3) Neutral Confederate/No Norm; Control. Blocks of participants were then randomly assigned to one of six film sequences.

**Materials**

**Video Cameras.** Two digital video cameras were utilized in this experiment. Video cameras were used to gather evidence of mimicry, emotional expression, and non-verbal social exchange during the participant-confederate interaction. A hidden camera unobtrusively filmed participants during the experiment and was positioned to adequately capture participants’ facial and postural expressions (waist up; see Figures 5 & 6). A second, ceiling-mounted camera was positioned on the confederate to capture the confederate’s facial and postural expressions (see Figure 7). The confederate was continuously placed in front of the more conspicuous, ceiling mounted camera. This provided experimental consistency and was intended to decrease the salience of filming for the participant. An inactive camera tri-pod with a sheet over it was placed
in the room corner, as well as a covered digital camera on a tripod, to distract participants from attempting to look for the true hidden camera if recording was suspected (see Figure 8).

**Film Clips.** Three previously established emotionally neutral film clips from: *The Last Emperor, All the President’s Men, and Hannah and Her Sisters* (Hewig et al., 2005) were utilized as stimuli to support the cover story, which described the study as concerned with the effects of emotions on memory. Ostensibly, participants were to remember details from the clips, which they believed to be emotional. The film clips were shown in 6 varying sequences across the three experimental conditions and total running time for these three clips was approximately 5 minutes, 15 seconds.

**PANAS scale (Watson, Tellegen, & Clark, 1988).** Participants were asked to report their current levels of positive and negative affect prior to and immediately following, the experimental manipulation. Participants rated positive emotional adjectives on a 5-point scale from 1 (Very Slightly or Not at All) to 5 (Extremely). Specifically, participants rated positive affect (PA) items (excited, interested, alert; Pre PA: $\alpha = .86$; Post PA: $\alpha = .91$) and negative affect (NA) items (upset, distressed, hostile, Pre NA: $\alpha = .79$; Post NA: $\alpha = .80$). Ratings for the positive adjectives were averaged, as were ratings of negative adjectives, to create positive and negative affect scale scores. Total scale scores for positive affect and negative affect ranged from 1-5, with higher scores indicating higher levels of positive and negative affect, respectively. Typically, positive affect and negative affect scale scores are summed, however the method of averaging the items was preferential to prevent missing data from distorting affective ratings.

**Susceptibility to Emotional Contagion Scale (Doherty, 1997).** Participants were asked questions concerning their susceptibility to emotional expression which measured the tendency to engage in emotional mimicry and the degree to which conscious emotional experiences are
influenced by afferent feedback. Participants rated statements like “If someone I’m talking with begins to cry, I get teary-eyed” on a four-point likert-type response scale from 1 (Never) to 4 (Always) ($\alpha = .67$). Higher scores indicated greater susceptibility to emotional contagion and its various component processes (i.e. tendencies to mimic and responsiveness to internal cues).

Marlowe-Crowne Social Desirability Scale (MC-20) Short Version (Strahan & Gerbasi, 1972). Finally, participants were asked to complete a social-desirability measure as it was theorized that this may relate to the tendency to abide by emotion norms. Participants rated statements like, “I have never been irked when people expressed ideas very different from my own” on a true/false scale ($\alpha = .74$). Items with socially desirable ratings received one point and scale scores ranged from 1 to 20 with higher scores indicating a greater tendency towards socially desirable behavior.

Film clip questions. Following posttest affect ratings, participants were asked basic multiple-choice questions concerning the details in the film clips. Scores on these questions were not of interest and the questions were only included to maintain consistency with the premise that the study concerned memory.

Confederate Emotion Manipulation Check. Participants were asked to rate the confederate’s mood to ensure the confederate’s emotional portrayal was properly received. Participants rated confederates using the same PANAS scale (Watson et al., 1988) utilized for self-reported affect but the directions were modified to reflect the person of focus was the ‘other participant’ or confederate (See Appendix 3 for all questions in posttest survey) (PA: $\alpha = .92$ experiment; NA: $\alpha = .65$ experiment).

Emotion Norm Manipulation Check. Participants were asked to rate the emotion norm at the end of the posttest survey as a manipulation check on the normative information
disseminated during the experimental period. Specifically participants were asked: “How would you expect other CSUSM students to rate their emotional state following exposure to these film clips?” Emotion items like disgust, anger, happiness, fear, sadness and joy were rated on a scale from 1(Not at all) to 10 (Extremely).

**Confederates.** Two trained female confederates participated in this experiment across the three conditions to portray positive, negative, and neutral affective states. Using confederates as the emotional stimuli in the experiment allowed for experimental control of the contagion effect (Barsade, 2002) and also permitted dynamic emotional expression that is often said to be lacking in studies concerning emotional contagion (Hess & Blairy, 2001). Confederates were trained to express positive (happiness), negative (sadness) and neutral affect, according to Bartel and Saavedra’s (2000) emotional expression classification that delineates facial, postural, and verbal expressions of positive, negative, and neutral (low-activated) emotion (see Appendix 1 for full classification). Confederates were trained on the appropriate procedures and behaviors in multiple training sessions over a five-week period, each lasting approximately 1.5 hours. During these sessions confederates practiced and repeated the emotional expressions, until the experimenter perceived the emotional portrayals accurate and consistent enough to begin practicing on naïve subjects.

Rehearsal of the experimental protocol on naïve subjects, prior to pilot data collection ensured that practice was obtained in the true experimental conditions (while being taped, with a naïve individual). A study by Labott, Martin, Eason, and Berkey (1991), with a similar confederate training protocol, determined that approximately three rounds of corrective feedback ensured confederates were accurate enough to begin true data collection. In the current
experiment, five rounds of corrective feedback were performed before the experimenter judged the confederates’ affective portrayals accurate enough to commence pilot testing.

**Procedure**

The experimenter activated both video cameras prior to the arrival of the participant and confederate. When the participant and confederate arrived to the experiment room, a sign indicated that participants should ‘please knock’ (see Figure 9). When the first person arrived and knocked, either participant or confederate, the experimenter asked this individual to wait in a hallway area until the second participant arrived. This procedure was included in the experiment out of the recognition that both parties would not arrive simultaneously and would be helpful in preventing suspicion of the confederate. When both parties were present, the participant and confederate were ushered into a small room to consider the informed consent documents for approximately 5 minutes (see Figure 10). Participants read and signed informed consent documents, which indicated the possibility that they may be videotaped, photographed, or otherwise recorded at any point during the experimental period. Once informed consent was given, the participant and confederate were ushered into the experimental space. This larger room contained video cameras, desks at which to complete the survey measures, and a center table where the film stimuli could be viewed simultaneously with the participant and confederate facing one another (see Figure 11). Upon entering this room, the experimenter placed the participant and confederate at different desks such that each individual’s back was to the other (see Figure 12).

Once seated, participants completed the pretest survey. Included in the pretest survey were basic demographic questions, the pretest affect measurement (PANAS; Watson et al., 1988), the Susceptibility to Emotional Contagion Scale (Doherty, 1997), and a short form of the
Marlow-Crowne Social Desirability Scale (Short form; MC-20; Strahan & Gerbasi, 1972) (see Appendix 2 for pretest survey). When pretest surveys were complete, participants signaled the experimenter by turning the survey packet over on the desk. The experimenter re-entered the room and asked participants to join together at the center table at the dual computer monitors. The room was configured so that the participant and confederate would choose the computer nearest to her. This helped ensure that the participant was positioned across from the hidden camera and not the more conspicuous ceiling mounted camera.

Dyads were randomly assigned to watch one of six video sequences. These six sequences were representative of all possible order combinations for the three film clips. The six distinct sequences were created to account and control for order effects. The film clip sequence was run through a single laptop to two external monitors (see Figure 13). This allowed for synchronous presentation of the film stimuli to the participant and confederate. When the participant and confederate were seated, instructions were given for the task. The experimenter told the participant and confederate that they would be watching film clips that were rated by other students as inducing a specific state of emotion, thereby relaying the emotion norm. Specifically participants were told, “Other CSUSM students rated these film clips as making them happy/sad,” or were given no normative information (in the control).

The posttest survey included the same affect measure taken prior to the experiment (PANAS; Watson et al., 1988; see Appendix 3 for entire posttest survey). Following self-reported affect, participants rated the confederate’s affective state, utilizing the same scale (PANAS; Watson et al., 1988). Finally a manipulation check was given concerning the perception of the emotion norm. Participants were asked to rate six emotion descriptors: 1) joy,
2) happiness, 3) sadness, 4) anger, 5) fear, 6) disgust on a scale from 1 (Not at all) to 10 (Extremely).

Finally, participants were asked two questions concerning basic plot points or facts from each film clip, to give the study face validity, as the premise was that the study concerned memory. Participants were thanked for participating and debriefed. All participants were asked to keep the nature of the study secret, including the use of deception in the cover story and the use of a confederate in the experiment.

**Video Coding.** Two independent coders, who were blind to condition, were extensively trained to evaluate all video recordings of the participant-confederate interaction during the film task. The pilot data was coded in parallel by coders to gain consistency. Following the pilot coding, 25% of the experimental data was coded in tandem to ensure sufficient reliability for mimicry and emotion ratings. Sufficient inter-rater reliability was obtained after coding 25% of the experimental data in parallel (i.e. .70 or above). A single coder then proceeded to code the rest of the experimental data for mimicry (facial and postural) and participant and confederate emotion. Previous research has shown that video-coders can reliably judge facial expression and non-verbal emotional expression (Ekman & Friesen, 1975; Gump & Kulik, 1997; Barsade, 2002) as well as mood from videotaped interactions (Bartel & Saavedra, 2000).

**Coding emotional state.** Coders evaluated positive, negative, and neutral emotional expression (of varying activations), according to Bartel and Saavedra’s (2000) emotion classification system. This classification provides coders with facial, postural, and vocal non-verbal emotional expressions that are indicative of positive, negative, and neutral/unactivated affect (see Appendix 1). This classification has been demonstrated to be reliable and valid in past
research on emotional contagion and has been used previously to code the emotional states of interacting group members in contagion studies (Barsade, 2002). Coders were asked to make a qualitative rating of emotional state of the participant and confederate based on valence (positive, negative, or neutral) and activation level (unactivated, low, or high) utilizing exhibited emotional behaviors. Coding participant affect was intended to verify self-reported affect, while coding confederate affect was intended to serve as a manipulation check on confederates’ affective portrayals. This was an additional method for ensuring that portrayed affect was consistent with intended affective display for the experimental condition.

**Coding mimicry.** Coders rated split-screen video recordings, which simultaneously showed confederate and participant emotional expression, for evidence of mimicry. The split-screen technique has been utilized extensively in research on mimicry because it allows for the simultaneous viewing of the mimetic stimuli, in this case confederate’s emotional expression, while additionally displaying the response, in this case the emotional expression of the participant (Bavelas, Black, Lemery, McInnis, & Mullett, 1987; see Figure 14). This technique allows the resemblance of one person’s reaction to that of another to be coded, additionally allowing for the clear delineation of the temporal sequence of reactions between both parties. This technique has been demonstrated to clearly show when behaviors are mimetic and is suggested as a technique for studying mimicry (Bavelas at al., 1987). The split screen between the participant and confederate allowed coders to note whether the emotional expression was mimicked or merely arbitrary, reactive emotional expression. Only facial or postural expressions of the same quality that followed confederate emotional expression were coded as mimicked emotional behaviors. Latency and duration of mimicked emotional behaviors were also coded.
Results

Pretest Affect. A one-way ANOVA revealed similar levels of positive affect, $F(2, 123) = 1.04, p = .36$, and negative affect, $F(2, 123) = .65, p = .53$, across the three experimental groups prior to the experimental manipulation (see Table 2 for means and standard deviations). Pretest ratings of affect were disregarded in all subsequent analyses.

Social Desirability. Linear regression analyses demonstrated that participants who tended towards social desirability were marginally more likely to rate their emotions as more positive than those with less of a tendency towards desirability, $F(1, 124) = 2.77, p = .10, R^2 = .02$. MC scores marginally predicted posttest PA scores, $(b = .70, t = 1.67, p = .10)$. Furthermore, those who tended towards social desirability were marginally more likely to rate their negative emotions as lower than those who did not tend toward desirability, $F(2, 123) = 2.72, p = .10, R^2 = .02$. MC scores negatively predicted NA scores, $(b = -.31, t = -1.65, p = .10)$. When broken out by condition, these socially desirable tendencies were not statistically significant, thus social desirability was not included in any of the subsequent analyses.

Film Clip Order. The effect of film clip order on posttest ratings of affect was assessed to ensure that the film clips, and the order in which they were presented, did not influence posttest affect ratings differently. A one-way ANOVA revealed that film clip order did not affect posttest ratings of positive affect, $F(5, 119) = .96, p = .45$, or negative affect, $F(5, 119) = .74, p = .60$. Furthermore, a factorial ANOVA revealed no significant interactions between video sequence and condition on posttest ratings of positive affect, $F(10, 116) = .96, p = .45$, or between the video conditions and posttest ratings of negative affect, $F(5, 119) = .74, p = .60$. 
Confederates. The impact of using two different female confederates in the experimental conditions was examined. A one-way ANOVA revealed that the two confederates did not significantly influence divergent ratings of positive affect following the experimental manipulation, $F(1, 124) = .85, p = .36$. However, in examining negative affect, a one-way ANOVA revealed that one female confederate did impact participants’ posttest ratings of negative affect significantly more than the other, $F(1, 124) = 4.36, p = .04$. One of the female confederates was shown to make participants feel significantly greater levels of NA ($M = 1.36, SD = .43$) than the other female confederate on average ($M = 1.29, SD = .39$).

**Emotional Contagion**

Emotional assimilation driven by emotional contagion was hypothesized to result in congruence between participants’ posttest affect ratings and the confederate’s portrayed affective state, mediated by mimicry of the confederate’s affective display.

**Confederate Emotion Manipulation Check.** Participant ratings of confederate affect following the experimental manipulation were intended to serve as a manipulation check on confederate’s affective portrayals within each experimental condition. It was predicted that confederate positive affect ratings would be highest in the happy confederate condition (HC/SN) where confederates portrayed emotional behaviors consistent with a state of positive affect (i.e., happiness). A one-way ANOVA revealed a significant difference in posttest ratings of confederate positive affect following the experimental manipulation, $F(2, 122) = 5.73, p = .004, R^2 = .09$. Participants rated confederate positive affect significantly higher in the happy confederate condition ($M = 2.34, SD = .73$) compared to the sad confederate condition ($M = 2.12, SD = .86$), $t(122) = 3.30, p < .05$. Further post-hoc analysis revealed that confederate
positive affect ratings were significantly higher in the happy confederate condition compared to the neutral control ($M = 2.12$, $SD = .86$), $t(122) = 2.12$, $p < .05$. The data indicate that confederate portrayals of positive affect were received as intended in the happy confederate condition.

Ratings of confederate negative affect were expected to be highest in the sad confederate condition (SC/HN) where confederates explicitly demonstrated emotional behaviors consistent with a state of negative affect (i.e., sadness). A one-way ANOVA revealed no significant difference in ratings of confederate negative affect between the conditions following the experimental manipulation, $F(2,122) = 1.49$, $p = .23$. Although ratings of confederate negative affect were in the expected direction, there were no significant differences between the happy confederate condition ($M = 1.18$, $SD = .29$), sad confederate condition ($M = 1.21$, $SD = .32$) and control condition ($M = 1.25$, $SD = .32$). The hypothesis that ratings of negative affect would be higher in the sad confederate condition relative to the control informed further probing of the omnibus ANOVA with a pairwise comparison between these conditions. Contrary to the hypothesis, the pairwise comparison revealed no significant difference in negative affect between the sad norm condition and control conditions, $t(42) = .06$, $p = NS$.

The failure of participants to rate negative affect for confederates as higher in the sad confederate condition, may have been a function of a general unwillingness to rate the confederate negatively. Exploratory analysis of the distribution of confederate’s negative affect scores demonstrated that in aggregate, participants scored confederate’s negative affect levels at a maximum of 2.3 on a 5-point scale, resulting in a restricted range of variance in ratings of confederate negative affect. Furthermore, ratings of confederate negative affect were very positively skewed, with most individuals rating the confederates negative affect as low across all
of the conditions. It is also possible that the consistently low ratings of confederate negative affect resulted from a weak experimental manipulation or unsuccessful portrayal (on the part of the confederates) of negative affect. However, confederate affective state was coded from the recorded interaction by a trained coder who was blind to condition and the objective coding of emotional state suggested that confederates were consistent in their emotional portrayals across the conditions, $\chi^2(10) = 95.46, p = .001$, and that confederate emotional portrayals were largely consistent with the condition ($V = .71$) (see Figure 15). Finally, the inability to find a difference in confederate negative affect ratings as a function of experimental condition, may be the result of the high ratings of confederate negative affect in the neutral, control. The neutral faces of participants, which were initially perceived negatively in the pilot-testing phase, may have been interpreted as similarly angry in the experiment despite best efforts to curb this interpretation by replacing the completely neutral facial expression with a relaxed, and slightly positive facial expression.

**Mimicry.** Split-screen recordings of the participant-confederate interaction were coded for mimicry, as emotional contagion suggests that effective assimilation is contingent on mimicry of emotional expression. Three split-screen videos were not compiled (two from the happy confederate condition, one from the control) because one data file (of either the confederate or participant) was missing or corrupt. A one-way ANOVA revealed a significant difference in the tendency to mimic across the three conditions, $F(2, 120) = 26.75, p = .001, R^2 = .31$ (see Figure 16). Post-hoc analysis revealed that compared to the control condition ($M = .10, SD = .30$), participants in the happy confederate condition (HC/SN; $M = .75, SD = .44$) mimicked the confederate significantly more, $t(123) = 7.18, p < .05$. Similarly, participants in the sad confederate condition (SC/HN; $M = .30, SD = .47$) were significantly more likely to
mimic the confederate compared to the control condition, \( t (123) = 2.36, p < .05 \). The tendency of participants to mimic the emotional expressions of confederates more often in the experimental conditions relative to the control condition suggests that confederates were more emotionally expressive in the experimental conditions and remained relatively emotionally neutral in the control condition.

**Positive Affect Contagion (Hypothesis 1).** It was hypothesized that positive affective assimilation resulting from emotional contagion would produce a relationship between participants’ posttest ratings of positive affect and ratings of confederate positive affect. It was further hypothesized that mimicry would mediate this relationship. The relationship between confederate and participant positive affect was expected to be most prevalent in the happy confederate condition (HC/SN) where confederates were instructed to demonstrate non-verbal behaviors consistent with a state of positive affect (happiness; i.e., smiling, laughing, leaning in, making eye contact).

A one-way ANOVA revealed that participants’ self-rated positive affect did not significantly differ across the conditions, \( F (2,123) = .30, p = .74 \). A pairwise comparison additionally revealed no significant difference in ratings of self-rated positive affect in the happy confederate condition compared to the control, \( t (42) = .62, p = NS \). Though ratings of confederate positive affect were significantly higher in the happy confederate condition, participants’ self-rated positive affect ratings did not mirror this trend. The consistently high ratings of confederate positive affect in this condition, and the absence of correspondingly high ratings of participant positive affect, could suggest that emotional contagion was not driving affective convergence in this condition. In other words, the confederate’s state of positive affect may not have been influential of the participant’s affective state, ruling out the possibility of
contagious affect. However, given that the ratings of confederate positive affect were in fact
different across the conditions, and highest in the happy confederate condition, the inability for
the condition to differentially predict participants’ posttest positive affect scores may indicate
that the disparate, negative emotion norm weakened the impact of confederate positive emotion
on participants’ positive emotion. In other words, the influence of the confederate’s positive
emotional expression may not have had a strong effect, or may have been mitigated by the
sadness norm, which could override or dilute the effect of positive emotional display on
corresponding ratings of positive affect.

Although the condition did not cause corresponding change in positive affect, a
mediation analysis was utilized to test the contagious nature of confederate positive emotional
display on participant’s self-rated positive affect. Ratings of confederate affect, made following
the interaction, were utilized to assess the relationship between confederate and participant
positive affect with frequency of mimicry as the mediating variable. The mediation for positive
affect was predicted to work only in the happy confederate condition, where confederates
explicitly modeled positive affect. However, the mediation was tested across all the conditions.
Therefore, the same mediation analysis was run across the three conditions separately, with
ratings of confederate positive affect predicting participant ratings of positive affect, and
mimicry as a mediating variable.

In the happy confederate condition (HC/SN) ratings of confederate positive affect were
regressed onto participants’ self-reported positive affect ratings. The linear regression analysis
demonstrated a significant impact for confederate positive affect on participant positive affect.
Ratings of confederate PA accounted for a significant proportion of the variance, in participants
self-rated positive affect, $F(1, 40) = 84.03, p = .001, R^2 = .68$, with confederate positive affect ($b$
= .91, \( t = 9.17, p = .001 \) positively predicting participants’ positive affect (see Figure 17). The second step of the mediation analysis attempted to establish a relationship between ratings of confederate positive affect and the propensity of the participant to mimic. The analysis revealed that ratings of confederate positive affect accounted for a significant proportion of the variance in mimicry frequency, \( F (1, 38) = 6.28, p = .02, R^2 = .14 \). Ratings of confederate positive affect (\( b = .82, \ t = 2.51, p = .02 \)) positively predicted mimetic frequency. In the third step of the mediation analysis participants’ posttest positive affect ratings were regressed on to mimetic frequency and ratings of confederate positive affect ratings. The analysis revealed that ratings of confederate positive affect and mimetic frequency accounted for a significant proportion of the variance in participants’ posttest positive affect ratings, \( F (2, 37) = 35.02, p = .001 \). However, mimetic frequency did not significantly predict participants’ posttest ratings of positive affect (\( b = .01, \ t = .20, p = .84 \)), while ratings of confederate affect remained predictive of participants’ posttest positive affect ratings effect (\( b = .91, \ t = 7.67, p = .001 \)). The inability of mimetic frequency to predict participants’ posttest positive affect ratings made it impossible to establish a mediated pathway. Therefore, mimicry did not mediate the affective assimilation between confederate and participant in the happy confederate condition.

It was predicted that the positive affect mediation would not be exhibited in the sad confederate condition (SC/HN), where positive affect would not have been related to mimicry, but the normative information only. Ratings of participants’ self-reported positive affect were regressed on to ratings of confederate positive affect. The analysis revealed that ratings of confederate positive affect accounted for a significant proportion of the variance in participants’ posttest positive affect ratings, \( F (1, 39) = 63.40, p = .001, R^2 = .62 \). Ratings of confederate positive affect (\( b = .77, \ t = 7.96, p = .001 \)) positively predicted participants’ levels of positive
affect (see Figure 18). The second step of the mediation analysis attempted to establish a link between confederate positive affect and mimicry. The data demonstrated that ratings of confederate positive affect did not account for a significant proportion of variance in mimetic frequency, $F(1, 39) = 2.88, p = .10$. Ratings of confederate positive affect ($b = .27, t = 1.70, p = .10$) did not significantly predict the tendency to mimic in the sad confederate condition. The failure to establishing the link between ratings of confederate positive affect and frequency of mimicry resulted in the inability to establish a mediated pathway for positive affect in this condition. No further analyses were conducted.

In the control condition, ratings of participants’ posttest, self-reported positive affect was regressed onto ratings of confederate positive affect. The linear regression analysis revealed that ratings of confederate positive affect accounted for a significant proportion of the variance in participants posttest ratings of positive affect, $F(1, 40) = 24.37, p = .001, R^2 = .38$. Ratings of confederate positive affect ($b = .61, t = 4.94, p = .001$) positively predicted participants’ self-rated levels of positive affect (see Figure 19). The second regression analysis attempted to establish a relationship between ratings of confederate positive affect and the propensity to mimic the confederate. This analysis demonstrated that confederate positive affect did not account for a significant proportion of the variance in mimetic frequency, $F(1, 39) = .70, p = .41$. Ratings of confederate positive affect did not significantly predict frequency of mimicry ($b = -.06, t = -.84, p = .41$). Without the second pathway linking confederate affect to mimicry, establishing a mediated pathway was not possible. No further analyses were run.

Analyses examining positive affect contagion revealed a consistent relationship between the ratings of confederate’s positive affect levels and participant’s positive affect levels that was not statistically mediated by mimicry. In all three conditions, the ratings of confederate positive affect
affect positively predicted participant positive affect, with the largest proportion of variance in participant positive affect explained by confederate positive affect in the happy confederate condition. Taken together these results demonstrate that while confederates positive affective displays influenced emotional assimilation, mimicry was not the driving force in this positive affective integration.

**Negative Affect Contagion (Hypothesis 2).** It was hypothesized that negative affective assimilation resulting from emotional contagion would produce a relationship between participants’ posttest ratings of negative affect and ratings of confederate negative affect. It was further hypothesized that this relationship would be mediated by mimicry. The relationship between confederate and participant negative affect was expected to be most prevalent in the sad confederate condition (SC/HN) where confederates were instructed to demonstrate non-verbal behaviors consistent with a state of negative affect (sadness; i.e., frowning, sighing, slumped posture).

A one-way ANOVA revealed that participants’ posttest ratings of negative affect did not differ significantly across experimental conditions following the experimental manipulation, $F(2,122) = .23, p = .79$. A pairwise comparison between the sad confederate condition (SC/HN) condition and control revealed no significant difference in participants’ posttest ratings of negative affect, $t(42) = -.61, p = NS$. The non-significant difference in posttest negative affect across the conditions was identical to what was found for positive affect. Again, this lack of significance may be informed by a number of factors.

First, that the condition was not predictive of greater levels of negative affect may indicate that emotional contagion was not driving negative emotional assimilation in this context.
While there was no statistically significant difference in ratings of confederate negative affect across the conditions as predicted, ratings of confederate negative affect were found to significantly predict participants’ negative affect ratings in the sad confederate condition, $b = .88$, $t (39) = 6.62$, $p = .001$, and in aggregate, $b = .65$, $t (123) = 7.35$, $p = .001$. This suggests that the influence of negative emotional behavior of the confederate may have been weakened in the face of a disparate norm for emotion (happiness). In other words, the condition itself, which encompassed both the norm and confederate behavior, may have had differential effects on positive and negative affect, mitigating the effect of confederates’ sad displays in the face of a happiness norm, on corresponding ratings of negative affect.

Although the condition was not informative of a corresponding change in negative affect as was hypothesized, a mediation analysis was utilized to test the contagious nature of confederate negative emotional display on participants’ self-rated negative affect. Negative affective convergence predicated on emotional contagion was hypothesized to produce a significant relationship between ratings of confederate negative affect and participants’ negative affect. Furthermore, the model of emotional contagion suggested that this relationship would be mediated by mimicry of the confederate. The mediation for negative affect was predicted to be present only in the sad confederate condition (SC/HN), where confederates explicitly modeled negative affect. However, the mediation was tested across all the conditions. Thus the same mediation analysis was run across the three conditions separately with ratings of confederate negative affect predicting participant ratings of negative affect, with mimicry as a mediating variable.

In the happy confederate condition (HC/SN) the negative affect mediation was expected to fail as negative affect ratings would have been related the sadness norm and not confederate
behavior. In the first step of the mediation analysis, ratings of self-reported posttest negative affect were regressed on to ratings of confederate negative affect. Ratings of confederate negative affect accounted for a significant proportion of the variance in participants self-reported posttest negative affect ratings, $F(1, 40) = 6.29, p = .02, R^2 = .14$. Ratings of confederate negative affect ($b = .55, t = 2.51, p = .02$) positively predicted participants’ negative affect ratings (see Figure 20). The second linear regression analysis attempted to establish a relationship between ratings of confederate negative affect and the frequency with which the participant mimicked the confederate. Mimetic frequency was regressed onto ratings of confederate negative affect. Ratings of confederate negative affect did not account for a significant proportion of the variance in mimetic frequency, $F(1, 38) = .26, p = .61$. Ratings of confederate negative affect ($b = -.54, t = -.52, p = .61$) failed to significantly predict participants posttest negative affect ratings. The failure in establishing a relationship between mimicry and ratings of confederate negative affect made establishing a mediated pathway impossible. No further analyses were conducted.

The mediation for negative affect was predicted to be present in the sad confederate condition (SC/HN), where confederates explicitly modeled negative affect. In the first step of the mediation self-reported posttest negative affect ratings were regressed on to ratings of confederate negative affect. Ratings of confederate negative affect accounted for a significant proportion of the variance in participants’ self-reported ratings of negative affect, $F(1, 39) = 43.80, p = .001, R^2 = .53$. Ratings of confederate negative affect ($b = .88, t = 6.62, p = .001$) positively predicted participants’ ratings of negative affect following the experimental manipulation (see Figure 21). The second step of the mediation analysis attempted to establish a relationship between ratings of confederate negative affect and mimetic frequency. Therefore,
frequency of mimicry was regressed onto ratings of confederate negative affect. Ratings of
confederate negative affect did not account for a significant proportion of the variance in
mimicry, $F(1, 26) = .72$, $p = .40$. Ratings of confederate negative affect failed to significantly
predict participants’ ratings of negative affect ($b = -.38$, $t = -.85$, $p = .40$). The failure to establish
a relationship between ratings of confederate negative affect and mimetic frequency negated the
possibility of a mediated pathway. No further analyses were conducted.

It was expected that the negative affect mediation would fail in the neutral condition
where no norm for negative affect or confederate portrayals of negative affect would be present.
The first regression analysis attempted to establish a relationship between participants’ self-
reported negative affect ratings and ratings of confederate negative affect. Ratings of confederate
negative affect accounted for a significant proportion of the variance in participants self-reported
negative affect, $F(1, 40) = 16.09$, $p = .001$, $R^2 = .29$. Ratings of confederate negative affect ($b = .58$, $t = 4.01$, $p = .001$) positively predicted participants’ ratings of negative affect (see Figure 22). The second regression analysis attempted to establish a relationship between ratings of
confederate negative affect and the propensity to mimic the confederate. Ratings of confederate
negative affect did not account for a significant proportion of the variance in mimetic frequency,
$F(1, 39) = .79$, $p = .39$. Ratings of confederate negative affect failed to significantly predicted
participants’ posttest ratings of negative affect ($b = -1.14$, $t = -1.43$, $p = .38$). The failure to
establish a relationship between mimetic frequency and ratings of confederate negative affect
made establishing a mediated pathway impossible. No further analyses were conducted.

As with positive affect, the results of the mediated regression analyses for negative affect
contagion revealed a consistent relationship between ratings of confederate negative affect and
participants’ negative affect that was not statistically mediated by mimicry. Taken together these
results demonstrate that while confederates negative affective displays influenced emotional assimilation, mimicry was not the driving force in either positive or negative affective integration.

**Normative Social Influence on Emotion**

It was hypothesized that normatively driven affective convergence would result in the convergence of participants’ affective ratings to the given norm for each condition. Namely normatively driven emotional assimilation was expected to produce higher ratings of positive affect in the happy norm condition (SC/HN) compared to the control condition. It was further expected that the norm for happiness would be endorsed significantly more in the happy norm condition relative to the control. It was hypothesized that that participants would report more negative affect in the sad norm condition (HC/SN), where the descriptive norm set an explicit expectation for participant sadness compared to the control condition. Furthermore, normatively driven emotional assimilation was expected to produce significantly higher ratings of the sadness norm among participants in the sad norm condition relative to controls.

**Emotion Norm Manipulation Check.** Normative ratings following the experimental manipulation were intended to serve as a manipulation check on the normative information disseminated in each experimental condition. It was predicted that norm ratings for happiness would be highest in the happy norm condition where participants were told that other CSUSM students reported feeling happy after watching the film clips. A one-way ANOVA revealed a significant difference in the endorsement of the happiness norm across the three conditions, $F(2, 123) = 3.87, p = .02, R^2 = .06$. Post-hoc analysis revealed that the happiness norm was endorsed significantly more in the sad norm condition ($M = 4.14, SE = .34$) than in the neutral condition
Endorsement of the happiness norm in the happy norm condition \( (M = 3.26, SE = .34) \) did not differ significantly from the neutral condition.

The significantly higher endorsement of the happiness norm in the sad norm condition is contrary to what was expected. The significantly higher endorsement of the happiness norm occurred in the condition where the confederate displayed positive affect may indicate that participants used the confederates’ behavior as normative proxy. A linear regression analysis demonstrated that ratings of confederate positive affect in the sad norm condition \( (HC/SN) \), did account for a significant proportion of the variance in the endorsement of the happiness norm, \( F(1,40) = 13.81, p = .001, R^2 = .26 \). Ratings of confederate positive affect in this condition positively predicted ratings of the happiness norm \( (b = 1.38, t = 3.73, p = .001) \). This finding suggests that confederate portrayal of positive affect in the sad norm condition likely influenced the propensity for participants to use confederate behavior to establish the norm. Furthermore, the physical portrayal of affect may have been a stronger influence on affect than normative information that is disseminated verbally. An emotion norm that is derived from the observed emotional behavior of others may ultimately serve as a stronger and more balanced manipulation in comparison to the contagion portrayal.

A subsequent manipulation check was conducted for the sadness norm. It was predicted that ratings of the sadness norm would be highest in the sad norm condition \( (HC/SN) \) where participants were told that other CSUSB students reported feeling sad after watching the film clips. Univariate analysis revealed a significant difference in endorsement of the sadness norm across the three conditions, \( F(2, 123) = 6.06, p = .003, R^2 = .09 \). Post-hoc comparisons revealed that the sadness norm was endorsed significantly more in the sad norm condition \( (M = 2.62, SE \)
= .31) than in the happy norm condition \((M = 1.10, SE = .31)\), \(t(123) = 3.46, p < .05\). The neutral condition \((M = 1.95, SE = .31)\) did not differ significantly from either experimental condition.

**Normative Social Influence - Positive Affect (Hypothesis 3).** A series of linear regression analyses tested the predictive power of a perceived happiness norm on participants’ self-rated positive affect. It was hypothesized that normatively driven positive emotional assimilation would be present only in the happy norm condition (SC/HN) where the normative information disseminated to participants explicitly dictated that most CSUSM students reported feeling happy following exposure to the film clips. A linear regression analysis revealed that perceptions of a happy norm positively predicted participants’ positive affect ratings in the happy norm condition, \(b = .17, t(40) = 2.99, p = .005\) (see Figure 23) and that ratings of the happiness norm accounted for a significant proportion of the variance in the participants’ positive affect levels, \(F(1, 40) = 8.95, p = .005, R^2 = .18\).

In the sad norm condition (HC/SN), a linear regression analysis revealed that the perceived happiness norm accounted for a significant proportion of the variance in participants’ posttest ratings of positive affect, \(F(1, 40) = 15.50, p = .001, R^2 = .28\). The happiness norm positively predicted posttest PA scores, \(b = .22, t(40) = 3.94, p = .001\) (see Figure 24). This was an unexpected finding, as again it was hypothesized that the predictive power of a happy norm would be most prevalent the happy norm condition (SC/HN). However, the consistently higher endorsement of the happiness norm in the sad norm condition, where the confederate’s emotional display was positive, may explain why ratings of the happiness norm significantly predicted ratings of positive in the sad norm condition.
Finally, in the control condition, a linear regression analysis revealed that perceptions of a happy norm did not account for a significant proportion of the variance in the participant’s posttest positive affect ratings, $F(1, 40) = 2.34, p = .13$ (see Figure 25).

**Normative Influence - Negative Affect.** A series of linear regression analyses were run to assess the predictive power of a perceived sadness norm on participants’ levels of negative affect. It was expected that negative emotional assimilation based on normative expectation would be present only in the sad norm condition (HC/SN) where the normative information disseminated to participants explicitly dictated that most CSUSM students reported sadness following exposure to the film clips. A linear regression analysis revealed that the sadness norm accounted for a significant proportion of variance in participants’ negative affect ratings in the sad norm condition, $F(1, 40) = 10.93, p = .002, R^2 = .22$, with the norm of sadness positively predicting posttest negative affect scores, $b = .09, t(40) = 3.31, p = .002$ (see Figure 26).

A subsequent regression analysis revealed that the sadness norm did not account for a significant proportion of participants’ negative affect ratings in the happy norm condition (SC/HN), $F(1, 40) = .04, p = .84$, with the norm of sadness failing to significantly predict posttest negative affect scores, $b = .01, t(40) = .20, p = .84$ (see Figure 27).

Finally, a linear regression analysis examined the influence of the sadness norm on ratings of negative affect in the control condition. The results revealed that perceptions of a sad norm accounted for a significant proportion of the variance in the participant’s posttest negative affect ratings, $F(1, 40) = 4.41, p = .04$. Perceptions of the sadness norm in the control condition positively predicted participants’ negative affect ratings, $b = .05, t(40) = 2.10, p = .04$ (see Figure 28).
Supplemental Norm Analyses

The bivariate model of emotion norm impact on positive and negative affect received support in this study. However, given that the model of contagion was conceptually and statistically more complicated and therefore more difficult to support, an effort was made to test the impact of normative emotional influence on emotional assimilation in an equally sophisticated conceptual framework. To this end, a series of mediated regression analyses were attempted in which endorsement of the happy or sad norm was evaluated as the mediating factor in the perpetuation of positive and negative affective states in the happy and sad norm conditions.

After recoding the condition variable into a series of dichotomous predictor variables, two regression analyses were run to test the model of normatively driven condition effects on congruent states of participant affect. It was hypothesized that the condition may have impacted alterations in participants’ positive and negative affective states through normative emotional influence. Relative to the control condition, the sad norm (happy confederate) condition did not account for a significant proportion of the variance in participants’ posttest negative affect scores, $F(1, 81) = .17, p = .68$. The alternative was tested in the happy norm condition. Similarly, the happy norm condition was not found to account for variance in participants posttest negative affect ratings, $F(1, 81) = .38, p = .54$. The inability to establish a basic effect between the conditions and states of positive and negative affect resulted in the inability to establish a normative endorsement as a mediating factor in the relationship between condition and emotional outcome.
Future research should look to make a more comparable comparison between contagious affect, and normative affect for instance as being mediated by self-categorization. Examining normative emotional convergence as the result of identity is a more comparably difficult model to establish, and has the potential to make the comparison of the two models more equivalent.

**Summary**

The results indicate that positive and negative affect remained relatively stable from pretest to posttest for participants in the two experimental conditions. However, the contrasting normative and contagious affect could have diluted the impact of either or both of the manipulations within each experimental condition. Looking within each condition, participants in the happy confederate/sad norm (HC/SN) and sad confederate/happy norm (SC/HN) conditions came into the experiment experiencing more positive affect than negative affect, and remained more positive than negative following the manipulation. When confronted with a happy confederate and a negative normative expectation, as in the happy confederate/sad norm condition (HC/SN), positive affect ratings seemed to be based on the positive affect of the individual. However, when confronted with a negative confederate and a positive emotional expectation based on the norm, as in the sad confederate/happy norm condition (SC/HN), positive affect ratings seemed to be based on the positivity described by the norm.

Testing the hypotheses pertaining to emotional contagion demonstrated evidence of emotional assimilation to the confederates’ portrayed emotional state. That is, participants who rated the confederate positively demonstrated positive affect in the happy confederate condition. Likewise, participants who rated the confederate negatively demonstrated convergent negative affect in the sad confederate condition. While there was a significant tendency for participants to
mimic in these conditions, positive emotional assimilation and negative emotional assimilation were not statistically mediated by mimicry.

Testing the hypotheses pertaining to the norm revealed support for convergence to the given emotion norm, though this model was conceptually easier to support with the data. Endorsement of the happy norm in the happy norm condition predicted participants’ ratings of positive affect. Furthermore, endorsement of the sadness norm in the sad norm condition predicted participants’ ratings of negative affect.

The results of this study imply that emotional assimilation may be driven by regard for the typical emotion for one’s group (as with emotion norms), and interaction with another individual experiencing an emotion. While assimilation to the confederate’s affective display was not resultant of emotional mimicry, as the model of emotional contagion would suggest, the results demonstrate that the emotions of others, whether through cognition (as with emotion norms) or physical presence (as with the live confederate actor), influence individual states of affect.

Discussion

This study contributes to the literature on emotional assimilation by testing the strength of two explanations for shared emotion. Although ambiguity concerning the mechanisms supporting emotional assimilation has stimulated research on shared emotional states, multiple supporting mechanisms have never been examined together in a single experiment. The results of this study suggest that emotional assimilation is a multi-mechanistic phenomenon with the data of this study supporting normatively driven emotional assimilation and emotional assimilation to a live individual. When explicitly primed with a happiness norm prior to viewing an ambiguous
series of film clips, and subsequently viewing the confederate’s negative response to the same ambiguous film clips, participants’ positive affect ratings conformed to the happiness norm. Alternatively, when primed with a sad norm prior to viewing an ambiguous series of film clips, and subsequently viewing the confederate’s positive response to the same series of clips, participants positive affect ratings conformed to the positive live stimulus. However, assimilation to the confederate’s positive emotional state did not result from the mimicry of positive emotional behavior, suggesting that alternative supporting mechanisms ought to be investigated in the perpetuation of interpersonal affect transfer.

Mechanisms like social appraisal (Parkinson et al., 2005), conditioning (Gonzalez et al., 2002), direct-induction (Preston & de Waal, 2002), language-mediated association (Hoffman, 2002), perspective taking (Hoffman, 2002) and social comparison (Kulik & Mahler, 2000) have all been suggested as legitimate alternate influences on the creation of shared affect. Mimicry remains a viable mechanism in supporting emotional assimilation in social contexts, but one that is not supported by this study.

Substantive conclusions regarding negative affect cannot be drawn based on the results of this study, as negative affect ratings did not show any variability across the experimental conditions. However, the results of this study indicated a clear tendency for participants to actively maintain states of positivity. These results are seemingly incongruent, in that participants in one condition abided by the norm while participants in the other abided by the confederate. However, research on affective priming and the affect infusion model (AIM;Forgas, 1995) suggests that not only do individuals strive to maintain positive moods and alleviate negative moods (Clark & Isen, 1982; Isen & Levin, 1972; Mayer et al., 1991), but that people experiencing positive affective states are motivated to engage in behaviors and cognitions
that have the highest potential for maintaining their positive affective state (Remus, Bonos, & Ilies, 2006). In the present experiment, the results indicate that participants’ motivation to maintain positivity may have resulted in attending to the confederate, in the case that the confederate was positive, or in attendance to the norm, in the case that the norm was positive. Research on affect infusion suggests further that affect biases the attentional processes of individuals, influencing the encoding and retrieval of affectively congruent information (Forgas, 1995). This may explain the lack of variation in negative affect ratings for the confederate in that participants may have attended to only to the confederate’s positive emotional signals.

**Emotional Contagion**

The simultaneous test of two explanations for emotional convergence resulted in evidence of assimilation to the confederate’s emotional state, particularly in the happy confederate condition. Results demonstrated that confederates’ emotional state, both positive and negative, consistently predicted participants’ ratings of positive and negative affect, as emotional contagion would suggest.

In addition to the transfer of emotion from confederate to participant, the data from this experiment revealed a consistent tendency for participants to mimic both positive and negative emotional expressions of a confederate actor over an extended, dynamic emotional portrayal. Although several studies have demonstrated evidence of mimicry in response to more dynamic emotional expression (Bush, Barr, McHugo & Lanzetta, 1989; Gump & Kulik, 1997) evidence for the presence of mimicry and its association with emotional contagion is weak in more ecologically valid contexts (Hess & Blairy, 2001). Furthermore, the evidence gathered to suggest that mimicry supports shared emotion is based largely on mimicry of discrete emotional
expression from pictures of intense, and prototypical facial expressions. Live expressions, are studied much less frequently in contagion research and are less pure, less dramatic, quicker, but also more ambiguous than photographed images of emotional expression (McIntosh, 2006). Studies on contagion have often been criticized for the lack of external generalizability and researchers have called for studies of more dynamic emotional expression in emotional assimilation. Furthermore, where these studies typically only show facial expression, live expressions may also include bodily posture and attention to aspects of the surrounding space (McIntosh, 2006). This study contributes to the literature, by demonstrating that mimicry and contagion are co-occurring processes, but the results do not show that this co-occurrence explains emotional assimilation over an extended interaction.

The far less intrusive and covert measure of mimicry utilized in this study made the experimental paradigm more externally generalizable to situations in which emotional contagion may normally occur. Furthermore, the covert recording of participant and confederate expression should have reduced any reactivity that has the potential to result from drawing attention to the fact that facial expressions are being recorded, as in electromyographic recording. Beyond examining emotional contagion in a more ecologically valid context, this study contributes to the established literature by examining emotional contagion in response to dynamic emotional expression that is often said to be lacking in contagion studies.

Emerging research suggests some core issues with the explanation of emotional contagion that may explain the inconsistent relationship between mimicry and emotional assimilation. First, while the somatovisceral feedback account has received some support (Zajonc, 1980, Strack, Martin & Stepper, 1988, Laird, 1974), converging evidence suggests that a lack of specificity in autonomic feedback created by posed emotional expression makes the
mimicry of discrete emotions unlikely (Hess & Fischer, 2013). Rather it is believed that valence convergent emotional assimilation is most likely, where exposure to happiness may instigate positive feelings in an observer, as opposed to happiness (Hess & Fischer, 2013). Additionally, evidence that supports the mediating role of mimicry in the process of emotional contagion generally demonstrates that mimicry has a weak impact on changes in subjective emotion (Parkinson et al., 2005). It is unclear whether mimicry and somatovisceral feedback truly mediate interpersonal emotional exchange, or simply co-occur (Lishner et al., 2008). Several studies have been failed to establish the mediating role of mimicry in the contagion process (Blairy, Herrera, & Hess, 1999; Hess & Blairy, 2001), despite finding evidence of both emotional assimilation and mimicry.

**Normative Emotional Influence**

In addition to examining emotional contagion as an explanation for emotional assimilation, this study sought to examine emotional convergence as the product of social identity activation and adherence to a group emotion norm. This study presented participants with an ambiguous group-relevant event to which no pre-existing emotional response should have existed. The results demonstrated that a descriptive emotion norm concerning how most students felt in response to ambiguous stimuli informed convergence towards the group emotion standard. In essence, to the extent that participants were told that other university students felt happy or sad in response to a series of unemotional film clips, reported emotions tended to converge to these standards. This indicates that the consideration of normative emotional information was impactful of participants’ emotional response. Furthermore, the current study demonstrated that convergence towards an emotion norm has the potential to occur relatively rapidly. Finally, the results of this study offer evidence that group members are motivated to
conform towards positive and negative emotion norms, supporting the notion that this change is based on self-categorization and identity activation rather than preserving self-esteem and that this convergence is specific to the group and affective dimension (Moons et al., 2009).

Research concerning the impact of descriptive emotion norms for emotion on emotional assimilation in groups is relatively scant. However, the findings of this study correspond with past research that demonstrates the potential for group-relevant emotion norms to incite corresponding feeling (Moons et al., 2009; Leonard et al., 2011). While previous research on descriptive emotion norm convergence has shown that convergence to the norm can occur in the absence of contextual information (Moons et al., 2009) and in response to a highly contextualized situation (Leonard et al., 2011) this study demonstrates that convergence to the norm can occur in a highly ambiguous situation where expectation for emotion is clear, but the situation itself is novel.

The results of this study suggest that normative influence on emotion represents a viable mechanism in supporting the creation of shared affective states, which has important implications for social behavior. It is speculated that convergence to group-prototypical emotion can shape reality and consensus, making behavioral action seem more legitimate in a manner similar to shared attitudes (Seger et al., 2009; Leonard et al., 2011). Just as shared attitudes are perceived as more valid, leading to increased certainty, reduced anxiety and motivated action tendencies (Kelley 1973; Turner, 1991), it is speculated that shared emotions may likewise contribute to certainty in social action. This has informed the idea that emotional norms and adherence to these norms are crucial to supporting cohesive action, and have the potential to make group behavior seem more certain, legitimate, and justified than behavioral tendencies based on individual states of emotion (Seger et al., 2009).
Caveats:

The results of this study are not without caveats. Current research on group emotion suggests a conceptual distinction between group emotions, which are composed of the affect of individual members, and group-based emotions, which consist of feeling an emotion on behalf of a group. It is suggested that asking participants about their emotions generally, and about their emotions as group members, may result in different emotion profiles (Moons et al., 2009, Smith, Mackie, Seger, 2007). Therefore, the survey questions may have favored the contagion explanation, as the questions in the posttest survey did not concern how the individuals felt as CSUSM students, but solely as individuals. Questions that concerned emotions felt as members of the specific referent group, in this case as university students, may have elicited responses that were more in line with the group-based emotion explanation. It is impossible to tell to what extent the participants were conceptualizing themselves as members of a dyad, members of the CSUSM community, or even as individuals when rating their levels of affect following the experimental manipulation.

The experimental paradigm may have additionally favored the contagion explanation because of the strength of the contagion manipulation may have been stronger than that of the norm. Consensus or normative emotional expectation that is derived from observation of the emotional expression of others may have served as a stronger and more balanced alternative norm manipulation. However, the use of live emotional models to inform a norm for emotion would have made it difficult to separate the influence of normative emotion from emotional contagion, as live models would have similarly displayed emotional behaviors that could be mimicked.
Some have suggested that emotional convergence based on normative expectation does not represent a true change in participant emotion but rather simple conformity. However, several previous studies examining normative emotional convergence have examined downstream processes for emotionally consistent reaction, suggesting that the internalization of emotions based on normative expectation occurs, as does affect congruent behavior (Moons et al., 2009; Seger et al., 2009). Data from this study failed to show any significant interaction between the norm for happiness or sadness and the social desirability measure. This indicates that normatively driven affect was not impacted by the tendency to abide by social expectation. One would expect that if the power of the emotion norm on convergent emotion rating was explained by a tendency to conform, and not a genuine change in emotion, the tendency to behave desirably would moderate this effect.

Conclusion

A comprehensive understanding of the processes driving affective assimilation in social contexts has the capacity to inform a more comprehensive understanding of interpersonal, group, and intergroup behavior. These findings attest to the subtle nature of emotional sharing and suggest that emotional assimilation may be the product of multiple social processes, including adherence to normative expectation for emotion and adherence to the emotional states of physically present individuals. Furthermore, the results demonstrate that while individuals actively model the emotions of proximate others and mimic their emotional expressions, that emotional assimilation was not predicated on mimicry necessitating the investigation of other supporting mechanisms. Future research needs to investigate the propagation of shared emotional states as the product of both implicit and explicit social influence and look to determine the
situational, developmental, and contextual conditions under which these types of emotional influence are likely to occur.

References


Table 1

Descriptive Statistics of Demographic Measures for Participants by Condition

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<th>Total</th>
<th>HC/SN</th>
<th>SC/HN</th>
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<td>20 years (37)</td>
<td>21 (41)</td>
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*Note: HC/SN = Happy Confederate/Sad Norm, SC/HN = Sad Confederate/Happy Norm*
### Table 2

*Means and Standard Deviations for Pretest Measures by Condition*

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<th>Measure</th>
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*Note:* HC/SN = Happy Confederate/Sad Norm, SC/HN = Sad Confederate/Happy Norm. There were no statistically significant differences between conditions on any pretest measures.
Table 3

*Means and Standard Deviations for Posttest Measures by Condition*

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<td>1.48</td>
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<td>2.02</td>
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</tr>
</tbody>
</table>

*Note: HC/SN = Happy Confederate/Sad Norm, SC/HN = Sad Confederate/Happy Norm.*
Figure 1. Diagram of Bottom-Up and Top-Down Influences on Group Emotion

I. Emotion Contagion: Group Emotion from the Bottom-up

II. Normative Emotional Convergence: Group Emotion from the Top-down

Figure 1. Diagram of top-down and bottom–up influences on group emotion. In the diagram, squares represent group emotion and circles represent individual-level emotion. Emotional contagion constitutes a bottom-up process, where emotion is shared between individuals to inform a shared, group emotional state. Alternatively, normative social influence constitutes a top-down process, where shared emotion is driven from the group level to individuals.
Figure 2. Diagram of experimental conditions. The happy confederate/sad norm and sad confederate/happy norm conditions were the two conditions in which clear delineations could be drawn between the influence of normative social influence and emotional contagion on affect. These conditions, in which contagious and normative affect were contrasting, were tested in this experiment.
Figure 3. View from Participant’s Seat

Figure 3. Photograph of seat placement in experimental space. This view from the participants seat, demonstrates that placement of the participants and confederate’s chairs in the experimental space was intended to provide maximal eye contact between the participant and confederate while allowing the participant to adequately view the computer monitor.
**Figure 4. Overhead Schematic of final Experimental Setup**

This diagram represents an overhead schematic of the experimental space. The participant and confederate would enter the experimental space, at which time each would be assigned to her particular desk to complete pretest survey measures. The two parties would then join together at the center table to watch the film clips. This is where the experimental manipulation would take place, and the confederate would display emotional behavior. The interaction at this table was recorded. Following the movie clips, each party would return to her desk to complete the posttest survey measures.
Figure 5. The camera used to film participants’ emotional expressions was hidden in a moving box.
Figure 6. The box containing the hidden camera was utilized to film participants in the experiment was hidden among several other boxes, placed across from the participant. This procedure attempted to make the presence of a single box less conspicuous to prevent awareness of filming.
Figure 7. The ceiling mounted camera was utilized to film confederates’ emotional expressions during the experiment. This camera was more conspicuous, so participant’s backs were placed to the ceiling mounted camera in an attempt to make recording less conspicuous.
Figure 8. An inactive camera was placed in the experimental space, within the view of participants. This procedure was yet another precaution that attempted to decrease the salience of video recording for participants. Seeing the inactive video camera, was intended to contribute to the perception that video recording may not be occurring within this particular condition.
Figure 9. Greeting Sign for Participants

A sign was placed on the door to greet participants and the confederate as they arrived to the experimental space. This sign asked participants (or the confederate; whoever arrived first) to please knock. When participants knocked at the door the experimenter asked the first individual, either participant or confederate to wait in a seated hallway and wait for the second party to arrive. This procedure was intended to prevent suspicion of the confederate as an actor in this experiment.
Figure 10. When both the confederate and participant were present (as signaled by a second knock on the door), the experimenter ushered both parties into a small room, where both the participant and confederate were asked to consider the informed consent documents. The participant and confederate sat in the two chairs placed side-by-side and given identical documentation.
Figure 11. Demonstrates the configuration of the experimental space. Specifically, a large center table was configured such that a laptop was connected to two external monitors to allow for the synchronous presentation of the film clips.
Figure 12. The desks in the corners are where the participant and confederate completed the surveys prior to and following the experimental manipulation. The desks were placed so that the participant’s and confederate’s backs were to one another, to sustain perceptions of privacy when completing survey measures. The desk on the left was always assigned to the participant and the desk on the right was always assigned to the confederate.
Figure 13. A laptop was connected to two external monitors to allow for the simultaneous display of film stimuli to the participant and confederate. This ensured that the participant knew that they were watching the same film clips as the confederate.
Figure 14. This is a still shot of one of the videos used to rate mimicry and emotion for both the confederate and participant in each experimental condition.
Figure 15. The coded emotional state for participants by condition shows that a coder who was blind to condition coded the emotional states of confederates as consistent by condition. Thus in aggregate, confederates in the happy confederate condition were coded as displaying positive affect where confederates in the sad confederate condition were coded as displaying negative affect. Therefore, confederates were accurate in their emotional portrayals across the conditions.
Figure 16. The occurrence of mimicry that was coded from the split-screen video interaction between the participant and confederate showed that participants mimicked the confederate most often in the happy confederate/sad norm condition. Participants were significantly more likely to mimic in both experimental conditions compared to the neutral control (* p < .05)
Figure 17. A test of the mediated pathway from ratings of confederate positive affect and participant positive affect by way of mimicry, in the happy confederate condition (based on Baron & Kenny, 1986). Results failed to establish mimicry as a mediating factor in positive affect contagion in this condition.
Figure 18. Positive Affect Contagion in the Sad Confederate Condition

A test of the mediated pathway from ratings of confederate positive affect and participant positive affect by way of mimicry, in the sad confederate condition (based on Baron & Kenny, 1986). Results failed to establish mimicry as a mediating factor in positive affect contagion in this condition.
Figure 19. Positive Affect Contagion in the Control Condition

Figure 19. A test of the mediated pathway from ratings of confederate positive affect and participant positive affect by way of mimicry, in the control condition (based on Baron & Kenny, 1986). Results failed to establish mimicry as a mediating factor in positive affect contagion in this condition.
Figure 20. A test of the mediated pathway from ratings of confederate negative affect and participant negative affect by way of mimicry, in the happy confederate condition (based on Baron & Kenny, 1986). Results failed to establish mimicry as a mediating factor in negative affect contagion in this condition.
Figure 21. A test of the mediated pathway from ratings of confederate negative affect and participant negative affect by way of mimicry, in the sad confederate condition (based on Baron & Kenny, 1986). Results failed to establish mimicry as a mediating factor in negative affect contagion in this condition.
Figure 22. Negative Affect Contagion in the Control Condition

Figure 22. A test of the mediated pathway from ratings of confederate negative affect and participant negative affect by way of mimicry, in the control condition (based on Baron & Kenny, 1986). Results failed to establish mimicry as a mediating factor in negative affect contagion in this condition.
Figure 23. Influence of Happiness Norm on Positive Affect in Happy Norm Condition

\[ b = .17 \]
\[ SE = .06 \]

Figure 23. A linear regression analysis showed that the happiness norm positively predicted participant ratings of positive affect in the happy norm (sad confederate) condition.
Figure 24. Influence of Happiness Norm on Positive Affect in Sad Norm Condition

Figure 24. A linear regression analysis showed that the happiness norm positively predicted participant ratings of positive affect in the sad norm (happy confederate) condition.
Figure 25. Influence of Happiness Norm on Positive Affect in Control Condition

Figure 25. A linear regression analysis showed that the happiness norm positively predicted participant ratings of positive affect in the sad norm (happy confederate) condition.
Figure 26. Influence of Sadness Norm on Negative Affect in Sad Norm Condition

A linear regression analysis showed that the sadness norm positively predicted participant ratings of negative affect in the sad norm (happy confederate) condition.

\[ b = 0.09 \]
\[ SE = 0.03 \]
Figure 27. Influence of Sadness Norm on Negative Affect in Happy Norm Condition

\[ b = .01 \]
\[ SE = .04 \]

*Figure 27.* A linear regression analysis showed that the sadness norm positively predicted participant ratings of negative affect in the happy norm (sad confederate) condition.
Figure 28. Influence of Sadness Norm on Negative Affect in Control Condition

Figure 28. A linear regression analysis showed that the sadness norm positively predicted participant ratings of negative affect in the control condition.
## Appendix A: Emotion Classification System by Bartel & Saavedra (2000)

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>F: A lot of eye contact</td>
<td>F: Smile with teeth showing</td>
<td>F: Slightly raised eyebrows</td>
<td>F: Mouth may be turned slightly upwards</td>
</tr>
<tr>
<td>F: Open mouth</td>
<td>F: Arched eyebrows</td>
<td>F: Closed mouth smile</td>
<td>F: Little facial movement</td>
</tr>
<tr>
<td>F: Arched eyebrows</td>
<td>V: Rapid pace</td>
<td>F: Eyes scan stimuli</td>
<td>V: Soft but audible volume</td>
</tr>
<tr>
<td>V: Varied inflection</td>
<td>V: High pitch</td>
<td>V: Varied inflection</td>
<td>V: Some inflection in tone or pitch</td>
</tr>
<tr>
<td>V: Incredulous tone</td>
<td>V: Slightly breathless</td>
<td>V: Regular pace</td>
<td>V: Regular pace</td>
</tr>
<tr>
<td>P: Poised for action</td>
<td>V: Talking a lot</td>
<td>V: Clearly audible volume</td>
<td>P: Relaxed but engaged towards group members</td>
</tr>
<tr>
<td>P: Startled</td>
<td>V: Animated intonation</td>
<td>P: Hands are active during speech</td>
<td>P: Little movement in limbs or torso</td>
</tr>
<tr>
<td>P: Restless</td>
<td>P: Exaggerated hand gesture</td>
<td>P: Body poised to include group members</td>
<td></td>
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</tbody>
</table>

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<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>F: Expressionless</td>
<td>F: Excessive blinking</td>
<td>F: Frown</td>
<td>F: Eyebrows lowered, chin raised and mouth closed</td>
</tr>
<tr>
<td>F: Little eye contact</td>
<td>F: Drooping eyes</td>
<td>F: Eyes avoid stimuli</td>
<td>F: Sporadic eye contact</td>
</tr>
<tr>
<td>F: Closed mouth</td>
<td>F: Yawning</td>
<td>F: Blank stare</td>
<td>F: Sneering</td>
</tr>
<tr>
<td>V: Whispering volume</td>
<td>F: Fixed stare away from group</td>
<td>V: Soft volume</td>
<td>F: Flushed face</td>
</tr>
<tr>
<td>V: Monotone</td>
<td>F: Almost no eye contact</td>
<td>V: Slow pace</td>
<td>F: Nervous smile</td>
</tr>
<tr>
<td>V: Slow pace</td>
<td>V: Monotone</td>
<td>V: Monotone</td>
<td>F: Clenched teeth</td>
</tr>
<tr>
<td>V: Delayed Response</td>
<td>V: Few vocalizations</td>
<td>V: Head tilted downwards</td>
<td>V: Stuttering</td>
</tr>
<tr>
<td>V: Infrequent Response</td>
<td>V: Mumbling</td>
<td>V: Low volume</td>
<td>V: Rapid Speech</td>
</tr>
<tr>
<td>P: Slow movements</td>
<td>V: Low pitch</td>
<td>V: Low pitch</td>
<td>V: Shortness of breath</td>
</tr>
<tr>
<td>P: Reclined position</td>
<td>V: Delayed Response</td>
<td>V: Delayed Response</td>
<td>V: Uneven pitch</td>
</tr>
<tr>
<td>P: Immobile</td>
<td>P: Slouching</td>
<td>P: Slouching</td>
<td>P: Closed fists</td>
</tr>
<tr>
<td></td>
<td>P: Orienting away from group</td>
<td>P: Orienting away from group</td>
<td>P: Hand tremors</td>
</tr>
<tr>
<td></td>
<td>P: Motionless</td>
<td>P: Motionless</td>
<td>P: Paced for action</td>
</tr>
<tr>
<td></td>
<td>P: Leaning chin on hands</td>
<td>P: Leaning chin on hands</td>
<td>P: Nervous habits (rocking, chewing, nails)</td>
</tr>
</tbody>
</table>

* F = Facial Indicators, V = Vocal Indicators, P = Postural Indicators
Appendix B. Pretest Survey

**Current Mood:** This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way right now that is, in this present moment. Use the following scale to record your answers.

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<tr>
<th></th>
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<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td>very slightly or not at all</td>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>Interested</td>
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<tr>
<td>Distressed</td>
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<tr>
<td>Excited</td>
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<td>Upset</td>
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<td>Strong</td>
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<td>Guilty</td>
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<tr>
<td>Scared</td>
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<td>Hostile</td>
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<tr>
<td>Enthusiastic</td>
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<tr>
<td>Proud</td>
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<tr>
<td>Happy</td>
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<td>Positive</td>
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<tr>
<td>Optimistic</td>
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</table>

**Resp:** _______
Social Sensitivity Scale: This is a scale that measures a variety of feelings and behaviors in various situations. There are no right or wrong answers, so try very hard to be completely honest in your answers. Read each question and indicate the answer which best applies to you. Please answer each question very carefully.

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>Often</th>
<th>Always</th>
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<td>1</td>
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<tr>
<td>4</td>
<td></td>
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</tbody>
</table>

1) If someone I'm talking with begins to cry, I get teary-eyed.
2) Being with a happy person picks me up when I'm feeling down.
3) When someone smiles warmly at me, I smile back and feel warm inside.
4) I get filled with sorrow when people talk about the death of their loved ones.
5) I clench my jaws and my shoulders get tight when I see the angry faces on the news.
6) When I look into the eyes of the one I love, my mind is filled with thoughts of romance.
7) It irritates me to be around angry people.
8) Watching the fearful faces of victims on the news makes me try to imagine how they might be feeling.
9) I melt when the one I love holds me close.
10) I tense when overhearing an angry quarrel.
11) Being around happy people fills my mind with happy thoughts.
12) I sense my body responding when the one I love touches me.
13) I notice myself getting tense when I'm around people who are stressed out.
14) I cry at sad movies.
Personal Attitudes/Traits: Listed below are a number of statements concerning personal attitudes and traits. Please read each item and decide whether the statement is true or false as it applies to you. For each item, please circle TRUE or FALSE.

1. I never hesitate to go out of my way to help someone in trouble. TRUE/FALSE
2. It is sometimes hard for me to go on with my work if I am not encouraged. TRUE/FALSE
3. I have never intensely disliked anyone. TRUE/FALSE
4. On occasion I have had doubts about my ability to succeed in life. TRUE/FALSE
5. I sometimes feel resentful when I don't get my way. TRUE/FALSE
6. I like to gossip at times. TRUE/FALSE
7. There have been times when I felt like rebelling against people in authority, even though I knew they were right. TRUE/FALSE
8. I can remember "playing sick" to get out of something. TRUE/FALSE
9. There have been occasions when I took advantage of someone. TRUE/FALSE
10. I am always willing to admit when I made a mistake. TRUE/FALSE
11. I always try to practice what I preach. TRUE/FALSE
12. I sometimes try to get even rather than forgive and forget. TRUE/FALSE
13. When I don't know something, I don't mind at all admitting it. TRUE/FALSE
14. I am always courteous, even to people who are disagreeable. TRUE/FALSE
15. At times I have really insisted on having things my own way. TRUE/FALSE
16. There have been occasions when I felt like smashing things. TRUE/FALSE
17. I never resent being asked to return a favor. TRUE/FALSE
18. I have never been irked when people expressed ideas very different from my own. TRUE/FALSE
19. There have been times when I was quite jealous of the good fortune of others. TRUE/FALSE
20. I am sometimes irritated by people who ask favors of me. TRUE/FALSE
Demographic Questions

Age: ____________

My ethnicity is:
(1) Asian or Asian American, including Chinese, Japanese, and others
(2) Black or African American
(3) Hispanic or Latino, including Mexican American, Central American, and others
(4) White, Caucasian, Anglo, European American; not Hispanic
(5) American Indian/Native American
(6) Mixed; Parents are from two different groups
(7) Other (write in): ________________________________

Which generation do you belong to?

_______ First generation (I immigrated to the U.S. along or with my parents)

_______ Second generation (I was born in the U.S. and my parents immigrated)

_______ Third generation (My grandparent’s immigrated to the U.S.)

_______ Fourth generation (My great grandparent’s immigrated to the U.S.)

_______ Fifth generation or greater

University Level: (Circle One)

- Freshman
- Sophomore
- Junior
- Senior
- Other (write in): ________________________________
Appendix C. Posttest Survey

Current Mood: This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way right now, that is in this present moment. Use the following scale to record your answers.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Slightly</td>
<td>A little</td>
<td>Moderately or not at all</td>
<td>Quite a bit</td>
<td>Extremely</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interest</th>
<th>Sad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distressed</td>
<td>Negative</td>
</tr>
<tr>
<td>Excited</td>
<td>Pessimistic</td>
</tr>
<tr>
<td>Upset</td>
<td>Irritable</td>
</tr>
<tr>
<td>Strong</td>
<td>Alert</td>
</tr>
<tr>
<td>Guilty</td>
<td>Ashamed</td>
</tr>
<tr>
<td>Scared</td>
<td>Inspired</td>
</tr>
<tr>
<td>Hostile</td>
<td>Nervous</td>
</tr>
<tr>
<td>Enthusiastic</td>
<td>Determined</td>
</tr>
<tr>
<td>Proud</td>
<td>Attentive</td>
</tr>
<tr>
<td>Happy</td>
<td>Jittery</td>
</tr>
<tr>
<td>Positive</td>
<td>Active</td>
</tr>
<tr>
<td>Optimistic</td>
<td>Afraid</td>
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</tbody>
</table>


**Current Mood of Other Participant:** This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you think the other participant feels this way right now in the present moment. Use the following scale to record your answers.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
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<th>4</th>
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<tbody>
<tr>
<td>Very Slightly or not at all</td>
<td>A little</td>
<td>Moderately</td>
<td>Quite a bit</td>
<td>Extremely</td>
</tr>
</tbody>
</table>

_________ Interested | __________ Sad
_________ Distressed | __________ Negative
_________ Excited | __________ Pessimistic
_________ Upset | __________ Irritable
_________ Strong | __________ Alert
_________ Guilty | __________ Ashamed
_________ Scared | __________ Inspired
_________ Hostile | __________ Nervous
_________ Enthusiastic | __________ Determined
_________ Proud | __________ Attentive
_________ Happy | __________ Jittery
_________ Positive | __________ Active
_________ Optimistic | __________ Afraid
How would you expect other CSUSM students to rate their emotional state following exposure to these film clips?

**Disgust**

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**Anger**

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**Happiness**

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**Fear**

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**Sadness**

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**Joy**

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Film Clip Questions: Please think back to the film clips that you watched to answer the questions below.

Hannah and Her Sisters

1. What are Hannah and Holly shopping for?
   a. A gift for their niece
   b. A dress for Holly
   c. Shoes for an outfit
   d. Hannah's wedding

2. At the beginning of the scene, Hannah and Holly are walking into a store. What does Hannah compliment Holly on?
   a. Her hair
   b. Her bracelet
   c. Her shoes
   d. Her coat

Please describe, what you remember about the scene from this movie in as much detail as possible:
The Last Emperor

1. What is the professor's name?
   a. Theodore Flanders
   b. Reginald Hornstone
   c. William Huddersfield
   d. Philip Clayworth

2. What country is the professor from?
   a. Scotland
   b. Ireland
   c. England
   d. Wales

Please describe what you remember about the scene from this movie in as much detail as possible: