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Emotional Expression and Physiology in European Americans and Hmong Americans

Jeanne L. Tsai and
Yulia Chentsova-Dutton
Stanford University

Liliana Freire-Bebeau and
Diane E. Przymus
University of Minnesota

Ethnographic and clinical observations suggest that Asians are less expressive than European Americans. To examine whether this difference emerged in online emotional responding, 50 Hmong Americans (HAs) and 48 European Americans (EAs) were asked to relive past episodes of intense happiness, pride, love, anger, disgust, and sadness. Facial behavior and physiological reactivity were measured. For most emotions, more cultural similarities than differences were found. There were some exceptions: During happiness, fewer HAs than EAs showed non-Duchenne smiles (i.e., "social" smiles), despite similarities in reported emotional experience and physiological reactivity. Within-group differences between "less Hmong" and "more Hmong" HAs were also found. Implications of these findings for our understanding of culture–emotion relations are discussed.

Recent studies have revealed cultural variation in emotional phenomena, such as the appraisals of emotional events (Mesquita, 2001; Roseman, Dhawan, Rettek, Naidu, & Thapa, 1995; Scherer, 1997b), the interpersonal events that elicit emotion (Stipek, 1998), the frequency of experienced emotions (Kitayama, Markus, & Kurokawa, 2000), the duration of emotional experiences (Scherer, Matsumoto, Wallbott, & Kudoh, 1988), judgments of emotional facial expressions (Matsumoto, 1993), and memory for emotional events (Oishi, 2000; Wang, 2001). Far fewer studies, however, have examined whether cultural variation exists in online emotional responding (i.e., the changes in physiological responding, subjective experience, and expressive behavior that occur during an emotional event). These studies are critical in order to understand fully the relationship between culture and emotion and to uncover the extent to which culture can account for variation in emotional experience in applied settings. Thus, the present study compared the physiological responses and facial expressive behavior of European Americans and Hmong Americans (a Southeast Asian group originally from Laos) as they relived intense emotional episodes from their lives.

Ethnographic and Clinical Accounts of Cultural Models of Emotional Expression

According to anthropologists Kroeber and Kluckhohn (1952), culture consists of shared meaning systems and practices that are both "products of action" and "conditioning elements of further action" (p. 181). More recently, anthropologists have used the term *cultural model* to describe patterns of ideas and practices related to specific social, physical, and psychological phenomena, including salutations, games, public space, time, social relationships, divinity, and

Jeanne L. Tsai and Yulia Chentsova-Dutton, Department of Psychology, Stanford University; Liliana Freire-Bebeau and Diane E. Przymus, Department of Psychology, University of Minnesota.

Liliana Freire-Bebeau is now at Argosy University/Twin Cities.

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Correspondence concerning this article should be addressed to Jeanne L. Tsai, Department of Psychology, Stanford University, Building 420, Jordan Hall, Stanford, California 94305-2130. E-mail: jtsai@psych.stanford.edu

emotion (Fryberg & Markus, 2002; Shore, 1996; Strauss, 1992).

Ethnographic accounts, for example, suggest that Western and East Asian cultures vary in their dominant models of emotional expression (e.g., Benedict, 1946; Heider, 1991; Lutz, 1989). Whereas Western cultures have been described as encouraging open emotional expression, East Asian cultures have been described as promoting emotional balance and control. Consequently, East Asians have been depicted by ethnographers and clinicians as being less emotionally expressive and more "inscrutable" and "inhibited," and as valuing and practicing more self-constraint than their Western counterparts (Benedict, 1946; Hsu, 1985; Kleinman, 1986; see review by Russell & Yik, 1996; Song, 1985; Tseng & Hsu, 1969; Wu & Tseng, 1985; Yamamoto & Steinberg, 1981). Although these characterizations have been used most often to describe individuals of Chinese or Japanese descent, they have also been applied to other Asian cultural groups such as Vietnamese and Hmong (Frye, 1995; St. Paul Foundation, 1996; Winter & Young, 1998). Theorists have linked these different models of emotional expression to the relative emphasis these cultures place on individuals' social goals. That is, because one of the primary social goals in many East Asian contexts is to "fit in" and adjust to the needs of others, individuals are highly concerned about the impact that their emotional expressions may have on others. As a result, they dampen their emotional expressions in the interests of maintaining group harmony. In contrast, because one of the primary social goals in many Western contexts is to establish oneself as special and different from others, individuals are highly concerned about expressing their uniqueness through their emotions. As a result, they accentuate their emotional expressions as a way of asserting themselves (Kitayama et al., 2000; Markus & Kitayama, 1991; Mesquita, 2001; Tavris, 1989).

Previous Studies of Emotional Responding Across Cultures

Surprisingly few studies have examined whether cultural models of emotional expression influence online emotional responding in adults. Of the studies that have, most have compared the emotional responses of an East Asian group (typically of Chinese or Japanese descent) with those of a Western cultural group (typically European Americans). The basic paradigm used in these studies includes the induction of emotion in the laboratory via one of a variety of commonly used methods, such as having participants watch emotional film clips (Ekman, 1972; Friesen, 1972; Lazarus, Tomita, Opton, & Kodama, 1966; Tsai, Levenson, & Carstensen, 2000), make emotion-specific facial expressions (Levenson, Ekman, Heider, & Freisen, 1992), discuss areas of conflict or enjoyable topics in their relationship with their romantic partners (Tsai & Levenson, 1997), or relive emotional episodes in their lives (Drummond & Quah, 2001). Typically, these studies either measure reports of subjective experience during the task, expressive behavior, or physiological responding. Only one has focused on all three components of emotional responding (Tsai et al., 2000).

Across these studies, two main patterns have emerged. First, cultural differences in emotional responding tend to occur more in social than nonsocial contexts. For example, in Tsai et al. (2000), the researchers compared the physiological, subjective, and behavioral responses of older and younger Chinese American and European Americans while they were watching sad and amusing film clips in a room alone. No cultural group differences emerged in physiology, reports of emotional experience, or expressive behavior. Similarly, Lazarus et al. (1966) and Ekman (1972) found no differences in reported emotional experience or expressive behavior between Japanese and American male adults while they watched a distressing film clip in a room alone. By contrast, in studies where there was a continual exchange between experimenter and participant (e.g., when participants were instructed to make emotional facial expressions, as in Levenson et al., 1992), between participants (e.g., when couples discussed an area of conflict in their relationships, as in Tsai & Levenson, 1997), or when participants were observed by another person (e.g., while watching film clips, as in Friesen, 1972), cultural differences emerged in the direction of East Asians reporting or showing less emotion than their Western counterparts.

A second pattern concerns the component of emotional responding for which cultural differences are found. Among the studies described above, cultural differences emerged more strongly in reports of subjective emotional experience and measures of expressive behavior than in measures of physiological responding (Drummond & Quah, 2001; Friesen, 1972; Levenson et al., 1992; Tsai & Levenson, 1997). More specifically, when Asian participants reported less emotion and showed less expressive behavior than their Western counterparts, no differences in physiological responding emerged. Tsai and Levenson

(1997) proposed that self-reports of emotional experience and expressive behavior may be more influenced by cultural models of emotion because they are more easily detectable by others than most measures of physiological responding. Given that one of the functions of culture is to regulate social relations and that cultural transmission occurs primarily in social contexts (Boesch & Tomasello, 1998), we argued that the components of emotion that are not easily detectable by others (e.g., changes in sweat gland activity) may be less shaped by cultural learning than those that are (e.g., smiles, vocal expression). Thus, East Asian and Western models of emotional expression may shape subjective experience and behavior, without altering the physiological components of emotional response.

The Present Study

Despite these emerging patterns, several questions regarding the generalizability of previous findings remain unanswered. First, to elicit emotion, previous studies have used either "standard" stimuli (e.g., film clips) that may or may not have the same emotional meaning across cultures or idiosyncratic stimuli (e.g., relived imagery, dyadic interaction) that may or may not elicit specific emotional responses of similar intensity across cultures. Therefore, it is possible that previously observed variation in expressive behavior and reports of emotional experience are caused by cultural differences in the meaning of the stimuli or in the intensity of the elicited emotional response rather than to cultural differences in online emotional responding. Second, only two of the six studies described above have examined facial expressive behavior. These studies used global ratings of facial expressive behavior rather than more specific, standardized, and well-established coding systems such as the Facial Action Coding System (FACS; Ekman & Friesen, 1978a). Because the influence of cultural models of emotional expression on expressive behavior may be subtle, using such a system is essential for accurate behavioral assessment. Third, the previous studies were limited in the emotions that they elicited. They either elicited only a few emotions (e.g., anger) or general negative or positive affective states, rather than specific positive or negative emotions. As a result, we do not know whether cultural differences in emotional responding vary across specific emotional states.

Finally, few studies have examined the extent to which variation in emotional responding within cultural groups might exist. In theory, individuals who are strongly oriented to a particular cultural context should be more influenced by that culture's dominant model of emotional expression than those who are less oriented to that culture. Scholars have argued that demonstrating associations between cultural variables and the phenomena of interest within groups may be the most convincing way to demonstrate cultural influence (Triandis, Kashima, Shimanda, & Villareal, 1986). To our knowledge, Tsai and Levenson (1997) are the only researchers who have examined within-group variation in emotional responding. They found that the more oriented to Chinese culture Chinese Americans were, the less variable (and more moderate) were their reports of affect while they discussed an area of conflict with their romantic partners.

In the present study, we addressed these issues by having participants recall and relive past episodes in their lives when they felt intense emotion. We elicited three positive (happiness, pride, and love) and three negative emotions (anger, disgust, and sadness). We then used FACS to examine the expressive behavior of participants in our study. We were primarily interested in (a) whether there would be group differences in emotional response (i.e., physiological responding and facial expressive behavior); and (b) whether cultural models of emotional expression would predict these differences. Specifically, we compared the emotional responses of European Americans (EAs) and Hmong Americans (HAs). Like other East Asian cultures, Hmong culture emphasizes adjusting to others and controlling one's emotions (Frye, 1995; Lee, 1995, 1996; Winter & Young, 1998), and therefore, HAs were an appropriate group with whom to examine the relationship between models of emotional expression and emotional responding. To assess within-group differences in emotional responding, we examined whether the emotional responses of HAs and EAs varied as a function of their reported orientations to Hmong and American cultures, respectively.

Hypotheses

We tested two main hypotheses. First, based on descriptions of Asians being less expressive than Westerners (specifically, EAs), we predicted that HAs would demonstrate less facial expressive behavior than would EAs. Although few studies have found cultural differences in physiology, given the limitations of previous studies described above, we acknowledged the possibility that there would be group differences in physiological responding, and therefore did not make a specific prediction about physiological

Table 1
Sample Descriptive, European Americans and Hmong Americans

Variable	*M*s, (*SD*s), and percentages	
	European Americans ($n = 48$)	Hmong Americans ($n = 50$)
Age in years	20.65 (2.31)	20.12 (1.96)
Years in college	2.73 (1.27)	2.26 (1.26)
% employed	77.1	68.0
% female	47.9	52.0
Years in United States	20.54 (2.37)	17.53 (2.84)
English language proficiency[a]		
Speaking**	4.98 (0.14)	4.41 (0.76)
Understanding**	5.00 (0.00)	4.48 (0.75)
Writing**	4.99 (0.20)	4.48 (0.75)
% annual income ($10,000 or less)	73.0	72.7
American orientation[b]	4.10 (0.36)	3.80 (0.38)
Hmong orientation[b]	—	3.36 (0.47)

[a] Rated on a 5-point scale ranging from 1 (*not at all proficient*) to 5 (*extremely proficient*). [b]Rated on a 5-point scale ranging from 1 (*not at all*) to 5 (*extremely oriented*).
** $p < .01$.

responding. Because our task explicitly asked all participants to describe times in their lives when they experienced specific emotional states "very strongly," we did not expect that the groups would necessarily differ in the intensity of their reports of subjective emotional experience during the task.

Second, we hypothesized that within each cultural group, cultural orientation would be associated with emotional responding. Specifically, we predicted that among HAs, those who were more oriented to Hmong culture would demonstrate less expressive behavior than those who were less oriented to Hmong culture. Similarly, we predicted that among EAs, those who were more oriented to American culture would demonstrate more expressive behavior than those who were less oriented to American culture. Again, we acknowledged the possibility that within-group differences in physiological responding would emerge.

Method

Participants

Fifty HA and 48 EA undergraduates from colleges and universities in the Twin Cities, Minnesota, were recruited through announcements in newspapers and flyers distributed across campuses as well as through general psychology subject pools. Participants received $10 per hour or research credits for their participation.

To increase the cultural homogeneity of the HA sample, in order to participate in the present study, HAs were required to (a) be born in either Laos, Thailand, or in the United States; (b) have Hmong parents who were born and raised in Laos; and (c) be fluent in both Hmong and English. Similarly, EA participants were required to (a) be born in the United States, (b) have EA parents and grandparents who were born and raised in the United States, and (c) be fluent in English in order to participate in the study.

One-way analyses of variance (ANOVAs) revealed no differences between EAs and HAs in age and years in college, and chi-square analyses revealed no differences in employment status or sex.[1] Whereas all EAs were born in the United States, only 28% of HAs were; the remaining HAs were born in either Laos (38%) or Thailand (34%). Not surprisingly, the two groups significantly differed in their years spent in the United States, $F(1, 96) = 32.35$, $p < .01$, and reported proficiency in speaking, $F(1, 93) = 25.44$, $p < .01$; understanding, $F(1, 92) = 23.55$, $p < .01$; and writing English, $F(1, 92) = 18.52$, $p < .01$. The groups also differed in their orientation to American culture, $F(1, 95) = 16.42$, $p < .01$; with EAs being more oriented to American culture than HAs. HAs reported being moderately oriented to Hmong culture (see description of cultural orientation measure, below). Table 1 provides descriptive information for both samples.

[1] We initially conducted analyses that included Sex as a factor. There were no significant interactions involving Sex, and therefore, we collapsed across sexes.

Relived Emotion Task

The relived emotion task has been shown to be an effective elicitor of emotional responding in previous studies and has been widely used with both clinical and nonclinical samples (Levenson, Carstensen, Friesen, & Ekman, 1991; Oliveau & Willmuth, 1979, Schwartz, Fair, Salt, Mandel, & Klerman, 1976a, 1976b). For the purpose of the present study, we modified the task used by Levenson et al. (1991); instead of providing a prototypical emotional event, we provided a description of the target emotion. Interviewers were not physically present in the room while participants relived their emotions because of concerns that this would increase participants' self-consciousness and, as a result, interfere with their ability to relive their emotions. However, participants were in continuous verbal communication with the interviewer through an intercom system. Therefore, although the relived emotion task is less social than some tasks used to elicit emotion (e.g., couples discussing an area of conflict in their relationship), we viewed it as being as social as other tasks (e.g., being instructed to make facial expressions, watching a film in the presence of another person) for which cultural differences in emotional responding have emerged.

For each relived emotion, participants were provided with a label for the target emotion (e.g., "happiness") as well as a description of the target emotion, based on Lazarus' (1991) descriptions of emotions (e.g., "a time when you did something or something happened that you wanted very much, so that you felt very good"). Participants were asked to (a) recall and describe a time in their lives when they felt the target emotion very strongly, (b) focus on the moment at which they felt the target emotion, and (c) relive the target emotion. Participants pressed a button on a handheld switch to indicate when they were able to feel the emotion; they continued pressing the button as long as they were able to feel the emotion or until they were told to stop (after 2 min). This time period is referred to as the *relived emotion period.* The order in which participants relived each of the six emotions was randomized to avoid order effects. The effectiveness of the relived emotion task as an elicitor of emotional responding in the present study is reported in the Data Analysis and Results section.

Questionnaires

Cultural orientation. The General Ethnicity Questionnaire—American version (GEQ–A; Tsai, Ying, & Lee, 2000) and the General Ethnicity Questionnaire—Hmong version (GEQ–H; Tsai, 2001) were completed by HA participants. EA participants completed the GEQ–A only. These questionnaires measure cultural orientation and allow for independent assessments of orientation to American and Hmong cultures, respectively. They assessed cultural orientation in specific life domains including social affiliation (e.g., "Now, my friends are American/Hmong"), activities (e.g., "I engage in American/Hmong forms of recreation"), attitudes (e.g., "I am proud of American/Hmong culture"), exposure (e.g., "I was raised in a way that was American/Hmong"), food (e.g., "At home, I eat American/Hmong food"), and language (e.g., "How fluently do you speak English/Hmong?"). Participants rated 38 items on a 5-point Likert scale ranging from 1 (*very much*) to 5 (*not at all*). This measure had adequate internal consistency (GEQ–A: .87 for EA, .83 for HA, GEQ–H: .88 for HA; for additional information about the instrument's psychometric properties, please see Tsai, 2001). To test our second hypothesis, we divided HAs into those who were more or less oriented to Hmong culture, based on a median split ($Mdn = 3.44$); similarly, we divided EAs into those who were more or less oriented to American culture, based on a median split ($Mdn = 4.09$). In both cases, individuals whose cultural orientation scores fell on the median were excluded from the analyses. As expected, one-way ANOVAs revealed a significant difference in mean levels of Hmong cultural orientation for the two HA groups, $F(1, 47) = 51.23$, $p < .001$ (for "less Hmong" HAs, $M = 3.02$, $SD = 0.40$; for "more Hmong" HAs, $M = 3.69$, $SD = 0.47$) and in mean levels of American culture orientation for the two EA groups, $F(1, 42) = 152.54$, $p < .001$ (for "less American" EAs, $M = 3.76$, $SD = 0.19$; for "more American" EAs, $M = 4.41$, $SD = 0.16$.[2]

Trait affect. The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988)

[2] The two Hmong American (HA) groups differed in their orientation to American culture, but this difference only approached statistical significance (General Ethnicity Questionnaire—American version [GEQ–A] for "less Hmong" HAs = 3.90 [$SE = .06$], GEQ–A for "more Hmong" HAs = 3.70 [$SE = .08$]), $F(1, 47) = 3.48$, $p = .07$. This is not surprising, given that the variance in levels of orientation to Hmong culture (variance = .23, range = 1.83–4.25) was almost twice as great as the variance in levels of orientation to American culture (variance = .12, range = 3.37–4.78) for this HA sample.

is a measure of self-reported mood that has been used to assess momentary changes in mood as well as more enduring affective traits. The PANAS consists of 20 emotion terms, which are thought to represent two dimensions of mood: positive affect (e.g., enthusiastic, alert, active) and negative affect (e.g., distressed, upset, hostile, irritable). In the version of the PANAS that measures trait affect, participants are asked to indicate the extent to which they have felt particular affective states "on average." The PANAS has been found to be a valid measure of emotionality (Tellegen, 1985) as well as to have cross-cultural generalizability (Watson, Clark, & Tellegen, 1984). Alpha reliability estimates for our sample were .84 (for EAs) and .89 (for HAs) for positive affect and .73 (for EAs) and .78 (for HAs) for negative affect, which were comparable to those found in previous studies. The PANAS was administered at the end of the study so that the assessment of trait affect would not contaminate assessments of emotional experience during the relived emotion task.

Emotion inventory. A self-report inventory consisting of 25 emotion terms was administered to participants during the baseline period. The inventory included *happiness, love, pride, anger, disgust,* and *sadness*; the remaining emotion terms served as fillers. For each of the emotion terms, participants rated how they felt at the moment by using an anchored 9-point Likert scale (0 = *no emotion,* 4 = *moderate emotion,* and 8 = *the most you have felt in your life*).

Postexperimental session questionnaire. Participants were asked to indicate on a 9-point scale, ranging from 0 (*not at all*) to 8 (*the most in my life*) (a) how much the laboratory setting prevented them from disclosing more about their emotions, (b) how comfortable they were during the experiment, (c) how concerned they were about what the interviewer would think about them, and (d) how much the presence of the interviewer affected their responses.

Procedure

A trained female interviewer of the same ethnicity as the participant greeted the participant upon his or her arrival to the laboratory. Female interviewers were selected to increase participants' comfort level during sensor attachment and the relived emotion task. Participants were matched with interviewers of the same ethnicity to increase their level of comfort with the experimental setting (Bradley, Snyder, & Katahan, 1972; Murphy, Alpert, Moes, & Somes, 1986). Instruments and instructions were delivered to participants in English; however, HA interviewers were bilingual, and HA participants were told that they could speak Hmong when they needed to do so. After arriving at the laboratory, participants completed the demographic questionnaire and the cultural orientation inventory. Physiological sensors were then attached to the participants' torso and nondominant hand. Before reliving any emotions, participants were instructed to be silent and relax for 3 min to obtain measures of their physiological responding and facial behavior during baseline. A sign with an *X* in the middle was mounted on a monitor and placed at eye level in front of the participants to facilitate relaxation during baseline. Participants were asked to look at the *X* and empty their minds of all thoughts, feelings, or memories. Participants then completed the emotion inventory (there were no group differences in reports of emotional experience during this baseline period).

After the relaxation-baseline period, participants were asked to recall and relive past episodes when they felt very surprised. This served as a practice trial, and participants were allowed to ask questions to ensure that they understood the task. Participants were then asked to recall and relive a past episode of one of the target emotions (for specific instructions, please see the *Relived Emotion Task,* section above). Immediately following the relived emotion period for this target emotion, participants were asked to rate how intensely they felt the target emotion during the original event and while they tried to relive the emotion, using a 9-point Likert scale (0 = *not at all,* 4 = *moderately,* and 8 = *the most in my life.*) Participants were also asked to rate how able they were to relive the target emotion on a 9-point Likert scale (0 = *being not at all able,* 4 = *moderately able,* and 8 = *extremely able*). Participants were then instructed to relax for a few minutes. The same procedure was followed for the remaining five emotions. After recalling and reliving all of the emotions, participants completed the PANAS and the postexperimental session questionnaire. To minimize the likelihood that participants would provide socially desirable responses on the latter questionnaire, interviewers told participants that they would not see their responses (interviewers were not present when participants completed the questionnaires). Participants were also instructed to put their completed questionnaires in a sealed envelope and to drop them in a box in the room.

Dependent Measures

Facial expressive behavior. To record participants' facial expressive behavior, remotely controlled,

high-resolution color video cameras recorded the participant's face during the study. Cameras were hidden from participants' view behind darkened glass on a bookshelf. Sony ECM 55B Lavalier microphones clipped on participants' clothing were used to record their verbal responses. Facial behavior was scored using Ekman and Friesen's (1978a) FACS. FACS distinguishes 44 facial and 12 head and eye movements. Three trained and certified FACS coders scored every action unit (AU; i.e., a visually distinguishable and anatomically based unit of facial muscle movement) or combination of AUs that occurred during the baseline and relived emotion periods. The coders were blind to the emotion that the participants were reliving and they coded the video segments without sound. AUs and AU combinations were then grouped into specific emotion categories (anger, contempt, disgust, sadness, Duchenne and non-Duchenne smiles [see below], and general negative expressions) on the basis of previous empirical findings (Alvarado & Jameson, 1996; Dimberg & Lindquist, 1988; Ekman & Freisen, 1978b; Rosenberg, Ekman, & Blumenthal, 1998; Rozin, Lowery, & Ebert, 1994; Sayette & Hufford, 1995; SPAFF manual, as cited in Gottman & Levenson, 1992; Wiggers, 1982) and on personal communications with P. Ekman (May 4, 2001). Occurrences of crying behavior were also coded.

Although all the AU and AU combinations were coded for each emotional episode, we only examined the facial behaviors that one would expect participants to display during the specific emotion episode; these facial behaviors are referred to as the *target behaviors.* During *happiness*, we examined (a) the AU6+12 combination as the marker of felt happiness or enjoyment, known as the *Duchenne* smile; and (b) the AU12 without AU6 as the marker of social smiling (typically associated with maintaining social propriety or masking negative emotion), known as the *non-Duchenne* smile (Ekman, Davidson, & Friesen, 1990; Frank, Ekman, & Friesen, 1993). Although several studies have demonstrated the different functions, consequences, and correlates of the Duchenne and non-Duchenne smiles (Ekman et al., 1990; Prkachin & Silverman, 2002; Soussignan, 2002; Surakka & Hietanen, 1998), both smiles have been found to cooccur in specific positive social contexts (Messinger, Fogel, & Dickson, 1999). Because the occurrences of Duchenne smiles during *pride* and *love* were low, we only examined the occurrence of non-Duchenne smiles for these emotions. During *anger,* we examined the occurrence of AU4 (associated with general negative states including anger) and unilateral AU10, AU12, and AU14 (associated with contempt). During *disgust,* we examined the occurrence of AU4, AU9, and AU10 (the latter two being associated with disgust). During *sadness,* we examined the occurrence of AU4 and crying behavior.[3] To establish interrater reliability, one fifth of all videotapes were coded by all raters. The mean agreement ratio for scoring emotional configurations was 0.97 (range = 0.70–1.0).

Physiology. A system consisting of a Dell Pentium computer, HPVEE software (HPVEE, Version 4.01), and Coulbourn Lab Link V bioamplifiers (Coulbourn Instruments; Allentown, PA) were used to obtain continuous recordings of participants' physiological responses. Second-by-second measures of physiological responding were sampled from the cardiovascular, electrodermal, and respiratory systems, and mean levels of reactivity were calculated during the baseline and relived emotion periods. Because none of the cardiovascular or respiratory measures demonstrated significant change from baseline to the relived emotion period, they are not discussed further. (Please contact Jeanne L. Tsai for more information.) Electrodermal response was measured by skin conductance level. A constant-voltage device was used to pass a small voltage between electrodes attached to the palmar surface of the middle phalanxes of the first and third fingers of the nondominant hand. Skin conductance was measured in micromhos. To test our main hypotheses, the change in skin conductance levels from baseline was calculated by subtracting mean levels of skin conductance activity during baseline from mean levels of skin conductance activity during the relived emotion period for each emotion.

Data Analysis and Results

Before testing our hypotheses, we examined whether the relived emotion task was an effective elicitor of emotional responding, and whether group differences emerged in the types of emotional events recalled and the reported intensity of emotional experience during the relived emotion period.

Effectiveness of Relived Emotion Task on Emotional Responding

Reports of emotional experience. To examine whether the relived emotion task elicited significant

[3] There was only one instance of AU14+15, an AU combination associated with sadness, in the entire sample, and therefore, we excluded this combination from our analyses.

changes in reports of emotional experience compared with baseline, we conducted for each emotion 2 × 2 repeated measure ANOVAs (Group [EA; HA] × Task [baseline; relived emotion task]). Analyses revealed a significant main effect of task for each of the relived emotions, as shown in Table 2. As would be expected, participants reported feeling the target emotion more during the relived emotion period than during the baseline period. The Group × Task interaction was not significant, indicating that there were no differences in the effectiveness of the task on reports of emotional experience by cultural group.

Facial behavior. For each cultural group, we conducted Wilcoxon signed ranks tests to determine whether the percentage of participants who displayed the target facial behavior significantly increased during the relived emotion period, as compared with baseline. Compared with baseline, a significantly greater percentage of participants showed non-Duchenne smiles while reliving happiness, pride, and love and Duchenne smiles during happiness. Similarly, the percentage of participants who showed the target facial behavior during the negative emotions increased during the relived emotion period compared with baseline; however, although this increase was significant during relived disgust and approached significance during sadness, it was not significant during anger (see Table 2). Therefore, we did not include facial behavior during anger in our analyses. To demonstrate that the target emotional facial behavior occurred more frequently than all other possible emotional facial behaviors, we conducted chi-square analyses to test each target AU combination against the other emotion-related AU combinations. For ex-

Table 2
Effectiveness of the Relived Emotion Task (RET) on Emotional Responding for Both European American and Hmong American Groups

Reported emotion	*M* (*SD*)[a]					
	Baseline	RET	*n*	*F*	*df*	*p*
Happiness	2.20 (2.15)	4.97 (1.58)	98	114.34	1, 96	<.01
Pride	1.67 (2.06)	4.87 (1.86)	98	147.42	1, 96	<.01
Love	1.77 (2.30)	5.35 (1.80)	96	183.21	1, 94	<.01
Anger	0.41 (0.99)	4.52 (1.99)	96	329.41	1, 94	<.01
Disgust	0.30 (0.83)	4.36 (1.88)	94	365.80	1, 92	<.01
Sadness	0.54 (1.23)	4.89 (1.73)	97	469.28	1, 95	<.01

Facial behavior	% who display[b]			Wilcoxon	
	Baseline	RET	*n*	*Z*	*p*
Happiness[c]					
Duchenne	0	12	98	3.32	<.01
Non-Duchenne	10	34	98	4.00	<.01
Pride	10	28	98	3.16	<.01
Love	10	30	98	3.31	<.01
Anger	18	25	95	1.10	.27
Disgust	13	25	97	2.12	<.05
Sadness	10	20	96	1.88	.06

Skin conductance	*M* (*SD*)[d]			Wilcoxon	
	Baseline	RET	*n*	*Z*	*p*
Happiness	−0.03 (0.12)	0.08 (0.18)	98	−5.99	<.001
Pride	−0.03 (0.12)	0.07 (0.18)	98	−5.49	<.001
Love	−0.03 (0.12)	0.05 (0.18)	98	−4.55	<.001
Anger	−0.03 (0.12)	0.09 (0.19)	98	−6.06	<.001
Disgust	−0.03 (0.12)	0.08 (0.17)	98	−6.06	<.001
Sadness	−0.03 (0.12)	0.07 (0.17)	98	−5.63	<.001

[a] Rated on a 9-point scale (0 = *no emotion,* 4 = *moderate emotion,* 8 = *the most you have felt in your life*). [b]Behavior during relived anger includes general negative and contempt expressions; behavior during disgust includes general negative and disgust expressions; behavior during sadness includes negative and sadness expressions. [c]Facial expressions during happiness includes Duchenne and non-Duchenne smiles, whereas pride and love include non-Duchenne smiles only. [d]In micromhos.

ample, for sadness, we compared the occurrence of sadness facial behavior (general negative expressions and crying) with the occurrence of contempt, disgust, and smiling behaviors. Analyses revealed that for all relived emotions, the target emotional facial behavior occurred significantly more often than the other emotional facial behaviors.

To examine whether the relived emotion task was more effective in eliciting emotional facial behavior for one cultural group compared with another, we conducted separate Wilcoxon signed ranks tests for each cultural group, calculated the difference in Wilcoxon *Z*s, and compared the difference with a normal distribution. We found that none of the differences were significant, suggesting that the relived emotion task was not more effective in eliciting emotional facial behavior for one group than the other.

Physiology. Because the electrodermal (skin conductance) measure did not meet assumptions of homogeneity of variance, for each cultural group, we conducted nonparametric-Wilcoxon signed ranks tests on values during baseline and during the relived emotion period for each emotion. These analyses revealed significant differences in skin conductance activity during all of the emotions (Table 2). To examine whether the relived emotion task was more effective in eliciting skin conductance responses for one cultural group compared with another, we calculated the difference in Wilcoxon *Z*s and compared the difference with a normal distribution. None of these analyses were significant, with the exception of love ($Z = 1.61$, $p = .05$). The change in skin conductance from baseline during relived love was greater for EAs than for HAs.

Reported ability to relive emotions. To examine whether there were differences in participants' ability to relive their emotional episodes, we conducted a 2 × 6 (Group [EA, HA] × Emotion [happiness, pride, love, anger, disgust, sadness]) repeated measures ANOVA on their reported ability to relive their emotions. No significant main effects or interactions involving group or emotion were found. Participants reported being able to relive their emotional episodes to a moderate degree (happiness = 5.60, *SE* = .19; pride = 5.19, *SE* = .19; love = 5.50, *SE* = .18; anger = 5.08, *SE* = .19; disgust = 5.36, *SE* = .19; sadness = 5.45, *SE* = .19; on a 9-point scale, where 0 = *not at all able,* 4 = *moderately able,* and 8 = *very able*).

Thus, the relived emotion task was effective in eliciting changes in reported emotional experience and skin conductance activity for all of the emotions. In the domain of facial behavior, however, the task was more effective in eliciting changes during happiness, love, pride, disgust, and sadness than during anger.

No Group Differences in Types of Events Recalled or Reports of Emotional Experience During the Relived Episode

To examine whether the type of emotional events recalled varied by cultural group, the descriptions of the events were transcribed and coded for thematic content, based on a coding system developed by Scherer and colleagues (Scherer, 1988; Scherer, 1997a, 1997b; Scherer & Wallbott, 1994; Scherer, Wallbott, & Summerfield, 1986; see Ellgring & Banninger-Huber, 1986; and Summerfield & Green, 1986, for a detailed description of the coding system) in their cross-cultural questionnaire studies of the antecedent events, appraisals, and emotional reactions associated with specific emotions. Three research assistants coded the events; reliability was demonstrated on 20% of the sample (Cohen's kappa = 1.00). Chi-square analyses and Fisher's exact tests revealed no significant ($p > .05$) group differences in distribution of the types of events that participants recalled and then relived during all of the emotions. The majority of events that elicited *happiness* concerned continuing relationships, achievement situations, and new experiences; *pride* events were related to achievement situations; *love* events concerned continuing relationships and acquiring someone or something new; *anger* events concerned the violation of social norms and injury or damage; *disgust* events revolved around another person's actions or nonhuman organisms or objects (e.g., animals, food); and *sadness* events were related to separation or death and relationship problems.[4]

To examine whether there were any group differences in the intensity of reported emotional experience during the relived emotion periods, we conducted a multivariate analysis of variance (MANOVA) by group on reports of emotional experience during the relived emotion period. The main

[4] In general, the types of events reported by participants in our study for the emotions of happiness (joy), anger, and sadness were similar to those reported by European participants in Wallbott and Scherer (1986) and by American, Japanese, and European participants in Scherer, Matsumoto, Wallbott, and Kudoh (1988). Because these studies did not examine the emotions of pride, love, or disgust, we cannot make similar comparisons for these emotions.

Table 3
Self-Reports, Means, Standard Errors, and Rank of Emotion and Electrodermal Activity

	European Americans (n = 48)			Hmong Americans (n = 50)		
Emotion and variables	*M*	*SE*	Mean rank	*M*	*SE*	Mean rank
Happiness						
Reports of happiness[a]	4.71	.23		5.11	.23	
Skin conductance level	.10	.14	49.75	.10	.17	49.26
Pride						
Reports of pride[a]	4.51	.27		5.30	.28	
Skin conductance level	.12	.13	53.59	.08	.17	45.57
Love						
Reports of love[a]	5.04	.26		5.68	.26	
Skin conductance level	.10	.13	54.44	.06	.17	44.76
Anger						
Reports of anger[a]	3.91	.27		4.89	.28	
Skin conductance level	.11	.14	50.33	.12	.19	48.70
Disgust						
Reports of disgust[a]	4.00	.26		4.98	.27	
Skin conductance level	.11	.12	50.33	.11	.19	48.70
Sadness						
Reports of sadness[a]	4.56	.25		5.07	.25	
Skin conductance level	.11	.13	51.89	.09	.16	47.21

[a] Rated on a 9-point scale (0 = *not at all,* 4 = *moderate,* 8 = *the most in my life*).

multivariate effect of group was not significant (see Table 3 for means and standard deviations). Thus, all participants reported experiencing emotions of similarly strong intensity.[5] Again, this was not surprising given that participants were explicitly instructed to relive emotional episodes of strong intensity.

Hypothesis 1: Emotional Responding in EAs and HAs

Facial expressive behavior. For each emotion, we conducted nonparametric chi-square analyses or Fisher's exact test (when cell counts were less than expected) to examine whether group differences emerged in the occurrence of facial expressive behavior (expression data were categorical). Contrary to predictions, analyses revealed no significant differences between EAs and HAs in the occurrence of facial expressions displayed during pride, love, disgust, or sadness. A significant difference in the occurrence of non-Duchenne smiles during happiness did emerge, however, χ^2 (1, N = 98) = 4.28, $p < .05$; a greater percentage of EAs compared with HAs showed non-Duchenne smiles (see Figure 1, top panel). No significant differences emerged in Duchenne smiles during happiness.

Given differences in non-Duchenne smiles during happiness between EAs and HAs we conducted an internal analysis to determine whether the magnitude of this difference would increase if we compared the facial behavior of "more American" EAs (as determined by a median split, described above) with that of "more Hmong" HAs (also as determined by a median split, described above), using nonparametric chi-

[5] To examine whether there were group differences in the intensity of the emotional episodes when they originally occurred (e.g., how happy the participant felt when she initially won an award), we conducted an overall multivariate analysis of variance by group on reports of emotional experience during the original event. This analysis revealed a significant multivariate effect of group. Follow-up univariate analyses revealed group differences in the reported intensity of emotional experience during the original event for the emotions of happiness, pride, and anger, with HA reporting more happiness, pride, and anger than EA. To examine whether differences in the intensity of the original event might account for possible differences in the intensity of the relived event, we conducted univariate analyses of covariance on reported intensity of emotional experience during relived anger, happiness, and pride, controlling for their ratings of emotional experience during the original event. No significant group differences emerged.

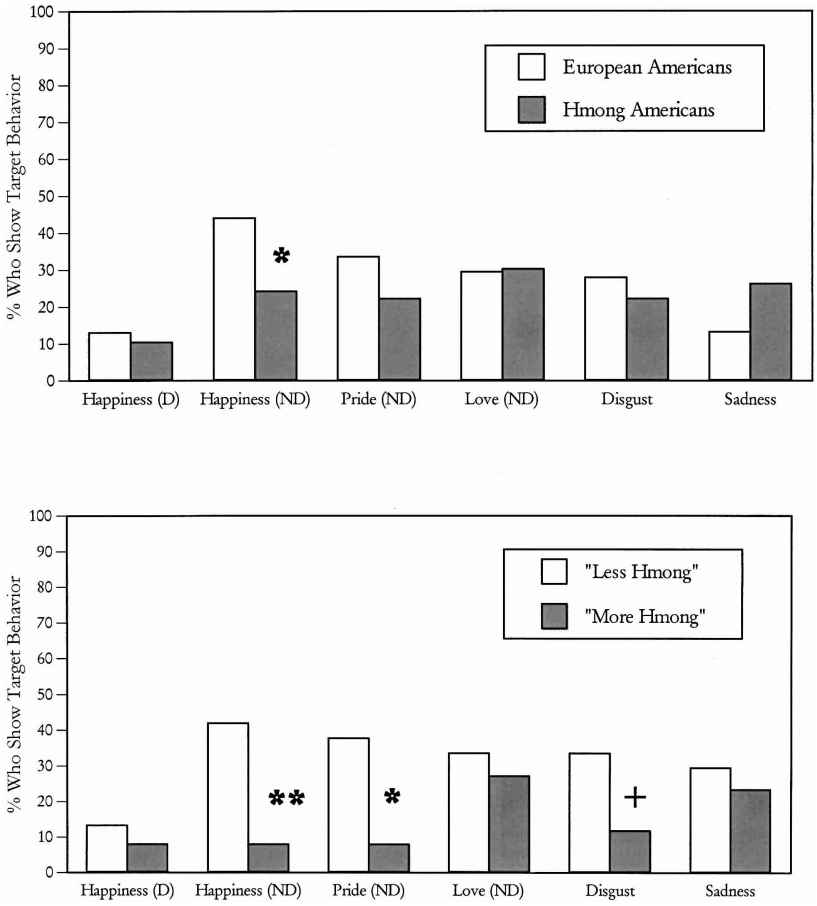

Figure 1. Percentage of participants in each group who showed the targeted facial behavior (see the *Facial expressive behavior* section for a description of these behaviors) during each relived emotional episode: European Americans ($n = 48$) versus Hmong Americans ($n = 50$; top panel), "less Hmong" Hmong Americans ($n = 24$) versus "more Hmong" Hmong Americans ($n = 26$; bottom panel). D = Duchenne; ND = non-Duchenne. † $p < .10$. * $p < .05$. ** $p < .01$.

square tests. Consistent with previous findings, a significantly greater percentage of "more American" EAs displayed non-Duchenne smiles during happiness than "more Hmong" HAs ("more American" EAs = 39.1%, "more Hmong" HAs = 7.7%), χ^2 (1, $N = 49$) = 6.92, $p < .01$; more than three times the size of the difference between the larger sample of EAs and HAs. This finding supports the interpretation that the EA–HA difference in non-Duchenne smiles during happiness is because of cultural differences between the groups.

Physiology. Because skin conductance did not meet homogeneity of variance assumptions, we conducted nonparametric Mann–Whitney tests. No significant differences were found in skin conductance between the groups (see Table 3).

Hypothesis 2: Variation Within Ethnic Groups

HAs. We hypothesized that among HAs, those who were more oriented to Hmong culture ("more Hmong" HAs) would demonstrate less facial expressive behavior than those who were less oriented to Hmong culture ("less Hmong" HAs). We conducted chi-square tests on measures of facial behavior as described above. Consistent with our second hypothesis, analyses revealed that during happiness and pride, "more Hmong" HAs showed fewer non-Duchenne smiles than did "less Hmong" HAs, χ^2 (1, $N = 50$) = 7.89, $p = .01$ (happiness); χ^2 (1, $N = 50$) = 6.46, $p = .01$ (pride; see Figure 1, bottom panel). There were no significant differences in Duchenne smiles during happiness, or in facial behavior during the other emo-

tions, although the difference between Hmong groups during disgust approached significance, χ^2 (1, N = 50) = 3.46, p = .06; again, in the direction of a smaller percentage of "more Hmong" HAs displaying disgust than "less Hmong" HAs. In fact, for all of the emotions, a greater percentage of "less Hmong" HAs than "more Hmong" HAs showed the target facial behavior. Mann–Whitney tests on skin conductance activity revealed no significant differences between Hmong groups for this physiological measure (see Table 4). There were also no significant differences in reports of emotional experience during the relived emotion periods.

EAs. We also hypothesized that among EAs, those who were more oriented to American culture ("more American" EAs) would demonstrate more expressive behavior than those who were less oriented to American culture ("less American" EAs). Again, we conducted chi-square tests on measures of facial behavior as described above. No significant differences in facial behavior emerged during any of the emotions. Mann–Whitney tests on skin conductance activity revealed a significant difference in electrodermal activity during pride; however, "more American" EAs demonstrated less electrodermal activity than "less American" EAs (Z = −2.01, $p < .05$; see Table 5). There were no significant differences in reported emotional experience during the relived emotion periods.

Group Differences in Emotional Responding Not Due to Trait Affect or Responses to the Experiment

To ensure that these differences were not due to trait affect or responses to the experimental setting, we compared group responses to the PANAS and the postexperimental session questionnaire. One-way ANOVAs revealed no significant between- or within-group differences in trait positive or negative affect. MANOVAs conducted on responses to the postexperimental questionnaire also revealed no significant between- or within-group differences. Therefore, we felt confident that the group differences in emotional responding that we observed were not attributable to variation in trait affect or responses to the experimental setting.

Discussion

Cultural Similarities in Facial Behavior and Physiology During Relived Emotion

We predicted that HAs would demonstrate less facial expressive behavior than EAs. Our hypothesis was supported for non-Duchenne smiling behavior

Table 4
Self-Reports of Emotion and Electrodermal Activity Among Hmong Americans by Orientation to Hmong Culture

	"Less Hmong" (n = 24)			"More Hmong" (n = 26)		
Emotion and variables	*M*	*SD*	Mean rank	*M*	*SD*	Mean rank
Happiness						
Reports of happiness[a]	5.00	0.36		5.23	0.34	
Skin conductance level	0.09	0.10	25.69	0.12	0.21	25.33
Pride						
Reports of pride[a]	5.05	0.45		5.52	0.43	
Skin conductance level	0.06	0.11	25.31	0.10	0.21	25.67
Love						
Reports of love[a]	5.71	0.40		5.65	0.38	
Skin conductance level	0.04	0.11	24.79	0.07	0.21	26.15
Anger						
Reports of anger[a]	5.48	0.42		4.35	0.40	
Skin conductance level	0.11	0.12	24.96	0.12	0.24	26.00
Disgust						
Reports of disgust[a]	4.81	0.41		5.13	0.39	
Skin conductance level	0.08	0.12	23.60	0.13	0.23	27.25
Sadness						
Reports of sadness[a]	4.91	0.43		5.22	0.41	
Skin conductance level	0.08	0.12	25.33	0.10	0.20	25.65

[a] Rated on a 9-point scale (0 = *not at all,* 4 = *moderate,* 8 = *the most in my life*).

Table 5
Emotional Responding Among European Americans by Orientation to American Culture

Emotion and variables	"Less American" (n = 21)				"More American" (n = 23)			
	M	*SD*	%	Mean rank	*M*	*SD*	%	Mean rank
Happiness								
Reports of happiness[a]	5.25	0.30			4.52	0.29		
Duchenne			20.0				8.7	
Non-Duchenne			52.4				39.1	
Skin conductance level	0.12	0.14		22.17	0.10	0.10		22.80
Pride								
Reports of pride[a]	4.55	0.36			4.71	0.35		
Non-Duchenne			38.1				34.8	
Skin conductance level	0.16	0.16		26.57	0.08	0.10		18.78
Love								
Reports of love[a]	5.35	0.38			4.86	0.37		
Non-Duchenne			19.0				39.1	
Skin conductance level	0.11	0.16		22.95	0.09	0.09		22.09
Anger								
Reports of anger[a]	4.15	0.36			3.95	0.35		
Skin conductance level	0.14	0.17		24.45	0.10	0.12		20.72
Disgust								
Reports of disgust[a]	4.50	0.36			3.76	0.35		
Negative expressions			38.1				13.6	
Skin conductance level	0.12	0.14		23.14	0.10	0.10		21.91
Sadness								
Reports of sadness[a]	4.40	0.32			4.91	0.31		
Negative expressions			5.0				18.2	
Skin conductance level	0.13	0.14		25.26	0.09	0.10		19.98

[a] Rated on a 9-point scale (0 = *not at all,* 4 = *moderate,* 8 = *the most in my life*).

during happiness. For the other emotions, we found more cultural similarities than differences. This was particularly surprising for the negative emotions: Despite the potential threat that expressing negative emotions may have on social relationships, no group differences emerged in facial behavior during negative emotions. It is possible, however, that cultural models of emotional expression shape the expression of negative emotion specifically in the presence of people who are intimately involved in the event (i.e., the people with whom participants were angry or disgusted). Consistent with previous studies of culture and emotional responding, we found no differences in skin conductance activity. Again, these findings support the notion that cultural models of emotional expression may shape facial expressive behavior more than physiology. In general, our findings are consistent with a growing number of cross-cultural studies of emotion, in which cultural differences emerged against a backdrop of striking cultural similarities (e.g., in the recognition of emotional facial expressions, Ekman et al., 1987, and Haidt & Keltner, 1999; in the semantic structure of emotion words, Moore, Romney, Hsia, & Rusch, 1999; in the appraisals associated with specific emotions, Scherer, 1997a; and in reported reactions to different emotional events, Scherer & Wallbott, 1994).

Cultural Variation in Emotional Responding: Non-Duchenne Smiles During Happiness

The consistent exception to this pattern of similarity, however, was the greater occurrence of non-Duchenne smiles during relived happiness among EAs compared with HAs. Because the magnitude of the difference increased by a factor of three when we compared subgroups that scored highest on our cultural orientation inventories (i.e., "more American" EAs with "more Hmong" HAs), we believe that the differences found in the larger sample were related to cultural orientation.

In the literature, non-Duchenne smiles have been described as "false" or social smiles, indicating that they are voluntarily produced, communicative signals used to mask negative emotion or to maintain social

norms. This is in contrast with Duchenne smiles, which are described as spontaneously produced smiles that indicate positive emotional experience (Ekman et al., 1990). On the basis of this definition, it would appear that compared with HAs, EAs were masking their negative emotions more, were more concerned with maintaining social propriety or politeness, or were more aware of the interviewer. Interestingly, this is contrary to common notions that East Asians engage in more social smiling than EAs (Klineberg, as cited by LaBarre, 1947). We did not find group differences in the occurrence of non-Duchenne smiles during pride and love, nor did post hoc analyses reveal significant differences between EAs and HAs in the occurrence of non-Duchenne smiles during the negative emotions. Moreover, although a greater percentage of EAs than HAs showed non-Duchenne smiles during happiness, pride, anger, and sadness, the reverse was true for love and disgust. There were no group differences in concern about the interview, based on participants' responses to the post-experimental session questionnaire. Thus, it is unlikely that in general, EAs were masking their negative emotions or being more polite than HAs.

Instead, we believe that because American culture places a strong emphasis on emotional expression, especially the expression of happiness (Kitayama et al., 2000; Wierzbicka, 1994), EAs may use non-Duchenne smiles to increase the intensity of their expressed happiness. That is, in the context of happiness, the function of the non-Duchenne smile may be to signal to others that one is experiencing the culturally desirable emotion. Because the experience of intense happiness is not as culturally desirable for HAs as it is for EAs, they may not use non-Duchenne smiles in the same way as EAs do. Future studies that vary the social demands of the situation could more definitively illuminate the cultural functions of non-Duchenne smiles during happiness.

Our findings, considered in light of evidence that non-Duchenne smiles are more variable than Duchenne smiles (Soussignan & Schaal, 1996) and of recent arguments that non-Duchenne smiles may have evolved after Duchenne smiles (Owren & Bachorowski, 2001), suggest that non-Duchenne smiles may be more culturally variable than Duchenne smiles. We are currently conducting a series of studies to examine whether this is the case.

Variation Within Groups

We hypothesized that within each cultural group, we would find differences in emotional responding, with those who were more oriented to their culture responding in ways that were more consistent with their cultural models of emotional expression. This hypothesis was confirmed for HAs. Consistent with the cultural imperative to moderate and control their emotions, fewer HAs with a strong orientation to Hmong culture displayed non-Duchenne smiles during happiness and pride and negative facial behavior during disgust than HAs who were less oriented to Hmong culture. These findings suggest that in some cases, the number of differences within groups may be greater than the number of differences between groups.

Variation also occurred among EAs: "more American" EAs demonstrated less electrodermal activity during pride than did "less American" EAs. This finding, however, is difficult to interpret, in the absence of differences in facial expression. Given that this finding was not predicted or supported by other findings and that the number of tests we conducted suggests that at least one finding was due to chance, we consider it likely that this finding is not robust.[6] Although one interpretation of our findings (or lack of findings) is that the American model of emotional expression does not translate into tangible differences in emotional responding, it may also be the case that our measure of American orientation does not capture meaningful differences among EAs. That is, because all of the EAs in our sample were from families that had been in the United States for several generations, there may be little variation in reported orientation to American culture. We are currently exploring better ways of differentiating EAs along emotionally relevant cultural lines (Tsai & Chentsova-Dutton, 2002b).

Limitations and Future Directions

In addition to the limitations of the present study, there are alternative explanations for the present find-

[6] We conducted 12 analyses for each of three sets of comparisons, resulting in a total of 36 analyses. Assuming that for every 20 statistical tests we would expect one "significant" effect as a result of chance, two of our four significant effects could possibly be due to chance. The fact that differences emerged in non-Duchenne smiles during happiness when all EAs were compared with all HAs, when "more American" EAs were compared with "more Hmong" HAs, and when "more Hmong" HAs were compared with "less Hmong" HAs, increases our confidence that this particular finding is robust and not a result of random factors.

ings. First, it is possible that we found few differences in emotional responding because the relived emotion task did not powerfully elicit emotional responding. Each method of eliciting emotion in the laboratory involves sizable trade-offs. We chose the relived emotion task because it allowed us to use emotion-specific stimuli that were similar in subjective intensity and personal meaning for the participants and had ecological validity. It has, however, been found to be less effective in eliciting emotion-specific autonomic activity and facial behavior than other tasks. For example, Levenson et al. (1991) found that instructing people to make emotion-specific facial expressions (the directed-facial action task) was more effective in eliciting emotion-specific autonomic nervous system activity than having participants relive emotions. In our own studies, face-to-face interview tasks elicit more emotional facial expressive behavior than the relived emotion task (Tsai, Roisman, Chiang, & Liu, 2002). However, although other tasks may elicit greater emotional responses, they carry other limitations: Compared with the relived emotion task, the directed-facial action task has less ecological validity, and the dyadic interaction and interview tasks are less able to elicit specific emotional states. Thus, our understanding of how culture shapes emotional responding may require studies that incorporate a judicious mix of tasks.

Second, it is possible that the observed differences were due to "experimenter demand." Because HA participants were interviewed by someone who was also HA (and EAs by someone who was EA), they may have been more likely to show facial behavior that was consistent with Hmong models of emotional expression (or for EAs, American models of emotion). Although we have no way of ruling out this possibility in the present study, we consider it consistent with our conceptions of culture. Culture does not exist solely in the minds of individuals, but in the interaction of the mind with its environment. For example, studies using various priming techniques have demonstrated that external stimuli may influence bicultural participants to behave in different ways, depending on the culture that is represented by the stimulus (Hong, Morris, Chiu, & Benet-Martínez, 2000). Similarly, other people (including experimenters) may be the "conditioning elements of further action" (Kroeber & Kluckhohn, 1952, p. 181) by serving as cultural primes. In future studies, the ethnicity of the experimenter could be varied to test these ideas.

Possible Clinical Implications

These findings may have important clinical implications. For example, in American clinical settings, two key features of depression are increased negative affect and reduced positive affect, as reported by the client and as observed by the clinician (*Diagnostic and Statistical Manual of Mental Disorders, fourth edition,* American Psychiatric Association, 1994). Clinicians have long described the difficulty of diagnosing mental illness in individuals from different cultural contexts (Sue & Sue, 1999). In part, this may be because there is little research that examines the specific ways in which culture might influence emotional responding (Tsai & Chentsova-Dutton, 2002a). The present findings suggest that clinicians should not immediately assume that culture influences the expression of negative emotions. Our findings also suggest the possibility that clinicians may erroneously view the fewer non-Duchenne smiles shown by HAs (and perhaps other individuals of Asian descent) when they are talking about happy events as a symptom of depression rather than as a culturally normative response. We have expanded and are currently expanding our studies of emotion and culture to include clinical samples, including those with a diagnosis of depression (Tsai, Pole, Levenson, & Muñoz, in press), to examine these possibilities.

In summary, we found that while reliving emotional events, EAs and HAs were mostly similar in their facial behavior and physiology. There was one exception: Despite reporting similar levels of happiness, more EAs than HAs displayed non-Duchenne smiles while reliving happiness. Together, these findings support, yet focus the hypothesis that culture shapes online emotional responding.

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