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Cultures of Moderation and Expression: Emotional Experience, Behavior, and Physiology in Chinese Americans and Mexican Americans

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Ethnographic accounts suggest that emotions are moderated in Chinese cultures and expressed openly in Mexican cultures. The authors tested this notion by comparing subjective, behavioral, and physiological aspects of emotional responses to 3 (warned, unwarned, instructed to inhibit responding) aversive acoustic startle stimuli in 95 Chinese Americans and 64 Mexican Americans. Subjective reports were consistent with ethnographic accounts; Chinese Americans reported experiencing significantly less emotion than Mexican Americans across all 3 startle conditions. Evidence from a nonemotional task suggested that these differences were not artifacts of cultural differences in the use of rating scales. Few cultural differences were found in emotional behavior or physiology, suggesting that these aspects of emotion are less susceptible to cultural influence.

Emotions are the cornerstones of our social worlds, affecting our interactions with others in countless ways. Emotions play a vital role in maintaining social order, including helping regulate social distance (drawing us toward some people and away from others), announcing our intentions, and influencing the behavior of others. Because emotions can be both helpful and disruptive, cultures develop norms about what constitutes desirable and undesirable emotional behavior. On the basis of differences in social conditions, traditions, and ideals, these norms can show considerable variation across cultures.

Psychologists who first studied culture and emotion were stimulated by the question of whether the facial expressions for certain "basic" emotions are universal. Despite prevailing social-constructivist views (e.g., Mead, 1975), the bulk of the empirical evidence indicated that for emotions such as anger, disgust, fear, happiness, sadness, and surprise, there is cross-cultural consistency in the associated facial displays (e.g., Ekman & Friesen, 1971, 1986; Ekman, Sorenson, & Friesen, 1969; Izard, 1971). There has been far less research on cross-cultural consistencies in other aspects of emotion; however, our research group has reported evidence for cross-cultural similarities in autonomic nervous system responding (Levenson, Ekman, Heider, & Friesen, 1992). Against the backdrop of these reports of similarities in facial and autonomic manifestations of emotion, there are many studies that have found cultural differences in the events that elicit emotions, the ways emotions are labeled and understood, how individuals cope with their emotions, and beliefs about how and when emotions should be expressed and felt (e.g., Ekman, 1972; Hochschild, 1979; Mesquita & Frijda, 1992; Shweder, 1993).

For the present study, we have chosen two cultures that are thought to differ quite dramatically in their views concerning emotion. Chinese culture has been portrayed in ethnographies as valuing emotional control and moderation (Klineberg, 1938; Potter, 1988; Wu & Tseng, 1985). Mexican culture, in contrast, has been portrayed as valuing the free and open expression of emotion (Garza, 1978; Guerra, 1970; Ramirez & Castañeda, 1974). We believe that these kinds of ethnographic notions of emotion are fertile sources of hypotheses that can guide laboratory research. However, we take particular note of two aspects of these portrayals. First, they focus primarily on cultural beliefs about emotion (i.e., metaemotion)—it remains to be seen whether these beliefs translate into measurable differences in emotional response under controlled conditions. Second, they tend to deal with emotion at a fairly general, nonspecific level—it remains to be seen whether cultural differences are consistent across three key aspects of emotion (i.e., facial expressions, reports of subjective experience, and autonomic nervous system response).

Ethnographic and Empirical Studies

Chinese Culture and Emotion

According to ethnographic accounts, members of Chinese culture view emotions as dangerous, value emotional moderation, and emphasize social harmony over individual expression (Klineberg, 1938). Wu and Tseng (1985) noted that in traditional Chinese medicine, extreme emotions are thought to cause illness. Given these observations, we would expect to find evidence of moderate emotional behavior or even emotional suppression on the part of the Chinese. In a study of psychiatric disorders, Kleinman (1986) concluded that Chinese culture was indeed characterized by emotional restraint. Related to this is the notion that the Chinese

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"somaticize" their emotions. In this view, rather than expressing/experiencing emotions verbally and behaviorally, the Chinese manifest emotions as physical or bodily symptoms related to illness. If true, this "somaticizing" of emotions may provide a culturally condoned outlet for emotional expression (e.g., complaining of a stomach ache when angry) when other forms of expressions may be considered inappropriate (e.g., yelling at your employer).

A somewhat different understanding of Chinese emotions, proposed by Potter (1988), is that emotions lack social significance in the collectivistic Chinese culture and thus are less relevant than they are in the individualistic American culture. The underlying assumption here is that emotions are more disruptive to the social harmony than they are helpful. In this view, emotional expression in Chinese culture is not so much discouraged or suppressed, but rather it is ignored. Potter described attitudes toward emotional displays in China as that of indifference, as evidenced by a statement by one of her cultural informants: "How I feel does not matter!" Although the underlying dynamic in Potter's model is quite different from that of Klineberg, Wu and Tseng, and others, both models may lead to the same result: low levels of emotional experience and sparse emotional displays.

Empirical tests of these notions based on measurement of actual emotional responding (e.g., precisely measuring participants' subjective, behavioral, and physiological responses to carefully specified emotional stimuli under controlled conditions) have been rare. Tsai and Levenson (1997) found support for emotional moderation in Chinese culture in a study comparing Chinese American and European American dating couples who had unrehearsed conversations about their relationship. Chinese American couples reported fewer periods of positive emotion and showed less variability in their reported emotional experience than European American couples. Other studies of emotion in Chinese culture have not directly measured emotional responding, but rather have examined qualities of emotional judgments. Ekman et al. (1987) found that college students from Asian countries (Hong Kong, Japan, Sumatra) attributed less emotional intensity than students from non-Asian countries to photographs of facial expressions posed by Caucasians. Matsumoto (1993) reported a similar pattern of lower intensity ratings for Asian Americans using photographs of facial expressions posed by both Caucasians and Japanese. Consistent with ethnographic views reviewed earlier, Matsumoto also found that Asian participants rated the emotional expressions as being less "appropriate" under various social situations than did Caucasian participants.

Mexican Culture and Emotion

Similar to Chinese culture, Mexican culture is believed to be collectivistic. Ethnographic accounts of Mexican culture describe affiliation, group cohesion, and maintaining strong interpersonal relationships as highly valued (Carrillo, 1982; see Eisenberg, 1999, for additional references). However, beyond these similarities are a number of important cultural differences. Carrillo (1982), for example, noted that interpersonal relationships in Mexican culture are characterized by high levels of affection. In Mexican culture, affect is more openly accepted and more highly valued than in Anglo culture (Garza, 1978; Guerra, 1970; Ramirez & Castañeda, 1974). The sentiment is best captured by Murillo's (1976) statement that in Mexican American culture, "It is through ... an ability to experience, in response to environment, emotional feelings and to express these to one another and share them that one experiences the greatest rewards and satisfactions in life" (p. 100).

Related to this emotional openness, Triandis and his colleagues (Triandis, Marín, Lisansky, & Betancourt, 1984) reported a strong normative pressure in Latin American cultures to behave in a positive manner toward others. Triandis's theory is consistent with a Mexican philosophy of being not only both expressive and emotional as a group but also collectivistic and wanting to promote group cohesion. Inherent in this view is the belief that emotions promote group cohesion, which contrasts rather dramatically with the Chinese view that emotions are socially dangerous. Thus, according to these ethnographic observations, we would expect Mexican individuals to be more emotionally expressive than Chinese individuals, particularly when it comes to positive emotions.

As was the case with Chinese culture, empirical studies of actual emotional responding in Mexican culture have been rare. The few existing studies provide mixed support for ethnographic observations of greater emotional expression in Mexican culture. In support of these notions, Garza (1978) found that Chicanos performed better than Caucasians on a learning task when they learned material they liked, concluding that this indicated greater importance assigned to affective meaning in Chicano culture. However, Eisenberg (1999) found no cultural differences between Mexican American and Anglo American mother–child dyads in how much they talked about emotions. Finally, contradicting ethnographic accounts, Deffenbacher and Swaim (1999) found Mexican American middle and high school students to be less likely to express their anger via verbally or physically aggressive behavior than Caucasian students.

Summary and Implications for the Present Study

Despite the fact that Mexican Americans and Chinese Americans constitute the two fastest growing ethnic groups in the United States (Buriel & De Ment, 1997), they have not been well studied in the empirical literature on emotion. When they have been studied, Chinese or Mexican participants have typically been compared with European American samples (in which the ethnographic contrasts are not as striking) rather than with each other. Moreover, most studies have focused on beliefs or judgments about emotions rather than on actual emotional responding and have not distinguished between subjective, behavioral, and physiological aspects of emotion. In the present study, we compared emotional responding with standardized stimuli in Mexican and Chinese participants using a multimethod approach that allows the assessment of subjective, facial expressive and autonomic indicators of emotion. We believe this approach provides a good test of hypotheses derived from ethnographic accounts of emotion and extends these notions by providing a more differentiated measurement of emotion.

Methodological Considerations: Culture and Emotion

There are a number of critical sampling issues that need to be addressed in empirical studies of culture. Many studies have used

nationality, self-identified race, or self-identified ethnicity as a proxy for culture. Without due care, cultural variations within groups can dwarf purported between-group cultural variations (for a discussion of some of these issues, see Leung, 1996; Matsumoto, 1993). In laboratory studies conducted in the United States, college students typically serve as the representatives of the cultures of interest. These college students are often bicultural and, thus, differ greatly in their exposure and adherence to various cultural traditions. To us, a comparison between Chinese Americans and Mexican Americans who have relatively little exposure and adherence to Chinese and Mexican cultural traditions, respectively, makes little sense in a study of cultural influences on emotional responding. Given that the participants in the present study were college students living in the United States, we adopted a careful selection procedure to try to ensure that they had significant exposure to the cultural traditions of interest. Because we can never eliminate all within-group variation in cultural adherence, we also measured various aspects of acculturation so that these could be used in our analyses.

There are also a number of critical issues related to the measurement of emotion. It is now well accepted that emotion encompasses subjective experience, behavioral expression, and physiological arousal (Lang, 1979). Although it could be argued that culture influences all aspects of emotion equally, we believe that culture influences these different aspects of emotion in different ways. For example, cultures may be more concerned with the more socially visible aspects of emotion (e.g., what we say we feel, what we show on our faces) than the socially invisible aspects (e.g., subjective experience that is not verbalized, changes in the viscera). Additionally, aspects of emotional responding differ in how amenable they are to voluntary control. Thus, carrying out a cultural mandate to regulate emotion in a particular way may be easier for certain aspects of emotion (e.g., what we say we are feeling) than for others (e.g., whether our blood pressure is rising).

Finally, the conditions under which emotions arise vary greatly in terms of their context (e.g., interacting with others in public settings vs. reading a book alone) and the complexity of the appraisals involved (e.g., decoding the thoughts and feelings of others vs. reacting to a sudden loud noise). In our previous work, we have examined the impact of emotion in situations requiring relatively complex appraisals in both interpersonal contexts (dyadic interaction in dating couples; Tsai & Levenson, 1997) and private contexts (watching films; Tsai, Levenson, & Carstensen, 2000; making voluntary facial expressions; Levenson et al., 1992). In the present study, we used a situation involving relatively simple appraisals in relatively private contexts (hearing sudden loud noises), hoping to determine whether the impact of culture on emotional responding extends even to these types of emotional situations.

Hypotheses

Hypothesis 1: Self-report of emotional experience. Chinese Americans will report experiencing less positive and less negative emotion than Mexican Americans in response to an acoustic startle.

Hypothesis 2: Self-report of emotional control. Chinese Americans will report trying to control their emotions more than Mexican Americans in response to an acoustic startle.

Hypothesis 3: Expressive behavior. Chinese Americans will show less emotional behavior (facial expressions, gestures, body movements) than Mexican Americans in response to an acoustic startle.

Rationale (Hypotheses 2–3)

Ethnographic accounts suggest that Chinese culture endorses emotional moderation and Mexican culture endorses open emotional expression. Differences in emotional responding reflecting cultural beliefs are most likely to be found in the most voluntarily controllable (self-reported experience of emotion) and most socially visible (emotional behavior) aspects of emotion.

Hypothesis 4: Autonomic nervous system. Chinese Americans and Mexican Americans will show similar levels of physiological reactivity to an acoustic startle.

Rationale (Hypothesis 4)

Physiological responding is under less volitional control than either self-report or behavior. Cultural beliefs place greater emphasis on regulating emotional experience and expressive behavior than on physiological responding.

Hypothesis 5: Acculturation. Emotional differences between ethnic groups will be greatest among those participants who are most strongly identified with their culture of origin.

Rationale (Hypothesis 5)

Differences in emotional responding between ethnic groups result from differences in cultural beliefs and attitudes toward emotion. Those participants with the strongest identification with their culture of origin should be most strongly influenced by these beliefs.

Method

Participants

Participants were 159 Chinese American and Mexican American college students. Of the participants, 95 were Chinese American (45 men and 50 women), and 64 were Mexican American (31 men and 33 women). Of the Chinese American students, 44 were born in the United States, and 51 were foreign-born. Fifty of the Mexican American students were born in the United States, and 14 were foreign-born. The mean age for the sample was 20.04 (SD = 1.95). Chinese American and Mexican American groups did not differ significantly in the proportion of men and women, $\chi^2(1, N = 159) = .018$, *ns*, or mean level of education, $t(138) = -1.36$, *ns*. Mexican Americans were significantly older than Chinese Americans (20.7 years vs. 19.6 years), $t(84.71) = -3.45$, $p < .001$, and were also more likely than Chinese Americans to come from lower income or lower-middle-income homes (70.4% vs. 24.1%), $\chi^2(4, N = 141) = 32.1$, $p < .001$.

Participants were recruited via newspapers, radio station announcements, and flyers posted around several campuses in the San Francisco Bay Area. Interested individuals were screened over the telephone for eligibil-

ity. Those who qualified were mailed a package that included questionnaires on health, life-stress, personality, acculturation, ethnic identity, and demographics. Upon completion of the questionnaire package, participants were scheduled to come to the University of California, Berkeley campus for a laboratory session. Participants were paid $15 to complete the questionnaire booklet and $35 for the laboratory session.

Eligibility. Strict inclusion criteria were adopted, especially for ethnic and cultural background. These criteria aimed to equalize participants across age, level of education, socioeconomic status, and degree of exposure to American culture and to the participant's culture of origin. Specifically, all participants were required to be between the ages of 18 and 30 years, to have received a high school diploma from a school in the United States, and to be enrolled currently as full-time college students. Participants also had to meet specific ethnicity criteria (see below).

Culture/ethnicity criteria for both groups. We developed ethnicity criteria in consultation with researchers who had special expertise relevant to these ethnic groups. Participants' parents and all four of their grandparents (two sets of grandparents) had to be of the same ethnicity (thus, biracial or multiracial participants were excluded). At least 50% of participants' close friends during childhood or adolescence and at least 10% of their neighborhood during childhood or adolescence had to comprise members of the same ethnic group. All participants were required to be fluent in English.

Additional criteria for Chinese Americans. Chinese Americans had to be born and raised either in the United States, China, Taiwan, or Hong Kong. Both parents and all four of their grandparents had to have been born and raised in China, Taiwan, or Hong Kong. In addition, all Chinese American participants needed to have attained at least moderate proficiency in speaking and understanding Chinese (Mandarin, Cantonese, Taiwanese, or any other Chinese dialect).

Additional criteria for Mexican Americans. Mexican Americans had to be born and raised either in the United States or Mexico, and both of their parents and all four of their grandparents had to have been born and raised in Mexico. Their current religion or religion while growing up had to be Catholic. They also must have attained at least moderate proficiency in speaking and understanding Spanish.

Apparatus and Materials

Self-report measures. As part of the questionnaire package, participants completed a six-page General Ethnicity Questionnaire (Chinese or Mexican version as appropriate) designed to measure their orientation toward their culture of origin. Both the Chinese (Tsai, Ying, & Lee, 2000) and Mexican versions were adapted from several existing measures of acculturation (Cuellar, Harris, & Jasso, 1980; Mendoza, 1989; Sodowsky, Lai, & Plake, 1991; Suinn, Rickard-Figueroa, Lew, & Vigil, 1987; Szapocznik, Scopetta, Kurtines, & Aranalde, 1978). Each version consisted of 75 items asking participants to rate their exposure to or preference for their culture of origins' traditions, people, or language on a scale ranging from 1 (*extremely*) to 5 (*not at all*). A total acculturation score was derived by summing all of the items. In each case, lower scores indicated stronger orientation to the culture of origin.

To measure emotional experience after each trial, participants were asked to complete a 9-point Likert-type scale ranging from 0 (*not at all*) to 8 (*very much*) to rate how strongly they felt each of the following 13 specific emotions: amusement, anxiety, contempt, contentment, disgust, embarrassment, fear, anger, happiness, interest, relief, sadness, and surprise. Participants used the same 9-point scale to indicate the degree to which they tried to control their body movement, facial expression, verbal expression, and physiological reactions during the trial.

Audiovisual. All instructions were presented visually on a 13-in. (33-cm) TV monitor placed directly in front of the participant at a distance of four feet. A remote-controlled, high-resolution video camera, partially concealed behind darkened glass, was used to obtain frontal views of each participant's face and upper torso. Participants were informed prior to the start of the experiment that they would be videotaped.

Startle stimuli. The acoustic startle was a 115 dB burst of white noise (100 ms in duration) administered through two large loudspeakers located behind the participant's head. Participants typically liken this noise to a gunshot. It should be noted that this kind of startle stimulus is highly salient and noxious, much louder than the kind of background "startle probe" stimulus typically used in startle probe studies that use mild startle stimuli to assess stimulus valence and underlying mood (e.g., Vrana & Lang, 1990).

Physiology. Seven physiological functions were measured using a system consisting of a Grass Model 7 12-channel polygraph and a microcomputer (Grass Instruments, Quincy, MA). (a) Cardiac interbeat interval, the electrocardiogram, was measured using Beckman miniature electrodes (Beckman Instruments, Fullerton. CA), with Redux paste placed on opposite sides of the chest. The interval between successive R-waves was measured in milliseconds. (b) Pulse transmission time to the finger was measured using a UFI photoplethysmograph (UFI Instruments, Morro Bay, CA) attached to the top phalange of the second finger of the nondominant hand. Transmission time was measured as the time interval between the R-wave of the electrocardiogram and the upstroke of the peripheral pulse at the finger. (c) Finger pulse amplitude, the trough-to-peak amplitude of the finger pulse, was also measured from the UFI photoplethysmograph. (d) Ear pulse transmission time was measured using a UFI photoplethysmograph attached to the right ear lobe. Transmission time was measured between the R-wave of the electrocardiogram and the upstroke of the peripheral pulse at the ear. (e) Mean arterial blood pressure was measured using an Ohmeda 2300 Finapres blood pressure monitor (Ohmeda Medical, Laurel, MD). This monitor measures blood pressure on every heartbeat using a cuff attached to the middle phalange of the fourth finger of the nondominant hand. (f) Skin conductance level, the level of sweat gland activity on the surface of the hand, was measured by passing a constant voltage between Beckman regular-size electrodes attached to the palmar surface of the lower phalanges of the first and second fingers on the nondominant hand. The electrodes used an electrolyte paste consisting of sodium chloride in Unibase. (g) Finger temperature was measured using a Yellow Springs Instruments thermistor (Yellow Springs, OH) attached to the palmar surface of the first phalange of the fourth finger of the nondominant hand. Respiratory and somatic activity was also measured, but those data were not examined for the present study.

Using locally developed software, the computer determined second-by-second averages for each physiological measure. Collectively, these seven measures provide a broad sampling of autonomic nervous system responses spanning cardiac, vascular, and electrodermal subsystems. Moreover, in previous research (e.g., Gross & Levenson, 1993, 1997), we have found these systems to be responsive to the kinds of emotional stimuli used in the present study.

Procedure

Participants came into the laboratory for a 2-hr experimental session. Previous studies have suggested that the ethnicity of an experimenter can influence physiological responses to laboratory tasks (Anderson, 1989; Murphy, Alpert, Willey, & Somes, 1988). Thus, participants only had contact with a research assistant of their own gender and ethnicity during the experimental session. Participants were seated in a comfortable chair facing the video monitor described above. After signing a consent form, they completed a pretrial inventory that gauged their current emotional state (see below). After completing these brief measures, the research assistant attached the physiological sensors and explained their function.

The experiment consisted of five trials. For three of the five trials, participants were exposed to an acoustic startle under three different instructional conditions (see below for details) in a counterbalanced order.

This acoustic startle is of sufficient magnitude (115 dB) to produce a strong defensive response (Landis & Hunt, 1939). Because this response is reflexlike, and thus may be highly consistent across individuals, it was important to include experimental conditions that would be conducive to the emergence of cultural differences. Thus, we presented the startle under three different instructional conditions. In the unanticipated condition, participants were not warned of the impending startle, maximizing the probability that the reflexive response would be observed. In the anticipated condition, participants were told the startle would occur after a countdown period. This anticipated condition provided participants with time to reappraise the situation, and thus possibly modify their emotional response in culturally appropriate ways. In the inhibited condition, participants were also warned about the startle and were additionally asked to suppress their observable emotional response. This inhibited condition provided participants with time for reappraisal and provided an explicit instruction to modify the emotional response, both amenable to influence by cultural beliefs and practices.

For each participant, the three startle trials were separated by two nonstartle trials: a handgrip task (always the second trial and described below) and a mental arithmetic task (always the fourth trial). The handgrip task (described below) was included to provide a nonemotional task that produces a reliable physiological response. Thus, this task provides a control for individual differences in nonemotional physiological reactivity that can be used to sharpen analyses of physiological reactivity during emotional tasks.

Before each trial began, detailed instructions for the trial were presented on the video monitor. After the overview of the trial was presented, participants were instructed via the monitor to, "Begin to relax now. Empty your mind of all thoughts, memories and emotions." These instructions remained on the screen for 2 min, during which the participant rested quietly. Each of the five trials began immediately after the 2-min relaxation period and was followed by a 2-min rest period during which no instructions were given. These two relaxation periods served as the pre- and posttrial baselines, respectively. After the posttrial relaxation period, participants provided ratings of how strongly they had felt each of 13 specific emotions during the trial (e.g., "How sad did you feel when you heard the loud noise"). A detailed description of the five trials follows.

Unanticipated startle. In the unanticipated startle trial, participants were told, "In this part of the experiment I want you to relax for a while. I'll turn on some soft white noise now to help block out any other sounds coming into the room." They were then asked to confirm that they heard the soft noise before moving on. Once they confirmed the soft noise, they were instructed to "Please continue to look at the 'x' on the screen while you are relaxing." The startle occurred unexpectedly at the end of the 2-min pretrial relaxation period. If the unanticipated trial was not the last startle trial, participants were instructed at trial's end that they would be told exactly when any future startles would occur.

Anticipated startle. In the anticipated startle trial, participants were instructed as follows:

> In this part of the experiment, you will hear a loud noise. You will know exactly when the loud noise will occur. You will see a countdown from 10 to 1 on the video screen. When you see '1' - the loud noise will happen. Before beginning the countdown, I want you to relax. I will not start the countdown until the rest period is over.

After the pretrial relaxation period, the participants were reminded of the countdown, and then the countdown began, lasting for 20 s, with each number presented on the screen for 2 s. After the "1" came on, it remained on the screen for the duration of the startle and throughout the 2-min posttrial relaxation period.

Inhibited startle. The inhibited startle trial was similar to the anticipated startle condition in that participants were informed that the startle would occur after a countdown. In the inhibited startle condition, however, participants also received additional instructions prior to the countdown:

> We want to see how well you can keep from showing any emotional response when you hear the noise. Try not to feel anything, and try not to have a physiological reaction. Also, see if you can act so that someone seeing the video with the sound off won't know that anything has happened. Try not to show any visible signs or feel anything before, during, or after the loud noise occurs. Try to look relaxed all the way through. See if you can fool the person who will be studying this video.

After the pretrial relaxation period, participants were reminded of the countdown and to try and not show any reactions when the startle occurs. After the "1" came on, it remained on the screen for the duration of the startle and throughout the 2-min posttrial relaxation period.

Handgrip. Prior to beginning the experiment, the subject was asked to squeeze a Jamar Hand Dynamometer (Lafayette Instruments, Lafayette, IN) three times using maximum strength. A value computed as one half of the average of these three attempts was used as the target grip strength for that participant. During the actual handgrip trial, the target score was written on a post-it note and taped to the monitor stand in front of the participant. The participant was informed via the monitor that "in this part of the experiment, you will be engaging in a physical task," and they were instructed to pick up the handgrip device and confirm the target score aloud. The video instructions then informed them that a tone would signal when they should start squeezing the device so that the meter pointer on the handgrip matched the target score. They were also instructed to count aloud by ones while they were squeezing to avoid breath holding. Once the participants confirmed that they understood the instructions, the 2-min pretrial relaxation period began. After the 2-min pretrial baseline, the screen informed them that they should,

> start squeezing so that the needle on the dial stays on the number posted in front of you. Count out loud by 1's, starting with the No. 1. Keep squeezing on the device until you hear the second tone and see the word "STOP" on the screen.

After one minute they were told to put the device down and relax for two minutes.

Data Reduction

Self-report data. To reduce the number of dependent measures, self-report data were averaged into two composite measures: positive emotion (amusement, content, happiness, and relief) and negative emotion (anger, anxiety, contempt, disgust, embarrassment, fear, and sadness).

Behavioral data. A team of undergraduate research assistants used a modified version of the Emotional Expressive Behavior coding system (Gross & Levenson, 1993) to measure startle behavior and emotional expressive behavior during the 1-s period containing the startle stimulus and during the following 5 s. Judges were required to make binary evaluations (present/not present) about the occurrence of the following facial and upper body movements: hard eye closure, eye tightening, eye widening, brow lowering, brow raised, lip corners down, lip corners up, lip stretch, neck stretch, head jerk, shoulder raised, shuddering, forward lunge, and torso raise. In addition, judges provided Likert ratings regarding the intensity/duration of any manifestations of the following emotions and emotionally relevant behaviors: anger, anxiety, disgust, confusion, contempt, interest, embarrassment, fear, happiness, sadness, surprise, crying, laughter, and overall pleasantness/unpleasantness. Intensity/duration ratings used a 0–6 scale where 0 = *none*, 1 = *slight and short*, 2 = *slight and long*, 3 = *moderate and short*, 4 = *moderate and long*, 5 = *strong and short*, and 6 = *strong and long*. Finally,

judges counted the number of times that enjoyment smiles and nonenjoyment smiles (Ekman & Friesen, 1982) were displayed by the participants. To establish reliability, all participants were coded by two judges. The average of the two judges was used in all analyses. For binary codes, the percentage of agreement for pairs of judges was 86%. For Likert ratings, reliability was computed by correlating the codes from each pair of judges for each participant. The mean correlation among judges across the entire sample was .83.

To reduce the number of dependent measures, we computed four composite scores by first standardizing all behavioral codes and then aggregating related behaviors. A positive behavior composite score was created by combining lip corners up, pleasantness/unpleasantness, happiness, laughter, interest, enjoyment smiles, and nonenjoyment smiles. A negative behavior composite score consisted of eye tightening, brow lowering, lip corners down, shuddering, pleasantness/unpleasantness, anger, anxiety, confusion, contempt, crying, disgust, embarrassment, fear, and sadness. On the basis of descriptions of the startle response provided by Landis and Hunt (1939) and Ekman, Friesen, and Simons (1985), we created a composite score for startle behavior that included hard eye closure, lip stretch, neck stretch, head jerk, shoulder raise, forward lunge, and torso raise. Because participants often report being surprised by the startle stimulus, we created a composite score for surprise behavior that consisted of codes for surprise, eye widening and brow raising.

Physiological data. For our primary physiological analyses, we used composite scores that were calculated as the average of the standardized scores (corrected so that positive values always indicated greater arousal) for cardiac interbeat interval, pulse transmission time to the finger and ear, skin temperature, pulse amplitude, skin conductance, and mean arterial pressure. This kind of composite score has several advantages, including (a) reducing the number of dependent measures, thus helping control for Type I error; (b) providing a measure that is sensitive to variation across participants in which response systems are maximally active (i.e., individual response stereotypies); and (c) increasing reliability because of the greater stability of aggregated scores. Moreover, in previous studies using similar emotional stimuli, we have used these kinds of composite measures with some success (e.g., Fredrickson & Levenson, 1998; Gross & Levenson, 1993).

For each of the three startle conditions, second-by-second physiological averages were reduced to mean values representing five nonoverlapping time windows: (a) 2-min pretrial baseline period, (b) 20-s prestartle countdown period (anticipated and inhibited startles only), (c) first 5-s reactivity period (including the 100 ms while the startle stimulus was present), (d) next 10-s reactivity period (intended to capture responses in slow-reacting signals such as finger temperature), (e) next 15-s reactivity period (starting after the first two reactivity periods, when many signals begin returning to baseline levels). These means were then combined into a composite score for each time period, and difference scores were then computed for each trial by subtracting the pretrial baseline composite score from composite scores for each of the three reactivity time windows (Periods c, d, and e above).

For the handgrip trial, the second-by-second physiological averages were reduced to mean values representing two nonoverlapping time windows: (a) the 2-min pretrial baseline period and (b) the 1-min period when participants were squeezing the handgrip device. These means were then combined into a composite score for each time window, and reactivity scores were calculated by subtracting the pretrial baseline composite from the handgrip period composite.

Results

Results are presented for the self-report, behavioral, and physiological variables separately. Within each type of variable, results from analyses of ethnic differences will be presented first, followed by those involving sex differences. Finally, analyses of the impact of within-group differences in acculturation are reported.

Self-Report

Emotion. To test Hypothesis 1 that Chinese Americans would report experiencing less emotion than Mexican Americans, participants' positive and negative self-reported emotion composite scores were analyzed using a 2 × 2 × 3 (Ethnicity × Sex × Startle Type) multivariate analysis of variance (MANOVA), with startle type serving as a repeated measure (see Table 1 for effects of startle type). Evidence for ethnic differences were found in a significant main effect for ethnicity, $F(2, 150) = 3.59$, $p < .05$, and a significant Startle Type × Ethnicity interaction, $F(4, 602) = 3.02$, $p < .05$. To explicate these findings, we conducted separate univariate repeated measures analyses of variance (ANOVAs) for positive and negative emotion. Across the startles, Chinese Americans reported experiencing significantly less positive emotion and negative emotion than Mexican Americans, thus supporting Hypothesis 1 (see also Table 1). For positive emotions, the ethnic differences varied as a function of the type of startle, Startle Type × Ethnicity, $F(2, 302) = 5.34$, $p < .01$. In response to the unanticipated and inhibited startles, Chinese Americans and Mexican Americans did not differ in the amount of positive emotion reported. In response to the anticipated startle, however, Chinese Americans reported significantly less positive emotion ($M = 1.26$)

Table 1
Mean Comparisons for Self-Reported Emotional Experience by Startle Type and Ethnicity

Emotion composite score	Unanticipated		Anticipated		Inhibited	
	M	*SD*	*M*	*SD*	*M*	*SD*
Startle type						
Positive emotion	1.10_a	0.10	1.64_b	0.13	1.50_b	0.10
Negative emotion	1.99_a	0.12	1.77_b	0.11	1.67_b	0.10

	Chinese American		Mexican American	
Ethnicity				
	M	*SD*	*M*	*SD*
Positive emotion	1.22_a	0.11	1.61_b	0.14
Negative emotion	1.61_a	0.12	2.01_b	0.15

Note. Means in the same row that do not share the same subscript differ at $p < .05$. The main effect for startle type was significant in the overall multivariate analysis of variance, $F(4, 610) = 8.93$, $p < .001$, and in the analyses of variance for positive emotion, $F(2, 306) = 13.77$, $p < .001$, and negative emotion, $F(2, 293.6) = 5.86$, $p < .05$. Participants reported less positive emotion and more negative emotion to the unanticipated startles compared with the anticipated and inhibited startles.

than Mexican Americans ($M = 1.99$), $t(113.9)$[1] $= -2.75$, $p < .01$. For negative emotions, there was no Startle Type × Ethnicity interaction.

An analysis of sex differences revealed no significant Sex or Sex × Ethnicity effects in the amount of emotional experience reported.

One concern in analyzing these self-report data is the possibility that found differences between Chinese Americans and Mexican Americans in self-reported emotion could be because of systematic differences in how the two groups used the 9-point rating scale. For example, Chinese Americans may have tended to use the lower end of the rating scale, confounding actual differences in emotional experience with a response style or bias. If such a response bias did indeed exist, then one would expect Chinese Americans to provide lower emotion ratings than Mexican Americans even in nonemotional tasks. The handgrip task represented this kind of nonemotional task. However, we found no significant differences between the two ethnic groups on this task, supporting the conclusion that our finding that Chinese Americans reported experiencing less emotion than Mexican Americans in response to the startle stimuli represents a true cultural difference in emotional experience rather than an artifact of response style.

Emotional control. We also compared the two ethnic groups on the degree to which they reported controlling their emotional response, as indicated by self-reported attempts to control their facial expressions, body movements, verbal expressions, and physiological reactions. Participants' emotion control ratings were analyzed using a 2 × 2 × 3 (Ethnicity × Sex × Startle Type) MANOVA, with startle type treated as a repeated measure (see Table 2 for effects of startle type). Relevant to ethnic differences, there was a significant main effect for ethnicity, $F(4, 145) = 4.40$, $p < .01$. The Startle Type × Ethnicity interaction was not significant. To further understand these findings, we conducted separate univariate analyses for each emotion control variable (see Table 2). Results revealed that Chinese Americans reported trying to control their verbal expression, $F(1, 150) = 4.49$, $p < .05$; body movement, $F(1, 150) = 5.35$, $p < .05$; and physiological reactions, $F(1, 150) = 13.79$, $p < .001$; less than Mexican Americans (see Table 2).

Following the same logic used earlier for the self-reported emotion, we used data from the nonemotional handgrip task to check for response style differences. During the handgrip task, Chinese Americans also reported trying to control their body movement, $t(157) = -2.59$, $p < .05$, and physiological reactions, $t(156) = -2.97$, $p < .01$, less than Mexican Americans. Thus, Chinese Americans reported exerting less control of body movements and physiological reactions than Mexican Americans to both the emotional (startles) and nonemotional (handgrip) tasks. This suggests that Chinese Americans might use the scales on the control items differently than Mexican Americans. Given this finding, we reanalyzed the data for self-reported control of verbal expressions, body movement, and physiological reactions during the emotional startle tasks using an analysis of covariance (ANCOVA) to control for the degree of emotional control reported on the nonemotional handgrip task. Controlling for response style in this manner eliminated almost all of the found ethnic differences in self-reported control during the startles. The only exception was that Chinese Americans still reported controlling their physiological reactions to the startle significantly less than Mexican Americans, $F(1, 148) = 5.57$, $p < .05$. With or without this statistical control, these findings do not support Hypothesis 2, which had predicted greater reported emotional control for the Chinese Americans than Mexican Americans.

Table 2
Means and Standard Deviations for Self-Reported Emotional Control by Startle Type and Ethnicity

	Unanticipated		Anticipated		Inhibited	
Emotion control score	*M*	*SD*	*M*	*SD*	*M*	*SD*
Startle type						
Facial expression	1.70_a	0.17	3.32_b	0.22	5.65_c	0.17
Verbal expression	1.93_a	0.21	2.76_a	0.24	4.20_b	0.26
Body movement	1.82_a	0.19	3.56_b	0.22	5.71_c	0.18
Physiological reactions	1.86_a	0.19	2.90_b	0.23	4.62_c	0.22

	Chinese American		Mexican American	
Ethnicity				
	M	*SD*	*M*	*SD*
Facial expression	3.38_a	0.17	3.74_b	0.20
Verbal expression	2.56_a	0.23	3.35_b	0.28
Body movement	3.37_a	0.18	4.02_b	0.22
Physiological reactions	2.56_a	0.19	3.68_b	0.23

Note. Means in the same row that do not share the same subscript differ at $p < .05$. The main effect for startle type was significant in the overall multivariate analysis of variance, $F(8, 594) = 32.73$, $p < .001$, and in the analyses of variance for attempting to control facial expressions, $F(1.98, 296.7) = 139.34$, $p < .001$; verbal expression, $F(2, 300) = 36.60$, $p < .001$; body movement, $F(2, 300) = 133.06$, $p < .001$; and physiological reactions, $F(1.99, 298.4) = 61.40$, $p < .001$. Consistent with the instructions, participants exerted the greatest effort to control their emotional response to the inhibited startle and the least control during the unanticipated trial.

In terms of sex differences in the amount of emotional control reported in response to the startles, there was no significant main effect for gender, but there was a significant Sex × Ethnicity interaction in the overall MANOVA, $F(4, 145) = 4.40$, $p < .05$. Follow-up univariate ANOVAs revealed that the Sex × Ethnicity interaction approached significance when comparing participants' attempts to control their physiological reactions, $F(1, 148) = 3.42$, $p = .07$. Among Chinese Americans, men and women did not differ significantly in the extent to which they reported controlling their physiological reactions, $F(1, 89) = 0.11$, *ns*. Among Mexican Americans, however, men reported controlling their physiological reactions significantly more ($M = 4.17$) than women ($M = 3.2$), $F(1, 59) = 4.75$, $p < .05$.

Behavior

To test Hypothesis 3 that Chinese Americans would display less emotional behavior than Mexican Americans, we compared the

[1] Degrees of freedom reflect adjustments for violations of underlying assumptions for a given statistical procedure.

two groups on the positive behavior, negative behavior, startle behavior, and surprise behavior composites using a 2 × 2 × 3 (Ethnicity × Sex × Startle Type) MANOVA, with startle type treated as a repeated measure. Neither the ethnicity nor Startle Type × Ethnicity interaction was significant. Thus, Hypothesis 3 was not supported.

An analysis of sex differences revealed a significant main effect of sex, $F(4, 144) = 5.29$, $p < .01$. Follow-up univariate ANOVAs revealed that women displayed significantly more negative behavior, $F(1, 147) = 9.27$, $p < .01$; positive behavior, $F(1, 147) = 10.65$, $p < .01$; and startle behavior, $F(1, 147) = 12.69$, $p < .01$; than men. The mean emotional behavior scores for men and women were −1.212 and 1.800, respectively, for negative behavior, −2.03 and 1.15 for positive behavior, and −1.023 and 0.839 for startle behavior. There were no differences in the amount of surprise behavior displayed by men and women. The Sex × Ethnicity interaction was not significant.

Physiology

Hypothesis 4 predicted that Chinese Americans and Mexican Americans would show similar amounts of physiological reactivity in response to the acoustic startles. In order to test this hypothesis, we analyzed our physiological reactivity composite scores for each of the three time windows described earlier using a 2 × 2 × 3 × 3 (Ethnicity × Sex × Startle Type × Time) ANOVA, with startle type and time treated as repeated measures. No significant differences were found for ethnicity or any of the interactions of ethnicity with the other factors. Although we cannot prove a null hypothesis, these results are such that Hypothesis 4 cannot be rejected.

In terms of sex differences in physiological response, there were no main effects for sex, but there was a significant Ethnicity × Sex interaction, $F(1, 109) = 5.91$, $p < .05$. Among Chinese Americans, men and women did not differ significantly in their autonomic physiology across the three startles, $F(1, 69) = 0.25$, *ns*. Among Mexican Americans, however, men showed a smaller autonomic response ($M = -0.03$) than women ($M = 0.07$), $F(1, 40) = 7.87$, $p < .01$.

Acculturation

Hypothesis 5 predicted that ethnic differences would be strongest among participants who were most strongly oriented toward their culture of origin. To test this hypothesis, we used a median split to categorize each participant as high or low on his or her respective acculturation measure scores. We then recomputed the MANOVAs for each of the dependent measures (as above) using this new dichotomous acculturation variable as an additional between-subjects factor. We were interested in examining those instances in which significant interactions between ethnicity and acculturation emerged, suggesting the importance of considering within-group differences.

There were two instances of a significant Ethnicity × Acculturation interaction. In terms of how much negative emotional behavior was displayed, Chinese Americans who were most strongly oriented to Chinese culture displayed less negative emotional behavior ($M = -0.70$) than those who were less oriented to Chinese culture ($M = 0.99$), $F(1, 142) = 3.80$, $p = .05$. The reverse pattern held for Mexican Americans—those who were most strongly oriented to Mexican culture displayed more negative emotional behavior ($M = 1.86$) than those who were less oriented to Mexican culture ($M = -0.33$). Thus, for both groups, this finding supported Hypothesis 5 insofar as the more closely oriented participants were to their culture of origin, the more likely they were to show the emotional behavior consistent with ethnographic accounts (i.e., less emotion in Chinese Americans, more emotion in Mexican Americans).

In terms of how much positive emotional behavior was displayed, Chinese Americans who were most strongly oriented to Chinese culture did not differ significantly from those who were less oriented to Chinese culture. Among Mexican Americans, those most strongly oriented toward Mexican culture showed significantly less positive behavior ($M = -1.94$) than those who were less oriented to Mexican culture ($M = 2.10$), $F(1, 142) = 4.10$, $p = .05$. This finding does not support Hypothesis 5, which predicted more emotional behavior among Mexican Americans who were strongly oriented to Mexican culture and less emotional behavior for Chinese Americans who were most strongly identified with Chinese culture.

Taking all of these results together, Hypothesis 5 received only limited support. In the domains of self-reported emotion and physiological reactions, acculturation did not affect our findings. In the behavioral domain, orientation to the culture of origin had an inconsistent influence, varying as a function of whether the emotional behavior was negative or positive.

Discussion

This study tested hypotheses derived from ethnographic accounts of cultural beliefs about emotion by examining subjective, behavioral, and physiological aspects of actual emotional responding to carefully controlled stimuli administered in a laboratory setting. Whereas many of our previous studies of cultural differences in emotional responding have used socially complex situations (e.g., interaction between partners in intimate relationships; Tsai & Levenson, 1997) or stimuli that require more complex appraisals (e.g., emotional films; Tsai, Levenson, & Carstensen, 2000), here we used a much simpler emotional stimulus (acoustic startle presented to participants sitting alone in a room). To the extent that cultural beliefs about emotion primarily target social/interpersonal behavior and work in large part through influencing appraisals, the use of startle stimuli should provide an indication of the extent to which cultural influences can be found even with simple stimuli that produce responses thought to occupy the middle ground between reflex and emotion (Ekman et al., 1985).

We found support for two of our hypotheses. First, consistent with ethnographic accounts, Chinese Americans reported experiencing less emotion than Mexican Americans. Support for this hypothesis was quite strong insofar as it was found for reports of both negative and positive emotions. Second, consistent with our rationale that cultural differences are not likely to permeate the more involuntary and less socially visible aspects of emotion (e.g., physiology), we could not reject the hypothesis that Chinese Americans and Mexican Americans would show similar levels of physiological response. Although we found some support for our

fifth hypothesis that differences between Chinese Americans and Mexican Americans would be greater among those who are most strongly oriented toward their culture of origin, this was limited (only found for emotional behavior) and inconsistent (different in direction for positive and negative emotional behavior). Our other two hypotheses (greater reported emotional control and less emotional behavior among Chinese Americans than Mexican Americans) were not supported.

Self-Report of Emotional Experience

Our findings that Chinese Americans reported experiencing less emotion than Mexican Americans were quite robust, showing consistency across the three types of startles and across both positive and negative emotion. These findings are consistent with ethnographic notions and prior empirical investigations that portray Chinese culture as emotionally moderate and Mexican culture as embracing emotion (e.g., Ramirez & Castañeda, 1974; Tsai & Levenson, 1997). Compared with previous studies, the present study is unusual in that Chinese and Mexican cultures were directly contrasted with each other. Further confidence in this finding is gained by considering the findings using these same self-report scales on the nonemotional handgrip task. The fact that no cultural differences were found on this nonemotional task suggests that the finding of lower reported emotion for Chinese Americans in response to the startles could not be attributed to a response bias but rather is a difference that only emerged in an emotional context. The finding that cultural differences in emotional report are found even with such simple stimuli as sudden loud noises is an impressive endorsement of the power that culture holds over this aspect of emotional responding. The fact that these cultural differences in self-report emerge absent a parallel cultural difference in behavioral or physiological response provides further indication that there is a special relationship between culture and the way we report our emotional experiences.

Although most of our findings in the domain of self-reported emotional experience were consistent across the three startles, there was one notable exception. Mexican Americans reported experiencing more positive emotion than negative emotion in the anticipated startle, a finding that may be culturally informative. The anticipated startle provides a 20-s warning period in which the participant can prepare for the upcoming noxious event. Interestingly, it was only in response to the anticipated startle that Mexican Americans reported more positive emotion than Chinese Americans. Thus, it may be that normative pressures in Latin cultures to behave positively toward others (Triandis et al., 1984) are most likely to emerge in situations that allow ample time for the situation to be appraised fully and culturally appropriate responses to be prepared.

Behavior

As we have noted, ethnographies typically do not distinguish among emotion self-report, behavior, and physiology. Perhaps because of this and the fact that the early empirical studies of culture and emotion focused on recognizing emotional facial expressions, it is commonly thought that cultural influences will be found both in what people say they feel (e.g., Hochschild, 1979) and what emotional behaviors they show (e.g., Ekman, 1972). Although we expect that under the proper conditions, cultural modulation of expressive behaviors can and does occur (e.g., the finding of modulation of facial expressions to films in the presence of an authority figure; Friesen, 1973), it is worth remembering that facial behaviors can be quite automatic and difficult to rein in once they start. The startle is a stimulus that is strong, sudden, and short-lived. In situations such as these, cultural influences may be much more likely to be found in retrospective self-reports than in the much more immediate and less easily controlled expressive behaviors. Whether this is unique to the startle or whether it extends to other similarly acute and powerful stimuli is an important question for future studies.

Self-Report of Emotional Control

Although we had predicted that Chinese Americans would report greater attempts to control their emotions than Mexican Americans, we found no evidence of this. Moreover, we encountered one opposite finding insofar as Chinese Americans reported trying to control their physiological reactions less than Mexican Americans. In light of the consistent ethnographic emphasis on emotional control in Chinese culture and our own strong findings of less reported emotional experience among Chinese American participants, the absence of parallel findings in reported emotional control is quite striking. We can offer two possible, albeit admittedly post hoc, explanations for this finding. First, it is possible that there is something about the worldview of Chinese Americans that led them to have less subjective emotional experience in this particular situation and thus less need to exert effort to control their reactions. Second, it is possible that once a cultural "feeling rule" (e.g., Do not say you feel a lot of emotion when stressed) becomes ingrained, it becomes relatively effortless. Viewed in this light, our findings that Chinese Americans do not report exerting greater effort to control their emotions may reflect the automaticity that these cultural moderators of emotional report assume in Chinese Americans by the time they reach early adulthood.

Physiology

As predicted, physiological responses were similar in amplitude for the two ethnic groups. All analyses between Chinese Americans and Mexican Americans revealed no significant differences in physiological response to the startles. We continue to believe that autonomic physiology may be an aspect of emotional responding that is least susceptible to cultural influence. Of course, cultural influences on physiological responding may be found in situations that are more amenable to protracted appraisal than was the case with the kinds of sudden, short-duration stimuli used in the present study. However, this pattern of finding cultural differences in self-report and cultural similarity in physiological response are quite consistent with our previous studies of emotion and culture using quite different stimuli. Tsai and Levenson (1997) found few differences in emotional physiology between European American and Chinese American dating couples during dyadic interaction despite finding cultural differences in the amount and variability of self-reported affect. Levenson et al.'s (1992) study comparing the Minangkabau of West Sumatra with European Americans found

that voluntary emotional facial configurations produced similar patterns of autonomic activation in the two groups but large differences in self-reported emotion. Tsai, Levenson, and Carstensen (2000) also found no differences between Chinese Americans and European Americans in their physiological response to amusing and sad film clips. We expect that these findings derive from the fact that autonomic reactions in emotion are relatively more "hardwired" and more difficult to control voluntarily than self-report and behavioral aspects of emotion. These differences are further reinforced by greater cultural concerns with the more socially visible aspects of emotion such as language and behavior and less concern with the less socially visible physiological responses.

Acculturation

Our assessment of acculturation provided some support for the value of accounting for within-culture variation when attempting to understand the basis of cultural influence. In the domain of emotional behavior, we found that acculturation predicted variations in the magnitude of response. However, this included one instance (negative emotional behavior) in which greater orientation to the culture of origin was associated with behavior that was more consistent with the cultural ideal and one instance (positive emotional behavior) in which the behavior was inconsistent with the cultural norm. No effects resulting from acculturation were found in the realm of self-report. Thus, these findings do not lend themselves to a straightforward explanation of the influences of acculturation. However, it is worth noting that our stringent selection criteria likely worked to limit within-group variation. Thus, in a sample with greater variation in acculturation levels, stronger and more consistent acculturation effects might be found.

Ethnographic Versus Empirical Data

A primary goal of this study was to use a laboratory-based methodology that assesses self-report, behavioral, and physiological aspects of actual emotional responding to test hypotheses derived from ethnographic accounts of emotion. We chose Chinese Americans and Mexican Americans because ethnographic accounts suggest that they are quite different in their approach to and beliefs about emotion. Our finding that Chinese Americans report experiencing less emotion in response to these stimuli than Mexican Americans supports ethnographic notions about the emotional values of these two groups. However, our behavioral and physiological findings did not parallel the self-report findings, a pattern of disjunction we have found in our other studies of emotion and culture.

We interpret this pattern of findings across studies as indicating that the ethnographies of these groups are more applicable to self-reports of emotion than to emotional behavior or physiology. This makes good sense given that ethnographies primarily document cultural values and attitudes (Klineberg, 1938; Murillo, 1976) and not behavior or physiology. We have noted that self-reports of emotional experience are likely to be much more susceptible to volitional control than behavioral and physiological aspects of emotion. Thus, it may be considerably easier to say that one is not sad after the death of a relative than to prevent one's lip corners from turning downward and one's eyes from tearing. Importantly, these kinds of dissociations have also appeared in some ethnographic accounts. For example, Potter (1988) noted that displays of emotion are abundant among some Chinese, but such displays are trivialized. Words, actions, and internal bodily changes can have quite different social implications, giving rise to divergences between the attitudes and values regarding each of these aspects of emotional responding within cultures.

Sex Differences

Sex differences were found in the amount of emotional behavior displayed by men and women. Our finding is consistent with that in other literature, which has documented greater emotional behavior among women when compared with men (Hall, Carter, & Horgan, 2000; see also LaFrance & Banaji, 1992). The present findings extend this gender difference to two cultural groups that have generally not been well represented in studies of sex/gender and emotion.

We also found a striking sex difference within one of our cultural–ethnic groups but not the other. Among Mexican Americans, men reported exerting more effort to control their physiological reactions and showed less physiological arousal when compared with Mexican American women. Among Chinese Americans, no sex differences were found. It is important to note that, paralleling these findings, sex differences are featured more prominently in ethnographies of Mexican American emotional and social norms than in those of Chinese Americans. For example, although Mexican culture as a whole may embrace emotional experience and expression, beliefs about machismo, male honor or male superiority (Carrillo, 1982) may consider certain aspects of emotional expression in men to be construed as weak. Interestingly, it was in the physiological realm (both in reported control and actual response) that Mexican American men showed this tendency. Perhaps the physiological aspects of emotion, which we have consistently found to be the least influenced by culture, are left available for influence by sex/gender.

Limitations

A full account of the influence of culture on emotion will require a complete sampling of cultures, elicitors, situations, emotions, and response systems. The present study represents only a partial sampling of these important variables. Although this study has strength in its multimethod measurement of self-report, behavioral, and physiological aspects of emotion, the acoustic startle stimulus selected has limitations in terms of its simplicity (some would argue it is more reflex than emotion; e.g., Ekman et al., 1985; Landis & Hunt, 1939) and the fact that it produces a fairly limited range of emotional responses (e.g., predominantly surprise and fear).

In the realm of culture, we chose to study Chinese American and Mexican American college students as representatives of their cultures of origin. Doing so has the advantages of convenience, similarity of level of exposure to American culture, and comfort with laboratory experimentation. Conversely, it runs the risk of working with people who do not adequately represent the true nature of cultures of the world (Leung, 1996). Although both of

these limitations are real, they are offset somewhat by the similarities of the present findings with those derived by us using other stimuli and by their consistency with ethnographic accounts derived from interviews and observations conducted with members of the cultures of origin.

Conclusions

The question of how culture influences emotion has been of interest to social scientists for decades, yet few empirical studies have addressed this question in ways that enable assessment of emotions as they actually occur. Our findings suggest that even in response to a sudden, simple, short-lived emotional stimulus, culture appears to exert powerful influences. Consistent with ethnographic accounts, Chinese Americans reported experiencing lower levels of emotion than Mexican Americans. With the advantage of a multimethod laboratory approach, we were able to determine that these differences were in the realm of self-reported emotional experience and did not extend to the behavioral and physiological levels. Thus, it appears that different aspects of the human emotion system are differentially susceptible to cultural influence, with the most voluntarily controllable aspects and socially visible most likely to reveal cultural differences.

References

Anderson, N. B. (1989). Racial differences in stress-induced cardiovascular reactivity and hypertension: Current status and substantive issues. *Psychological Bulletin, 105,* 89–105.

Buriel, R., & De Ment, T. (1997). Immigration and sociocultural change in Mexican, Chinese, and Vietnamese American families. In A. Booth, A. C. Crouter & N. Landale (Eds.), *Immigration and the family: Research and policy on U. S. immigrants* (pp. 165–200). Mahwah, NJ: Erlbaum.

Carrillo, C. (1982). Changing norms of Hispanic families: Implications for treatment. In E. E. Jones & S. J. Korchin (Eds.), *Minority mental health* (pp. 250–266). New York: Praeger Publishers.

Cuellar, I., Harris, L. C., & Jasso, R. (1980). An acculturation scale for Mexican American normal and clinical populations. *Hispanic Journal of Behavioral Sciences, 2,* 199–217.

Deffenbacher, J. L., & Swaim, R. C. (1999). Anger expression in Mexican American and White non-Hispanic adolescents. *Journal of Counseling Psychology, 46,* 61–69.

Eisenberg, A. R. (1999). Emotion talk among Mexican American and Anglo American mothers and children from two social classes. *Merrill-Palmer Quarterly, 45,* 267–284.

Ekman, P. (1972). Universals and cultural differences in facial expressions of emotion. In J. Cole (Ed.), *Nebraska Symposium on Motivation, 1971* (pp. 207–283). Lincoln: University of Nebraska Press.

Ekman, P., & Friesen, W. V. (1971). Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology, 17,* 124–129.

Ekman, P., & Friesen, W. V. (1982). Felt, false and miserable smiles. *Journal of Nonverbal Behavior, 6,* 238–252.

Ekman, P., & Friesen, W. V. (1986). A new pan-cultural facial expression of emotion. *Motivation & Emotion, 10,* 159–168.

Ekman, P., Friesen, W. V., O'Sullivan, M., Chan, A., Diacoyanni-Tarlatzis, I., & Heider, K., et al. (1987). Universals and cultural differences in the judgments of facial expressions of emotion. *Journal of Personality and Social Psychology, 53,* 712–717.

Ekman, P., Friesen, W. V., & Simons, R. C. (1985). Is the startle reaction an emotion? *Journal of Personality and Social Psychology, 49,* 1416–1426.

Ekman, P., Sorenson, E. R., & Friesen, W. (1969, April). Pan-cultural elements in facial displays of emotion. *Science, 164,* 86–88.

Fredrickson, B. L., & Levenson, R. W. (1998). Positive emotions speed recovery from the cardiovascular sequelae of negative emotions. *Cognition & Emotion, 12,* 191–220.

Friesen, W. V. (1973). *Cultural differences in facial expressions in a social situation: An experimental test on the concept of display rules.* Unpublished doctoral dissertation, University of California, San Francisco.

Garza, R. T. (1978). Affective and associative qualities in the learning styles of Chicanos and Anglos. *Psychology in the Schools, 15,* 111–115.

Gross, J. J., & Levenson, R. W. (1993). Emotional suppression: Physiology, self-report, and expressive behavior. *Journal of Personality and Social Psychology, 64,* 970–986.

Gross, J. J., & Levenson, R. W. (1997). Hiding feelings: The acute effects of inhibiting negative and positive emotion. *Journal of Abnormal Psychology, 106,* 95–103.

Guerra, M. H. (1970). The retention of Mexican-American students in higher education with special reference to bicultural and bilingual problems. In H. S. Johnson & W. J. Hernandez (Eds.), *Educating the Mexican-American* (pp. 124–144). Philadelphia: Johnson Press.

Hall, J. A., Carter, J. D., & Horgan, T. G. (2000). Gender differences in nonverbal communication of emotion. In A. H. Fischer (Ed.), *Gender and emotion: Social psychological perspectives* (pp. 97–117). New York: Cambridge University Press.

Hochschild, A. R. (1979). Emotion work, feeling rules, and social structure. *American Journal of Sociology, 84,* 551–575.

Izard, C. E. (1971). *The face of emotion.* East Norwalk, CT: Appleton-Century-Crofts.

Kleinman, A. (1986). Illness meanings and illness behaviour. In S. McHugh & T. M. Vallis (Eds.), *Illness behavior: A multidisciplinary model* (pp. 149–160). New York: Plenum Press.

Klineberg, O. (1938). Emotional expression in Chinese literature. *Journal of Abnormal and Social Psychology, 33,* 517–520.

LaFrance, M., & Banaji, M. (1992). Toward a reconsideration of the gender-emotion relationship. In M. S. Clark (Ed.), *Emotion and social behavior* (pp. 178–201). Thousand Oaks, CA: Sage.

Landis, C., & Hunt, W. (1939). *The startle pattern.* Oxford, England: Farrar & Rinehart.

Lang, P. J. (1979). A bio-informational theory of emotional imagery. *Psychophysiology, 16,* 495–512.

Leung, K. (1996). The role of beliefs in Chinese culture. In M. H. Bond (Ed.), *The handbook of Chinese psychology* (pp. 247–262). London: Oxford University Press.

Levenson, R. W., Ekman, P., Heider, K., & Friesen, W. V. (1992). Emotion and autonomic nervous system activity in the Minangkabau of West Sumatra. *Journal of Personality and Social Psychology, 62,* 972–988.

Matsumoto, D. (1993). Ethnic differences in affect intensity, emotion judgments, display rule attitudes, and self-reported emotional expression in an American sample. *Motivation & Emotion, 17,* 107–123.

Mead, M. (1975). Review of "Darwin and facial expression: A century of research in review." *Journal of Communication, 25,* 209–213.

Mendoza, R. H. (1989). An empirical scale to measure type and degree of acculturation in Mexican American adolescents and adults. *Journal of Cross-Cultural Psychology, 20,* 372–385.

Mesquita, B., & Frijda, N. H. (1992). Cultural variations in emotions: A review. *Psychological Bulletin, 112,* 179–204.

Murillo, N. (1976). The Mexican American family. In C. A. Hernandez, M. J. Haug, & N. N. Wagner (Eds.), *Chicanos: Social and psychological perspectives* (pp. 97–108). St. Louis, MO: Mosby, Inc.

Murphy, J. K., Alpert, B. S., Willey, E. S., & Somes, G. W. (1988).

Cardiovascular reactivity to psychological stress in healthy children. *Psychophysiology, 25,* 144–152.

Potter, S. H. (1988). The cultural construction of emotion in rural Chinese social life. *Ethos, 16,* 181–208.

Ramirez, M., & Castañeda, A. (1974). *Cultural democracy, biocognitive development and education.* New York: Academic Press.

Shweder, R. A. (1993). The cultural psychology of the emotions. In M. Lewis & J. M. Haviland (Eds.), *Handbook of emotions* (pp. 417–431). New York: Guilford Press.

Sodowsky, G. R., Lai, E. W., & Plake, B. S. (1991). Moderating effects of sociocultural variables on acculturation attitudes of Hispanics and Asian Americans. *Journal of Counseling & Development, 70,* 194–204.

Suinn, R. M., Rickard-Figueroa, K., Lew, S., & Vigil, P. (1987). The Suinn-Lew Asian Self-Identity Acculturation Scale: An initial report. *Educational & Psychological Measurement, 47,* 401–407.

Szapocznik, J., Scopetta, M. A., Kurtines, W., & Aranalde, M. D. (1978). Theory and measurement of acculturation. *Revista Interamericana de Psicología, 12,* 113–130.

Triandis, H. C., Marín, G., Lisansky, J., & Betancourt, H. (1984). Simpatía as a cultural script of Hispanics. *Journal of Personality and Social Psychology, 47,* 1363–1365.

Tsai, J. L., & Levenson, R. W. (1997). Cultural influences of emotional responding: Chinese American and European American dating couples during interpersonal conflict. *Journal of Cross-Cultural Psychology, 28,* 600–625.

Tsai, J. L., Levenson, R. W., & Carstensen, L. L. (2000). Autonomic, subjective, and expressive responses to emotional films in older and younger Chinese Americans and European Americans. *Psychology and Aging, 15,* 684–693.

Tsai, J. L., Ying, Y.-W., & Lee, P. A. (2000). The meaning of "being Chinese" and "being American: Variation among Chinese American young adults." *Journal of Cross-Cultural Psychology, 31,* 302–332.

Vrana, S. R., & Lang, P. J. (1990). Fear imagery and the startle-probe reflex. *Journal of Abnormal Psychology, 99,* 189–197.

Wu, D. Y. H., & Tseng, W. (1985). Introduction: The characteristics of Chinese culture. In W. Tseng & D. Y. H. Wu (Eds.), *Chinese culture and mental health* (pp. 3–13). Orlando, FL: Academic Press.

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