

Culture and Facial Expression: Open-ended Methods Find More Expressions and a Gradient of Recognition

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We used multiple methods to examine two questions about emotion and culture: (1) Which facial expressions are recognised cross-culturally; and (2) does the “forced-choice” method lead to spurious findings of universality? Forty participants in the US and 40 in India were shown 14 facial expressions and asked to say what had happened to cause the person to make the face. Analyses of the social situations given and of the affect words spontaneously used showed high levels of recognition for most of the expressions. A subsequent forced-choice task using the same faces confirmed these findings. Analysis of the pattern of magnitude, discreteness, and similarity of responses across cultures and expressions led to the conclusion that there is no neat distinction between cross-culturally recognisable and nonrecognisable expressions. Results are better described as a gradient of recognition.

INTRODUCTION

This study examines two pressing questions about culture and the recognition of emotional expressions. First, which facial expressions of emotion are recognised cross-culturally? And second, is the “forced-choice” method

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that has been so widely used to answer this question a valid method, or does it lead to spurious findings of universality, as has been recently charged (Russell, 1994)?

Which Expressions are Recognised?

For the past 25 years psychology textbooks have reported that there are at least six pan-cultural basic emotions with facial expressions that are reliably recognised across cultures. These emotions are: happiness, sadness, anger, fear, disgust, and surprise (photos 1–6 in Fig. 1). This well-known list is the result of the pioneering work of Paul Ekman (Ekman & Friesen, 1971; Ekman, Sorensen, & Friesen, 1969), Caroll Izard (1971), and their colleagues, who demonstrated high rates of recognition for these faces in a variety of Western and non-Western societies. A large body of subsequent research has confirmed that people in many cultures can reliably assign labels to photographs of these six facial expressions (Biehl et al., 1997; Boucher & Carlson, 1980; Ekman et al., 1987; Fridlund, Ekman, & Oster, 1987). More recently Ekman (1994b) suggested that 13 other emotions are candidates for addition to the list of pan-cultural emotions: amusement, awe, contempt, contentment, embarrassment, excitement, guilt, interest, pride in achievement, relief, satisfaction, sensory pleasure, and shame. He stated that not all of these additional candidates have a distinctive universally recognised facial expression, but that some of them are likely to, especially contempt and embarrassment.

Yet until now there has been little cross-cultural exploration of facial expressions beyond the original six. Izard (1971) reported that expressions of interest-excitement and shame-humiliation were identified at rates above chance in seven Western nations plus Japan. However the shame-humiliation expression elicited the lowest recognition rate (out of eight expressions) and elicited a mere 41% correct response rate in Japan. Little subsequent cross-cultural work has been done with either of these two expressions. Most cross-cultural studies that have used facial expressions as stimuli have restricted themselves to Ekman's original set: happiness, sadness, anger, fear, surprise, and disgust.

Only one additional expression has been added in the past 26 years, and its status is still ambiguous. Ekman and Friesen (1986) and Ekman and Heider (1988) reported that an expression showing a unilateral lip raise (similar to photo 7 in Fig. 1) was matched to the word "contempt" in 11 different nations. This finding has been replicated and extended by Matsumoto (1992a) and by Biehl et al. (1997). However, it has also been challenged by Russell (1991a, c, 1994), who reports that English-speaking Canadian participants did not label the photo as contempt, but rather preferred the labels "disgust" or "sadness". Ekman, O'Sullivan, and

Matsumoto (1991) and Rosenberg and Ekman (1995) responded to Russell's critique. Using a free-response paradigm in which participants chose their own labels, Rosenberg and Ekman (1995) found that English-speaking Americans did not spontaneously choose the word "contempt", even though participants in another condition consistently matched a contempt-eliciting *situation* to the contempt face. Rosenberg and Ekman (1995, p. 128) concluded that "people do recognize emotional meaning in the facial expression, and . . . the situational precursors of this expression might be more accessible than its verbal label". However, there has not yet been any cross-cultural work on the situational elicitors of the contempt expression.

Reasons to Examine More Expressions

The time may be right to examine some new facial expressions cross-culturally. Keltner and his colleagues (Keltner, 1995; Keltner & Bonanno, 1996; Keltner & Buswell, 1996) have documented that the experiences of embarrassment and shame are accompanied by patterns of nonverbal actions that may be distinct from those of the other seven well-studied facial expressions. The present study examines the cross-cultural recognition of these expressions, along with two other expressions for which there is similarly suggestive evidence from North America: expressions of amusement (Keltner & Bonanno, 1997; Ruch, 1993) and sympathy (Eisenberg et al., 1989).

In addition to this recent work on the face, recent work in anthropology and cultural psychology offers new tools and ideas that can improve empirical research on emotion and culture. Western researchers need no longer rely on Western conceptions and lists of emotions. For example, Shweder (1993) has written about the *Natyashastra*, an Indian treatise on emotion from the second century AD, which offers an alternative list of eight "basic" emotions. We employed the *Natyashastra* in the present study to create a more culturally balanced list of emotion words.

Several recent ethnographies have demonstrated that emotions that appear to be universal may actually work differently across cultures. For example, anger, which is often described as a potentially violent response to frustration or goal-blockage, appears to have a gentler and more prosocial flavour in highly interdependent societies such as among the Ifaluk (Lutz, 1988). And the emotions of shame, embarrassment, and guilt, which appear to result from three different kinds of personal failures or error among Americans (Keltner & Buswell, 1996; Tangney et al., 1996) have no neat parallel in most Asian societies (and even a few European ones), which usually lack a way to distinguish lexically between shame and embarrassment. In Orissa, India, for example, the Oriya language contains the single word *lajya* to cover a large area of emotion-space

that in English includes the words shame, embarrassment, shyness, and modesty. Yet even this one-to-many translation is misleading, for shyness and a liability to shame appear to be experienced as a moral virtue in Orissa, and as a defect in the confidence-valuing West (Menon & Shweder, 1994). The present study was designed with this recent work in mind, using methods that allow cultural differences in the meaning of a facial expression to show through in ways that traditional research methods have prevented.

Because of these new developments in emotion research and the growing cultural sensitivity of emotion researchers, we believe the time is right to expand research on culture and the recognition of facial expressions. By examining more expressions with more methods, and by contemplating hypotheses suggested by anthropologists and non-Western theories, we may be able to expand the empirical basis upon which the universality of emotional expressions is presently being debated.

Does the "Forced-choice" Method Yield Valid Evidence about Universality?

Yet although there are good reasons to press on with the cross-cultural exploration of facial expressions, there are also good reasons to pause and step back. The basic method that has been used to document cross-cultural similarity has recently been called into question (Russell, 1994).

A variety of methods have been used to study facial expressions cross-culturally, beginning with Darwin's (1872/1965) written request to missionaries around the world for reports on the behavioural expression of emotions. However, most modern cross-cultural work has relied on the general method used by both Ekman and Izard, in which posed photographs of facial expressions are shown one at a time to participants, who must then select a single word from a short list of emotion words. This method has been called the "forced-choice" method, because participants are forced to choose an item from a short list, rather than making up their own label.

Findings from forced-choice studies are the most important piece of evidence supporting what has been called the "Universality Thesis". Although there are several versions of this thesis, differing in the strength of their assertion (Russell, 1994, 1995), a prototypical and moderate version would state that there is a small set of facial expressions that are interpreted reliably and similarly as expressions of specific emotions, at levels far above chance, by (most) people in (nearly) all cultures.¹

¹ This statement is culled from several discussions of what is meant by universality (Ekman 1994a, b, Izard, 1994; Russell, 1994, 1995). It is a stronger version than the "minimal universality" described by Russell (1995).

However, the forced-choice method and the Universality Thesis have been strongly criticised by Russell (1994) on a number of grounds, raising the possibility that previous cross-cultural findings were due to methodological artefacts or errors of inference. First and foremost, Russell argues that forcing participants to choose among a small set of emotion words provided by the experimenters prevents participants from using any other emotion word. If a participant interpreted a smiling face as an expression of love or of some local positive emotion, yet was given a list of choices containing only one positive emotion—happiness—the participant would be forced to pick happiness, erroneously “confirming” the universality of the happiness expression. The few studies that allowed participants to pick their own emotion words (the “free-response” method, e.g. Boucher & Carlson, 1980; Izard, 1971; Russell 1991c; Russell, Suzuki, & Ishida, 1993) generally found lower rates of “correct” labelling, in a few instances even dipping below 25%, suggesting that the forced-choice method does to some extent channel and constrain responses.

A second and related problem is that both the forced-choice and free-response methods force participants to interpret facial expressions as expressions of emotion. Russell (1994) raises the possibility that people may interpret certain facial expressions primarily as instrumental actions (e.g. greeting, threatening) or as signs of nonemotional cognitive activity (e.g. concentration), rather than as expressions of internally felt emotional states (see also Fridlund, 1994; Frijda, 1953; Frijda & Tcherkassof, 1997). If there were cultural differences in the degree to which facial expressions are interpreted emotionally, these differences would be masked by the methods used in research to date.

A third problem is that work with the forced-choice method begins with lists of emotion words generated by North American researchers. It is interesting to note that all proposed basic emotions are represented by single words in the English language, while many other languages either lack one of these words, fail to distinguish among two of them, or else lexicalise important emotions that have no translation in English (Doi, 1981; Heider, 1991; Russell, 1991b; Wierzbicka, 1992). Whether or not emotional *expressions* differ across cultures, it seems clear that emotion lexicons, conceptual schemes, and lists of major emotions differ across cultures, raising the possibility that if cross-cultural emotion research had begun in India or China, the list of proposed basic universal emotions would be different.

A fourth problem is that recognition rates appear to vary by culture and level of education. Cross-cultural studies using college students in Western cultures generally replicate the high recognition rates (generally greater than 70%) found among American college students. Yet when college students in non-Western cultures are compared to those from Western

cultures, recognition scores are, on average, about 12% lower (Russell, 1994; similar findings in Biehl et al., 1997 and Matsumoto, 1992b). When non-college populations are compared to college populations within a single culture, recognition rates are again lower (Wolfgang & Cohen, 1988).

Russell's (1994) critique raises a variety of other methodological and conceptual issues, including the use of within-subject designs, the use of posed dramatic photos, and the lack of contextual information. No single point is decisive, but Russell combines them into a powerful argument: That there are a variety of methodological features that, when relaxed, each appear to lower recognition rates by a small or moderate amount. So what would happen if several of these features were relaxed in a single study? What would happen in a free-response paradigm, using a non-Western population that was not even forced to use emotion labels? Would previous findings of universality hold up? Russell suggests that they might not. He does not predict that rates would fall to "chance" levels, for there are a variety of other forces and cues at work; but he raises the possibility that recognition rates would decline from their normally impressive levels (greater than 80%) to a level where a variety of theories besides the Universality Thesis become plausible. Ekman (1994a) has responded to Russell's arguments, but we agree with Russell that this question is best answered by collecting new evidence using new methods. This study reports such new evidence.

The Present Study

The present study went beyond the standard forced-choice method in five ways, in the hope of providing new and more dependable evidence about the cross-cultural recognition of facial expressions.

1. *An expanded set of facial expressions.* We went beyond the usual six expressions to examine the recently studied expressions of contempt, embarrassment, shame, sympathy, and amusement. In addition, we examined three other expressions that were not predicted to be universally recognised. The inclusion of faces that are not expected to be universally recognised is an important step that can provide discriminant validity, a feature absent from most previous research in which all faces were found to be recognisable.
2. *An expanded list of emotion words.* Most previous studies have offered participants a list of six words, chosen from the local language as translations of the English words for the six basic emotions. In the present study we created a "Bicultural List of Emotions" (Table 1) by

taking the union of Ekman's seven emotions (including contempt) and the *Natyashastra's* eight emotions. This step reduced the language bias of lists derived exclusively from English.

3. *A free-response situational analysis.* Several studies have examined cross-cultural differences in the situations said to elicit the "basic" emotions. Boucher and Brandt (1981) found that Americans and Malays generated similar eliciting situations for each emotion, and were able to pair up situations generated in the other culture with the appropriate emotion word in their own language. Heider (1991); Mesquita (in press); Mauro, Sato, and Tucker (1992); and Scherer (1997a, b; Scherer, Wallbott, & Summerfield, 1986) all went beyond pairing studies to examine in great detail the appraisals and situational elicitors that people in many cultures reported when asked to describe specific emotion-eliciting events. All of these studies found a general background of cross-cultural similarity, against which interpretable cross-cultural differences stood out (see Mesquita, Frijda, & Scherer, 1997 for a review). However, all of these studies used emotion *words* as stimuli, and no study to date has examined the free-response situational antecedents provided by members of a non-Western culture when shown facial expressions of the sort used by Ekman and Izard. In the present study we showed people in India and the US 14 photographs of facial expressions, and simply asked them to tell us "what has happened to make the person feel this way?" This method is most similar to the method used by Frijda (1953) in which European participants were asked to view film clips and film stills of facial expressions and then describe "what might be going on in the person shown or what might have happened to her"?
4. *A free-response affect-word analysis.* Although we did not ask participants to provide affect words for each face, it turned out that participants usually did provide affect words when discussing the photos. We were therefore able to do a free-response analysis we had not planned to do: a simple count of the affect words spontaneously used in response to each photo.
5. *A forced-choice task with a "none-of-the-above" option.* After the free-response task just described, we showed participants the same photographs a second time, and asked them to pick the appropriate word from the Bicultural List of Emotions. However, we added the instruction "If you think the name of the emotion is not on this list, then just tell me the name that you think is appropriate". This simple step, which reduces the "forcing" of the forced choice method, has rarely been included in prior studies.

METHOD

Locations and Participants

Orissa is a relatively underdeveloped state in Eastern India, with an economy based on agriculture and mining. The city of Bhubaneswar is its capital (population in 1991 census: 412,000). Bhubaneswar is divided into two parts. The "Old Town" is a small and compact section full of temples, many of which are over 1000 years old. Residents of the Old Town were traditionally involved in performing religious duties at these temples, in particular at the giant Lingaraj temple, a major pilgrimage centre for Hindus from all over India. Many families continue to carry out their hereditary temple duties today, although many residents work or go to school in the "New Town" as well (Mahapatra, 1981). The large and sprawling New Town was built in the 1950s, next to the Old Town, as the new capital for the state of Orissa.

Participants were 40 residents of the Old Town, recruited through networks of acquaintances of a research assistant, who was a resident of the Old Town. Participants were 22 men and 18 women. Ages ranged from 15 to 60, although all but five participants were between 19 and 39 years of age. Fourteen participants were from the Brahmin caste, 12 were from other high castes (Kshatriya), eight from middle castes (Vaishya), two from lower castes, and three participants provided no caste information. Nine of the women stayed in the home to raise children; five were students, and three had jobs outside the home. Six of the men were students. The rest of the men held a variety of jobs, in shops, government service, teaching, and as priests and "tour guides" for pilgrims. In addition to the 11 participants who were students at the time (including 3 in high school), 9 other participants had been in school until the age of 21, and can therefore be considered to be university educated. Sixteen participants had left school at ages ranging from 12 to 18. In four of the interviews the audio-cassette was inaudible and could not be transcribed, so analyses of the free-response section of the interview are based on a total of 36 participants (19 men, 17 women).

The Wisconsin sample consisted of 40 undergraduate students at the University of Wisconsin-Madison (20 male, 20 female, age range 18-21). Participants were introductory psychology students who participated in the study in exchange for extra credit towards their course grade.

Materials

The 14 Photos. Figure 1 shows the 14 photos that were used, for the female poser only. Half of the participants saw these photos, and the other half saw an equivalent set of photos depicting a Caucasian male. Photos were cut down to rectangles of 7cm × 9cm and mounted in clear plastic card holders, for easy handling. The photos were selected largely on an a-priori basis as an attempt to cover all of the emotions in the Bicultural Emotions List for which there was some precedent (i.e. all except love, enthusiasm, guilt, and awe/wonder, which will require further study before they can be posed, if they can be posed at all.) The displays were of three kinds: (1) the facial displays of anger, fear, happiness, sadness, disgust, surprise, and contempt involved the same facial poses as those photos that have been used in previous cross-cultural studies of facial expression (e.g. Biehl et al., 1997; Ekman, Sorenson, & Friesen, 1969). The remaining photos were of (2) facial expressions that have been studied more recently (amusement, embarrassment, shame, sympathy); and (c) other, exploratory facial expressions.

The action units (AUs) as described by Ekman and Friesen's (1976) Facial Action Coding Systems (FACS) are presented in parentheses. The recently studied expressions were as follows: The expression of amusement included an enjoyment (Duchenne) smile accompanied by head movement back and gaze direction upwards (AUs 6, 12, 58, 63) (Keltner, 1995; Ruch, 1993). The embarrassment display included a non-Duchenne smile, lip press, gaze down, and head movement down, and face touch (AUs 12, 24, 54, 64) (Keltner, 1995). The shame display included head and gaze down (AUs 54, 64) (Izard, 1977; Keltner, 1995; Keltner & Harker, 1997). And the sympathy display included oblique eyebrows, fixed gaze, and head movement forward (AUs 1, 4, 58) (Eisenberg et al., 1989).

The other exploratory expressions included two displays thought to be associated with shame, *lajya*, or other self-conscious feelings and situations: The face cover (a hand covering the face), and the tongue-bite (AUs 12, 52, 64, and a face touch), which is prevalent in South Asia as an accompaniment of social slips and mistakes (Menon & Shweder, 1994). Finally, a gape expression was included (AUs 19 and 27) to determine whether a component of the disgust expression (Rozin, Lowery, & Ebert, 1994) would be read as disgust. There was no expectation or prediction that these photos would be interpreted similarly by the two samples; in fact their inclusion was motivated by a desire to include emblematic or iconic and culture-specific facial expressions. All photos except the tongue-bite were pre-tested and used before by Keltner and Buswell (1996).

THE SEVEN EKMAN EXPRESSIONS



1. ANGER



2. FEAR



3. HAPPINESS



4. SADNESS



5. DISGUST



6. SURPRISE



7. CONTEMPT



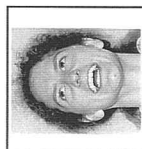
8. EMBARRASSMENT



9. SHAME



10. COMPASSION



11. AMUSEMENT

OTHER EXPLORATORY EXPRESSIONS



12. TONGUE BITE



13. FACE COVER



14. GAPE

FIG. 1. The seven Ekman expressions, recently studied expressions, other exploratory expressions.

The Bicultural List of Emotions. The sixth chapter of the *Natyashastra* (Masson & Patwardhan, 1970) offers a detailed taxonomy of the eight emotions (*bhava*) portrayed by actors and the corresponding meta-emotions (*rasa*) experienced by the audience at a play or by the reader of poetry or literature. The Sanskrit words for the eight *bhavas* of the *Natyashastra* are listed in the middle column of Table 1, and the six English words of Ekman's original list, plus contempt, are listed in the first seven rows of the left-hand column. From the descriptions of the *bhavas* given in the *Natyashastra* there appears to be a reasonably close match between the two lists on four of the items (anger-*krodha*, fear-*bhaya*, sadness-*soka*, and disgust-*jugupsa*). However, the *Natyashastra* adds four items that are not on Ekman's list, and it lacks three items that are on Ekman's list. We created a culturally balanced list of emotions by taking the union of the two lists. In addition, since we knew from previous work (Menon & Shweder, 1994) that there appear to be interesting differences in the self-conscious emotions, we added the emotions of shame, embarrassment, and guilt to the English list, and *lajya* to the Oriya list. We also

TABLE 1
The Bicultural List of Emotions

<i>English</i>	<i>Natyashastra (Sanskrit)</i>	<i>Modern Oriya</i>
1. Anger	Krodha	Raga
2. Fear	Bhaya	Bhaya/dara
3. Happiness	–	Sukha
4. Sadness	Soka	Dukha
5. Disgust	Jugupsa	Ghrna
6. Surprise	–	Ascharjya
7. Contempt	–	Tachalya
8. Love (romantic)	Rati	Prema (stri-parusha)
9. Amusement	Hasya	Hasa
10. Enthusiasm	Utsaha	Utsaha
11. Awe/wonder	Vismaya	Vismaya
12. Shame	–	Lajya
13. Embarrassment	–	Lajya
14. Guilt	–	Dosa
15. Compassion	–	Karuna

Note: The left column shows the 15 emotion terms presented in Wisconsin. The right column shows the 14 emotion terms presented in Orissa. The first 7 entries in the left column are the 7 facial expressions said to be universal by Ekman and Friesen (1971, 1986). Terms in the middle column are the 8 emotions said to be basic in the *Natyashastra* (Masson & Patwardhan, 1970). The bicultural list of emotions was created by taking the union of the Ekman 7 and the *Natyashastra* 8, adding in items 12–15, and finding suitable translations in American English and modern Oriya.

added sympathy (compassion), because of recent work on the facial expression of sympathy by Keltner and Buswell (1996). We then searched for the best set of words in modern Oriya (the language of Orissa) and in American English, to make the lists as comparable as possible across languages. After extensive consultation with English-Oriya bilinguals we settled on the 15 English words in the left-hand column of Table 1 and the 14 Oriya words in the right-hand column. (The Oriya list has one word fewer because Oriya does not distinguish between shame and embarrassment).

Design and Procedure

Each participant was interviewed individually, first using the free-response method and then using the forced-choice method. In Bhubaneswar, all interviews were conducted in the Oriya language, either in the home of the participant or in public spaces in the Old Town. An informal introduction included the statement that there were no right or wrong answers. The experimenter then turned on a tape-recorder and said "Now I'm going to show you some photos in which you'll see different emotions. Can you tell me what has happened to make the person feel this way? Just tell me briefly what has happened". The experimenter then shuffled the set of photos (either the male face-set or the female face-set), showed the first one, and waited for the participant to give a verbal response. The experimenter then continued on through the remaining photos, one at a time. After all 14 photos were shown, the experimenter collected demographic information about age, caste, education, and occupation. Then the experimenter shut off the tape-recorder and said "Now I'm going to show you the names of certain emotions. And then I'm going to go through the photos that you just saw, one more time. Can you please tell me the name of the emotion shown in each photo? If you think that the name of the emotion is not on this list, then just tell me the name that you think is appropriate". The experimenter took out a laminated card (9cm × 17cm) on which was printed, in large Oriya characters, the names of the 14 items on the Bicultural List of Emotions. The experimenter then showed the photos one more time, in the same order as before, and asked the participant to choose one of the 14 responses. For the few participants who had difficulty reading, the experimenter read aloud the whole list after each photo.

In Wisconsin, the procedure was the same except that all interviews were conducted in English in the Psychology Laboratory building, and demographic information did not ask about caste or occupation. The English and Oriya versions of the interview script were created simultaneously, and were checked for equivalence of meaning through back translation.

RESULTS

The foregoing procedure produced two different data sets: free-response situational descriptions were obtained on the first pass through the photos; and forced-choice affect words were obtained on the second pass. The forced-choice analyses will be presented first because these data correspond most closely to prior studies critiqued by Russell (1994). The free-response data will then be analysed to determine whether a more open-ended methodology leads to substantially different findings. Our initial analysis plan for the free-response data was to determine the modal situation-type given for each photo, using a coding scheme of the sort suggested by Lutz and White (1986). However, on inspection of the data we found that responses from both samples were full of affect words. Participants generally did not simply say "someone has insulted her", but were more likely to say "she is *angry* because someone has insulted her". We took advantage of this response style to perform an additional analysis: A simple count of the affect words participants used spontaneously when describing the situational elicitors of each face. This allows us to perform a free-response analysis of the sort that Russell (1994) says is needed, and it allows us to compare directly the specific words chosen in the free-response and forced-choice paradigms. This free-response affect-word analysis will be presented after the forced-choice analysis, followed by two analyses of the situational elicitors given in response to each photo.

Significance Tests

Most prior studies have offered between three and eight affect words as response choices and used a binomial test to determine whether the target word was chosen at a rate significantly above that which would be predicted by chance (i.e. 20% for five choices). However, we agree with Russell (1994) that such a significance test can only reject the null hypotheses that participants are responding randomly, or that the face contains no cross-culturally readable information. The rejection of these null hypotheses is consistent with many hypotheses, including the sort of "minimal universality" (Russell, 1995) that would be predicted from a few simple postulates about how people use their faces for nonemotional communication.

But if chance is not the proper baseline for comparisons, then what is? We believe that there is no single critical value for accepting or rejecting the Universality Thesis, and that the analysis of facial recognition data should instead weigh and interpret four criteria simultaneously:

1. *The magnitude of the modal response.* If the Universality Thesis is correct then those expressions that are pancultural should elicit very high recognition rates, generally in the 70–90% range as previously reported (Ekman, 1994a), even when methodological constraints are relaxed. If some weaker hypothesis is true then participants may be guessing from among three or four possibilities, and recognition rates would be in the range of 20–40% (Russell, 1994).
2. *The similarity of magnitude across cultures.* The Universality Thesis does not require that there be no statistically significant differences between two cultural samples (Ekman, 1994a). However, if both groups give the same modal response to each photo at a statistically indistinguishable level, this would provide strong support for the Universality Thesis. Conversely, a pattern in which magnitudes varied greatly across groups (even if both groups gave the same modal response) would argue for a weaker version of the Universality Thesis, particularly if magnitudes were consistently lower in non-Western groups (Russell, 1994).
3. *The discreteness of the modal response.* The Universality Thesis requires that a small number of facial expressions are easily distinguished from one another (as in Izard's "Differential Emotions Theory", 1977). If an anger photo is labelled as anger by 60% of participants and as disgust by 40%, this would be less supportive of the Universality Thesis than a pattern of 50% anger and 10% for the second-choice label.
4. *The pattern of magnitude, discreteness and similarity.* If there is a small number of basic emotions then there should be a small number of faces that are "well recognised", operationalised as eliciting judgements of high magnitude, discreteness, and cross-cultural similarity. Furthermore, these faces should be the ones described by Ekman et al. (1969); and Ekman and Friesen (1986), which were the models for photos 1–7 in the current study. If these seven expressions are well-recognised then the Universality Thesis is supported. However, beyond these seven expressions the territory is uncharted. The pattern of responses on the "recently studied expressions" may or may not extend the Universality Thesis to include new faces.

These four criteria will be assessed simultaneously below and statistical tests will be applied after the means from the four analyses are presented.

Analyses of Affect Words

First Analysis: Forced-choice Affect Words. Table 2 shows the words participants selected from the Bicultural List of Emotions in Wisconsin and Orissa to match each of the 14 photos. All words that were chosen by 10% of either sample are shown for that sample, along with the percentage of participants who chose the word. Responses to the male and female posers were very similar, and are combined in all analyses.² Table 2 shows that the modal emotion word matched the prediction in both samples for six of the seven Ekman expressions. The exception was the expression of contempt, which was labelled as *contempt (tachalya)* by 62.5% of Oriya participants, but was labelled as *disgust* by 55% of Wisconsin participants, consistent with Russell's (1991c) finding from Canadians.

Among the four recently studied expressions the embarrassment and amusement photos elicited the predicted modal responses from both samples. The other two photos elicited mixed responses. The shame photo was labelled as *shame* by a majority in Wisconsin, confirming previous findings (Keltner & Buswell, 1996), but was labelled as *sadness* in Orissa. The compassion photo was labelled first as *sadness* and secondarily as *compassion* in Wisconsin, whereas in Orissa it was most frequently labelled as *awe*, followed by *compassion*, *sadness*, *fear*, and *surprise*.

Among the other exploratory expressions only the face-cover showed a degree of cross-cultural similarity. It was seen as a self-conscious expression in Wisconsin (85% chose *shame* or *embarrassment*), although responses in Orissa were spread among a larger array of labels, with only 35% choosing *lajya*. The tongue-bite was seen primarily as *amusement* in Wisconsin, whereas it was seen as a self-conscious expression in Orissa (*guilt* plus *lajya*), consistent with its status as a specifically South Asian facial expression used to indicate that one has made a mistake. The gape was read in Wisconsin as *disgust* followed by *awe*, consistent with findings by Rozin et al. (1994) on components of the disgust expression. Participants in Orissa, however, had great difficulty interpreting this expression, as indicated by the low percentage that selected the modal label of *surprise* (22.5%), which is the lowest percentage for any modal label in Table 2. Furthermore, five Oriya participants were unable to find a suitable word on the Bicultural List of Emotions and provided their own descriptions, including "an abnormal face", "crazy", and "feeling pain". There was

² There was a slight tendency, particularly in Orissa, to give sex-linked elicitors on the free-response tasks; for example, the female poser was more likely to be described as interacting with children. However, there was no significant difference in the overall "accuracy" of labelling the expressions posed by the male and female posers.

TABLE 2
 Forced-choice: Emotion Labels chosen for Each Photograph, with
 Percentage of Each Sample who chose that Label

<i>Photograph</i>	<i>Wisconsin</i>	<i>%</i>	<i>Orissa</i>	<i>%</i>
<i>The 7 Ekman expressions</i>				
1. Anger	Anger	82.5	Anger	80
	Contempt	10		
2. Fear	Fear	55	Fear	55
	Surprise	30	Anger	17.5
			Surprise	12.5
3. Happiness	Happiness	72.5	Happiness	45
	Amusement	17.5	Amusement	37.5
			Enthusiasm	12.5
4. Sadness	Sadness	87.5	Sadness	42.5
			Disgust	10
			Contempt	10
5. Disgust	Disgust	77.5	Disgust	82.5
	Anger	15		
6. Surprise	Surprise	80	Surprise	42.5
	Awe	15	Awe	32.5
			Fear	15
7. Contempt	Disgust	55	Contempt	62.5
	Contempt	35	Disgust	17.5
<i>Recently studied expressions</i>				
8. Embarrassment	Embarrass.	40	Lajya	55
	Shame	22.5	Love	12.5
	Guilt	15	Amusement	12.5
	Love	12.5		
9. Shame	Shame	57.5	Sadness	45
	Sadness	20	Guilt	22.5
	Guilt	10	Lajya	15
10. Compassion	Sadness	37.5	Awe	30
	Compassion	30	Compassion	17.5
	Guilt	12.5	Sadness	17.5
			Fear	15
		Surprise	12.5	
11. Amusement	Amusement	40	Amusement	67.5
	Happiness	35	Enthusiasm	20
<i>Other exploratory expressions</i>				
12. Tongue-bite	Amusement	37.5	Guilt	27.5
	Happiness	12.5	Lajya	20
	Disgust	10	Happiness	12.5
	Shame	10	Enthusiasm	12.5
13. Face-cover	Shame	45	Lajya	35
	Embarrass.	40	Sadness	30
			Fear	12.5

TABLE 2
 Forced-choice: Emotion Labels chosen for Each Photograph, with
 Percentage of Each Sample who chose that Label

<i>Photograph</i>	<i>Wisconsin</i>	%	<i>Orissa</i>	%
14. Gape	Disgust	42.5	Surprise	22.5
	Awe	40	Awe	15
			Contempt	15
			Fear	12.5

Note: All words chosen by at least 10% of participants in a sample are shown for that sample. Modal words that matched across samples are shown in **bold**, as is the prediction if both samples matched the prediction. The Oriya word *lajya* was counted as the closest equivalent for the English words embarrassment and shame.

no other photo for which more than two participants failed to select a word from the choices given, either in Orissa or Wisconsin.

Second Analysis: Free Response Affect Words. The tape-recorded free-response interviews were transcribed and all affect words were extracted from the sentences spoken by participants. Liberal criteria were used, extending well beyond prototypical affect words (*happy, angry*) to include words and short phrases such as *feels alone, grumpy, and he is like "wow"*.³ The numbers in parentheses preceding each entry in Table 3 show the percentages of participants who used any affect word when discussing each photo. As participants were neither required nor even asked to provide affect words it is of interest to look at the variation across photos in the percentage who spontaneously used affect words. Russell (1994) suggested that some facial expressions may be interpreted nonemotionally (e.g. as demonstrating a purely cognitive state), rather than as expressions of internally felt affect. The numbers in parentheses in Table 3 are consistent with this proposal, because they show some variation in affect word usage across the photos. The anger, surprise, and compassion photos all elicited affect words from at least 80% of participants in both samples, whereas the contempt, disgust, tongue-bite, and gape photos elicited affect words from fewer than 60% of participants in one or both samples. The overall rates of affect-word usage were similar in the two samples (70% of all responses in Wisconsin; 77% in Orissa), although there were differences

³ This task turned out to be easy. The two authors of this report, working separately, obtained a 93% agreement rate in identifying affect words in the Wisconsin data set. Affect words in the Oriya data were identified by a native Oriya speaker, working with the first author to match the breadth of the criteria used in Wisconsin. The particular standards used turn out to matter little as disagreements are limited to low-frequency words on the fringes of the affective domain (e.g. "he looks sick", "she feels dumb").

TABLE 3

Free Response: Affect Word Clusters spontaneously used when Discussing Each Photograph, expressed as a Percentage of the Number of Participants who Used any Affect Word

<i>Photograph</i>	<i>Wisconsin</i>			<i>Orissa</i>		
	(%AW) ^a	<i>Word</i>	%	(%AW)	<i>Word</i>	%
<i>The 7 Ekman expressions</i>						
1. Anger	(80.0)	Anger Upset	90.6 12.5	(88.9)	Anger	81.3
2. Fear	(77.5)	Fear ^b Surprise	74.2 25.8	(80.6)	Fear Anger Surprise Disgust	34.5 24.1 24.1 13.8
3. Happiness	(77.5)	Happiness	93.6	(83.3)	Happiness	90.0
4. Sadness	(62.5)	Sadness Upset	52.0 28.0	(72.2)	Sadness Worry Dislike	46.2 11.5 11.5
5. Disgust	(55.0)	Disgust Anger	63.6 27.3	(77.8)	Disgust Dislike	82.1 14.3
6. Surprise	(82.5)	Surprise Fear	84.8 18.2	(88.8)	Surprise Fear	70.6 15.6
7. Contempt	(52.5)	Annoyance Dislike/ Contempt Confusion Disgust	28.6 19.0 14.3 14.3	(63.9)	Contempt Annoyance	60.9 13.0
<i>Recently studied expressions</i>						
8. Embarrassment	(57.5)	Embarrass.	73.9	(88.9)	Lajya Happiness Love	68.8 34.4 12.5
9. Shame	(80.0)	Sadness Disappoint. Shame	37.5 18.8 15.6	(77.8)	Sadness Lajya Guilt	39.3 17.9 14.3
10. Compassion	(80.0)	Sadness Worry Confusion	34.4 21.9 18.8	(80.6)	Sadness Surprise Worry Awe	37.9 17.2 17.2 10.9
11. Amusement	(72.5)	Happiness Funny	65.5 34.5	(94.4)	Happiness	85.3
<i>Other exploratory expressions</i>						
12. Tongue-bite	(52.5)	Happiness Funny	33.1 28.6	(55.6)	Happiness Lajya	35.0 25.0
13. Face-cover	(67.5)	Embarrass. Shame	59.3 29.6	(69.4)	Lajya Sadness	36.0

TABLE 3

Free Response: Affect Word Clusters spontaneously used when Discussing Each Photograph, expressed as a Percentage of the Number of Participants who Used any Affect Word

Photograph	Wisconsin			Orissa		
	(%AW) ^a	Word	%	(%AW)	Word	%
14. Gape	(75.0)	Surprise	33.3	(44.4)	Surprise	43.7
		Disgust	20.0		Awe	18.7
		Awe	20.0			
		Not-well	13.3			

Note: Modal clusters that matched across samples are shown in **bold**, as is the prediction when both samples matched prediction. Percentages may add to more than 100 as some participants cited two or more clusters. Words used in Table 3 but not mentioned in this footnote were single-word clusters with no synonyms. The modal word-root is used as the cluster name, except where noted, and synonyms are given in decreasing order of frequency. Words beyond the first synonym were generally used by only one participant. The clusters of affect words referred to in Table 3 are as follows: *Anger* includes mad, pissed off, offended. In Orissa: raga, krodha. *Amoyance* in Orissa: birakta. *Awe* was never used in Wisconsin, but the cluster includes amazed, astonished, like-oh-my-god. In Orissa: vismaya. *Confusion* includes bewildered, dazed, puzzled, lost. *Dislike/contempt* includes dislike, hate, and disapproval. The word contempt was never used in Wisconsin, but might be applied to this cluster; see footnote 6. In Orissa: tachalya koriba, tucha, bekhatir, pasand nahela, manaku napaille, bhala lagini. *Disgust* includes gross/grossed-out, repulsed. In Orissa, grhna. *Embarrassment* includes shy, bashful, feels-dumb. In Orissa: lajya. *Fear* includes scared (the modal word), afraid, frightened, horrified, freaked-out. In Orissa: bhaya, dara. *Funny* for photo 11 includes hilarious, jocular. *Funny* for photo 6 includes goofy, silly, giddy. *Guilt* in Orissa: anutap, dosi. *Happy* includes glad, feels-good, pleased, good-mood, elated, content. In Orissa: sukha, khushi, ananda. *Lajya* in Orissa should be taken to cover the semantic domains of embarrassment, shame, and shyness in English. *Love* in Orissa: Prema, bhala paiba. *Not-well* includes feeling-sick. *Sadness* includes depressed, unhappy, down, somber. In Orissa: dukha, bimarsha, bisada, udasa. *Surprise* includes shock, startled, is-like-wow. In Orissa: ascharjya, chamaki. *Worry* includes concerned. In Orissa: chinta.

^a %AW is the percentage of participants who used any affect word. The values reported after each affect word show the percentage of participants who used that affect word-cluster, as a percentage of the restricted pool of subjects who used any affect word. All clusters used by 10% of the participants who used any affect word are shown.

^b All Wisconsin word-clusters are given as the noun form of the word most often used by participants, with the following 3 exceptions: (1) fear, for which the most common word actually used in Wisconsin was "scared"; (2) awe, for which the most common word was amazed; and (3) contempt, which was chosen as the label for dislike and hatred. These three labels were preferred, even though the words awe and contempt were never used in Wisconsin, because they are the words used in the bicultural list of emotions.

on several of the photos. Mann-Whitney *U*-tests showed that the gape photo elicited more affect words in Wisconsin than in Orissa, whereas the disgust, embarrassment, and amusement photos elicited more affect words in Orissa than in Wisconsin ($P < .05$ for disgust, $P < .01$ for the others). It

appears, then, that some facial expressions are more likely than others to be described as expressions of emotion, and that these differences differ by culture. However, despite these differences, the majority of participants in each culture did use affect words when discussing each expression (with the single exception of the gape in Orissa).

To determine the modal emotion words used when discussing each photo affect words were grouped into clusters of close synonyms using relatively strict requirements⁴ (e.g., *angry* was joined with *mad* and *pissed off*, but not with *upset* or *offended*. See footnote to Table 3 for complete list of clusters). For each photo the number of participants who provided one or more words from a given cluster was counted, and the most frequently used clusters are shown in Table 3. Participants who did not use any affect word for a given photo are ignored for that photo, and the number after each affect word shows the number of participants who used a cluster, expressed as a percentage of the number of participants who used any affect word.⁵

Looking now at the modal clusters used by the two samples, Table 3 shows similarities and a few differences when compared to Table 2. As before, the modal emotion word matched the prediction in both samples for six of the seven Ekman expressions. As before, the exception was the expression of contempt, which was labelled as *contempt* in Orissa, but not in Wisconsin. In fact, no Wisconsin participant spontaneously used the word *contempt* when shown the contempt photo. Six Wisconsin participants used variants of the word *annoyed* which was judged to be related to but not synonymous

⁴ Decisions about the breadth of each cluster were made by the two authors, drawing on two sources of information: (1) the judgements of small panels of native speakers of each language; and (2) theoretical distinctions made in the emotion literature and required in the present study to investigate the discreteness of the various expressions (e.g. awe had to be kept distinct from surprise, and contempt from disgust).

⁵ There are several ways in which cluster usage could be reported. The simplest method would be to report the percentage of participants who used a word from a given cluster when discussing a particular photo. However, this method would *underestimate* the percentage that would have been obtained in a standard free-response task in which participants were explicitly asked to provide an affect word. Many participants in the present study who did not spontaneously use an affect word when discussing a photo would likely have provided one had they been instructed to do so. We chose instead to restrict the analysis to participants who spontaneously used any affect word. This method has the corresponding problem that it is likely to *overestimate* the values that would be obtained in a standard free-response task, because it eliminates participants who perceived no affect in the photos and therefore used no affect words. The "truth" probably lies in between these two computational methods, and the curious reader may compute the lower bound that would be obtained by the first method by multiplying each value in Table 3 by the corresponding percentage of participants who gave an affect word (in parentheses) and then dividing by 100. We believe the second computational method is more informative because it allows percentages to be compared across samples even in cases where the base rates of affect word usage differ between samples.

with contempt.⁶ Also as before, the fear photo was judged as showing both *fear* and *surprise* in Wisconsin, but as showing *fear* and *anger* in Orissa.

Among the recently studied expressions, the embarrassment photo matched the prediction in both samples, as before. However, the other three photos yielded different results here than they did in the forced-choice analysis. All three photos produced the same modal emotion word in both samples, although in all three cases the modal word was not the predicted word. The shame and compassion photos elicited the word *sadness* most frequently, whereas the amusement photo elicited the word *happiness* most frequently.

The other exploratory expressions also yielded a pattern of similarities and differences when compared to the results of Table 2. The face-cover continued to elicit self-conscious emotion words, although this time *embarrassment* was more common than *shame* in Wisconsin. The tongue-bite elicited the word *happiness* from both samples, whereas *guilt* and *lajya* had predominated in Orissa in Table 2. And the gape continued to elicit the words *surprise* and *awe* in Orissa, but this time it elicited the words *surprise* and *disgust* in Wisconsin.

In sum, it is noteworthy that the free-response method yielded responses that were generally similar to the forced-choice method, but with some differences on the recently studied and exploratory expressions. It is also noteworthy that the free-response method produced a match across cultural samples for 13 of the 14 photos, whereas the forced-choice method produced a match for only 9 of the 14 photos.⁷

⁶ The contempt photo in Wisconsin is the only entry in Table 3 where we believe that judgement calls that we made in determining the breadth of clustering would affect substantive conclusions. The complete list of affect word roots was: annoyed (6 times), dislike (2), disgust (2), confused (2), upset (2), hate, repulsed, puzzled, undecided, disapproval, "he's like yeah-right", bored, dismayed. Most of these words imply some sort of conflict with or criticism of something or someone, so a broad approach such as that used by Izard (1971) might lump many words together under the modal label "contempt". However, as the present study is attempting to assess the discreteness of emotions, rather than assuming discreteness a priori, and as the pattern for contempt was so different from the clear presence of the predicted modal word for the other 6 Ekman expressions, we felt it was most appropriate to maintain narrow clusters that did not take words from other emotion domains. Annoyed was judged to be closer to anger than to contempt, and repulsed was judged to be a synonym of disgust. We finally selected a cluster of words including dislike, hate, and disapproval, which we label in Table 3 as "dislike/contempt".

⁷ It is also noteworthy that the mean recognition rates are comparable between Tables 2 and 3. Looking only at Ekman's original 6 expressions, the mean recognition rates in the forced-choice data of Table 2 were 75.8% in Wisconsin and 57.9% in Orissa. In the free-response data of Table 3 the corresponding figures are 76.9% in Wisconsin and 66.8% in Orissa. However, these numbers are based on a computational method that overestimates the "true" recognition rate (as explained in footnote 5). Recalculating the first 6 expressions of Table 3 using the alternative underestimating method yields recognition rates of 56.7% in Wisconsin and 54.1% in Orissa.

Analyses of Situations

The situations described by participants as elicitors of the 14 facial expressions were coded at two levels of specificity: general domain codes; and specific subcodes. We developed the coding scheme described in Table 4, by beginning with a suggestion from the anthropologists Lutz and White (1986, p. 427):

Rather than using assumed universal biopsychological criteria or states as the basis for [cross-cultural] comparisons, it would seem useful to begin with a set of problems of social relationship or existential meaning that cultural systems often appear to present in emotional terms, that is, to present as problems with which the person is impelled to deal.

They suggest that a list of such common problems includes: (1) another's violations of cultural codes or of one's personal expectations; (2) one's own violation of those codes, including social incompetence or personal inadequacy; (3) danger to one's physical and psychological self and significant others; (4) the actual or threatened loss of significant relationships; and the positive "problems" of (5) the receipt of resources; and (6) a focus on rewarding bonds with others. We found this list to be very helpful, for many of the situations given by our participants fell cleanly into these six categories. Furthermore, these common problems are specified at a level of abstraction similar to that used by Lazarus (1991) in his list of "core relational themes". By combining the list given by Lazarus with the list given by Lutz and White we obtained a list of abstractly specified situational descriptors that accounted for most of the situations given by our participants. We then modified a few of these descriptors to better fit our data, dropped those that were not represented in our data, and added a few additional categories to account for common situations that were not otherwise captured (e.g. hearing a joke, experiencing something physically unpleasant). The result was the 15 subcodes listed in Table 4. These 15 subcodes are less specific than the more detailed codes used by Scherer et al. (1986), although our smaller sample size did not allow more fine-grained analyses. The 15 subcodes were then grouped into five domains at a higher level of abstraction: other-critical, self-conscious, negative, positive, and cognitive. We then removed all responses that lacked enough content to identify a clear situation, which left us with a codable response pool of 497 responses in Wisconsin and 264 responses in Orissa.⁸

⁸ The lower number of codable responses in Orissa is due to a common response style in Orissa. Participants frequently gave situations such as "someone has said something that made her angry", or "she has seen something frightening". These responses contain no information about the situation, other than the affect word itself, which was analysed in Table 3, and so were uncodable in the present analysis. Responses in Wisconsin were on average slightly longer and more likely to contain codable information.

TABLE 4

Situation Coding-System: 5 Domains and 15 Sub-Codes, with Percentage of Codable Response Pool in Wisconsin and Orissa collapsed across all 14 Photographs

<i>Domains and Subcodes</i>	<i>Description</i>	<i>Wisconsin</i>	<i>Orissa</i>
I. <i>Other-critical</i>	Events involving criticism of or opposition to another	14.9	14.4
O1:other-wrong	Other person has done something wrong, esp. harm or insult to self	6.8	6.4
O2:unpl-social	Unpleasant or oppositional social contact, fighting, criticising	7.8	7.6
II. <i>Self-conscious</i>	Events in which the self's behaviour or interactions are improper or awkward	13.3	14.8
S1:self-wrong	Self has violated a social or moral rule	7.0	10.6
S2:social-expos	Awkward social exposure, without making a mistake	5.0	3.8
III. <i>Negative</i>	Events with negative implications for self's goals, attachments, hedonics	32.8	33.0
N1:failure	Failures and setbacks, material losses	7.8	6.8
N2:loss	Loss of a valued person or attachment relationship	8.2	1.9
N3:unpl-phys	Exposure to things that are physically unpleasant	7.0	8.0
N4:danger	Real or vicarious threat to self or close other, including seeing death	7.6	7.6
IV. <i>Positive</i>	Events with positive implications for self's goals, attachments, hedonics	18.5	17.8
P1:success	Goals met, or progress made; material gains	9.3	6.4
P2:pleas-social	Pleasurable social interactions, especially with friends and family	4.4	7.2
P3:pleas-phys	Pleasurable physical activities (e.g. good food)	1.4	1.5
P4:comedy	Specific reaction to comedy, jokes, humour	3.4	1.1
V. <i>Cognitive</i>	Events that primarily call for or involve cognitive processing	15.9	13.3
C1:unexpected	Seeing or hearing something unexpected or unbelievable	6.4	6.8
C2:confused	Being confused, unable to understand what is happening	3.8	2.3
C3:thinking	Thinking or contemplating	4.6	3.4
<i>Miscellaneous</i>	Events that involve a clear situation which does not fall into any of the other 5 domains	6.6	6.8

Note: The total response pool was 14 photos times 40 participants = 560 in Wisconsin and $14 \times 36 = 504$ in Orissa. Responses that described no event or an underspecified event were then excluded, leaving a total codable response pool of 497 in Wisconsin and 264 in Orissa. Numbers in the right two columns show the percentage of this codable pool assigned to each domain and subcode.

All codable responses were assigned to one of the five domains (except for approximately 7% of responses in each sample that could only be placed in a "miscellaneous" domain). Within each domain, responses were assigned to one of the subcodes listed in Table 4 (except for a few responses in each domain that fit the criteria for the domain, but not for any of its subcodes; hence the percentages for each group of subcodes in Table 4 do not add up exactly to the percentage of responses for the overarching domain.) Situational codes were assigned relatively independently of the affect words used, that is, we focused on the event or activity described, rather than on the affect words that described the person's reactions to the event.⁹

To assess reliability the first author coded all 560 responses from Wisconsin, not blind to which photo elicited each response. The second author then coded a randomised list of all 560 responses, blind to the eliciting photo. The two codings matched exactly on domain in 85.9% of all cases (out of 7 possible choices, including miscellaneous and uncodable). The two codings matched exactly on subcode in 79.6% of all cases (out of 17 possible choices, including miscellaneous and uncodable). Differences between the two coders were worked out by consensus. Coding of the Oriya responses was done by the first author with the assistance of a bilingual native of Bhubaneswar, working both with the original Oriya transcripts and their English translations.

Third Analysis: Situation Domains. The second column of Table 5 gives, in quotes, the cognitive appraisals said by Lazarus (1991), Ekman (personal communication), or others to be associated with each emotion, along with the situational domain from Table 4 that most closely matches each appraisal. An appraisal was available in the literature for the emotions thought to be associated with the first 11 expressions. Most of these appraisals fit neatly into one and only one of our five domains, although there was some ambiguity for the emotions of shame and compassion. Because shame is one of the principal self-conscious emotions (Lewis, 1993; Tangney, 1991) we assigned its putative expression to the Self-Conscious domain, but Lazarus' appraisal (having failed to live up to an ego-ideal) and empirical research on the antecedents of shame (Keltner & Buswell, 1996; Tangney, 1992; Tangney et al., 1996) suggest that it might also fall within the Negative domain. The appraisal condition for compassion also failed to fit neatly into one of our domains, but it seemed most similar to our Negative domain, as that

⁹ For example, "He's surprised because he got an A on his exam" was coded as P1: success, rather than C1: unexpected. The full coding scheme and procedures are available from the first author.

TABLE 5
 Situation Codes: Predicted and Actual Modal Domains, expressed as a Percentage of the Number of
 Participants who gave any Codable Situation

<i>Photograph</i>	<i>Prediction^a</i>	<i>Wisconsin</i>			<i>Orissa</i>		
		(%CS ^b)	<i>Domain</i>	%	(%CS)	<i>Domain</i>	%
<i>The 7 Ekman expressions</i>							
1. Anger	Oth-crit: "A demeaning offence against me and mine"	(80.0)	Oth-Crit	81.3	(41.7)	Oth-Crit	66.7
2. Fear	Neg: "Facing an immediate, concrete, and overwhelming physical danger"	(82.5)	Neg Cog	66.7 15.2	(52.8)	Neg Oth-crit	63.2 21.1
3. Happiness	Pos: "Making reasonable progress towards the realisation of a goal"	(90.0)	Pos	86.1	(50.0)	Pos	100
4. Sadness	Neg: "Having experienced an irrevocable loss"	(92.5)	Neg	78.4	(44.4)	Neg Self-con	50.0 18.8
5. Disgust	Neg: "Taking in or being too close to an indigestible object or idea (metaphorically speaking)"	(82.5)	Neg Oth-Crit	72.7 21.2	(75.0)	Neg	92.6
6. Surprise	Cog: "Sudden exposure to something unexpected or disexpected"	(92.5)	Cog Neg Pos	51.4 27.0 13.5	(55.6)	Cog Neg	45.0 40.0
7. Contempt	Oth-crit: "Moral superiority towards someone"	(92.5)	Oth-crit Cog Neg	51.4 24.3 16.2	(66.7)	Oth-crit Neg Pos Misc	41.7 25.0 12.5 12.5
<i>Recently studied expressions</i>							
8. Embarrass.	Self-con: "A violation of a social convention that produces undesired social exposure."	(82.5)	Self-con Cog	51.5 21.2	(55.6)	Self-con Pos	50.0 30.0

(Continued overleaf)

TABLE 5 (Continued)
 Situation Codes: Predicted and Actual Modal Domains, expressed as a Percentage of
 the Number of Participants who gave any Codable Situation

Photograph	Prediction ^a	Wisconsin			Orissa		
		(%CS ^b)	Domain	%	(%CS)	Domain	%
9. Shame	Self-con?: "Having failed to live up to an ego-ideal"	(92.5)	Neg	37.8	(47.2)	Neg	52.9
			Self-con	21.6		Self-con	17.6
			Cog	16.2		Oth-crit	17.6
			Oth-crit	16.2			
10. Compassion	Neg: "Being moved by another's suffering and wanting to help"	(90.0)	Neg	50.0	(47.2)	Cog	52.9
			Cog	19.4		Neg	35.3
			Oth.crit	13.9			
11. Amusement	Pos: "A playful interpretation of threatening or incongruous information"	(95.0)	Pos	81.6	(55.6)	Pos	70.0
						Misc	20.0
<i>Other exploratory expressions</i>							
12. Tongue-bite	Self-con? (associated with making a mistake in Orissa)	(85.0)	Pos	47.1	(47.2)	Self-con	52.9
			Cog	29.4		Pos	17.6
13. Face-cover	Self-con? (covering the face in shame?)	(95.0)	Self-con	57.9	(47.2)	Self-con	35.3
			Neg	34.2		Neg	29.4
14. Gape	Neg? (includes part of the disgust face)	(90.0)	Neg	47.2	(41.7)	Neg	26.7
			Cog	25.0		Cog	26.7
			Misc.	19.5		Oth-crit	20.0

Note: Domains that matched across samples are shown in **bold**, as is the predicted domain when it matched both samples. Tentative predictions are made for the other exploratory expressions, as explained in the text.

^a Predictions taken from Lazarus (1991, P. 122), except for surprise and contempt (Ekman, personal communication, 1996), embarrassment (Keltner & Buswell, 1996), and amusement (Keltner & Bonanno, 1997).

^b %CS is the percentage of participants who provided a codable situation, with a clear event. The values reported after each domain name show the percentage of events that fell within that domain, as a percentage of the restricted pool of codable situations.

domain allowed for the vicarious experience of negative events happening to other people.

No appraisal was available for the three exploratory expressions, because it is not yet clear whether they are associated with any particular emotion. To facilitate the cross-expression analyses that will be made in Table 7 we tentatively made what we thought were the best domain assignments: the tongue-bite to the Self-conscious domain (following Menon and Shweder's linkage of the tongue-bite to *lajya*); the face cover to the Self-conscious domain (assuming one might cover one's face in shame); and the gape to the Negative domain (it includes a component of the disgust face).

The right half of Table 5 shows the domains that accounted for at least 10% of codable responses in either sample. As in Table 3, the numbers in parentheses show the percentage of participants who gave any codable situation, and the number after each domain name shows the percentage of those participants who gave situations within that domain. The modal domain chosen for each photo was the same across cultures for 12 of the 14 photos (matches are shown in bold), and of these 12 matches, 11 matched the "predictions". The compassion photo elicited both difference and similarity of response: Both samples used the Cognitive and Negative domains, but in different ratios, with the Negative domain predominating in Wisconsin and the Cognitive domain predominating in Orissa. The only photo that elicited little cross-cultural similarity was the tongue-bite, consistent with its status as a culture-specific emblematic expression in Orissa. Oriya participants "understood" its meaning within self-conscious situations, whereas Wisconsin participants gave situations involving primarily positive events.

Fourth Analysis: Situation Subcodes. Table 6 shows a similar analysis at a finer level of resolution, the 15 subcodes listed in Table 4. The second column shows the subcode that we think most closely matches the appraisal condition that was listed in Table 5. At this finer resolution cross-cultural differences become more apparent. Looking at all 14 photos, the Oriya and Wisconsin samples matched each other only eight times (compared to nine matches in Table 2, 13 in Table 3, and 12 in Table 5). Wisconsin participants matched the prediction 10 times, including, notably, all 7 of the Ekman expressions. Oriya participants, however, matched the prediction only 7 times, and they failed to match the prediction on 3 of Ekman's 7 expressions (anger, happiness, and sadness).

TABLE 6

Situation Codes: Predicted and Actual Modal Subcodes, expressed as a Percentage of the Number of Participants who gave any Codable Situation

<i>Photograph</i>	<i>Prediction^a</i>	<i>Wisconsin</i>		<i>Orissa</i>	
		<i>Subcode</i>	<i>%</i>	<i>Subcode</i>	<i>%</i>
<i>The 7 Ekman expressions</i>					
1. Anger	O1:Other-wrong	O1:Other-wrong O2:Unpl-social	50.0 31.3	O2:Unpl-social O1:Other-wrong	33.3 26.7
2. Fear	N4: Danger	N4: Danger	51.5	N4: Danger	36.8
3. Happiness	P1:Success	P1:Success P2:Pleas-soc P3:Pleas-phys	58.3 16.7 11.1	P2:Pleas-soc P1:Success	55.0 35.0
4. Sadness	N2:Loss	N2:Loss N1:Fail	40.5 29.7	N1:Fail S1:Self-wrong	25.0 18.8
5. Disgust	N3: Unpl-phys	N3: Unpls-phys O1:Other-wrong	57.6 12.1	N3: Unpl-phys N9:misc-neg	59.3 33.3
6. Surprise	C1: Unexpect	C1: Unexpect N4: Danger P1:Success	45.9 18.9 10.8	C1: Unexpect N4: Danger	45.0 40.0
7. Contempt	O2: Unpl-soc	O2: Unpl-soc C2:Confused O1:Other-wrong	37.8 13.5 10.8	O2: Unpl-soc N9:misc-neg M:Misc	37.5 20.8 12.5
<i>Recently studied expressions</i>					
8. Embarrass.	S2: Self-expos	S2: Self-expos S1:Self-wrong C3:Thinking	30.3 18.2 18.2	S2: Self-expos P1:Success	35.0 15.0
9. Shame	S1:Self-wrong	N1:Failure S1:Self-wrong C3:Thinking N2:Loss O2:Unpl.Soc	24.3 18.9 10.8 10.8 10.8	N2: Loss S1: Self-wrong O1: Other-wrong	17.6 17.6 17.6
10.	Compassion C2:Confused	N2:Loss 23.5 C2:Confused	11.1	N2:Loss N1:Failure	36.1 17.6
11. Amusement	P4:Comedy (P2?:Pleas-soc)	P1: Success P4:Comedy P2:Pleas-Soc	34.2 26.3 21.8	P1: Success P2:Pleas-soc M:Misc	30.0 20.0 20.0
<i>Other exploratory expressions</i>					
12. Tongue-bite	S1:Self-wrong?	C3:Thinking P1:Success P4:Joke	17.6 17.6 11.8	S1:Self-wrong	47.1
13. Face-cover	S1: Self-wrong?	S1: Self-wrong N1:Fail S2:Self-expos	28.9 15.8 15.8	S1: Self-wrong N1:Fail	35.3 29.4

TABLE 6 (Continued)

Situation Codes: Predicted and Actual Modal Subcodes, expressed as a Percentage of the Number of Participants who gave any Codable Situation

Photograph	Prediction ^a	Wisconsin		Orissa	
		Subcode	%	Subcode	%
14. Gape	N3:Unpl-Phys?	C1:Unexpect	22.2	C1:Unexpect	20.0
		N3:Unpl-Phys	19.4		
		M:Misc	19.4		
		N1:Fail	11.1		

Note: Predicted subcodes are the subcodes from Table 4 that most closely match the specific appraisal conditions listed for each expression in Table 5. The number after each subcode shows the percentage of codable responses that fell within that subcode. The percentage of all responses that were codable responses was given in parentheses for each photo in Table 5.

Significance Tests and Pattern Analyses

Table 7 reduces and extracts the relevant features of Tables 2, 3, 5, and 6, facilitating an assessment of patterns across photos, cultures, and methods. The magnitude, discreteness, and cross-cultural similarity found for each photo is converted to a 5-point scale where 1 indicates that the photo does not portray a well-recognised expression and 5 indicates that the expression portrayed is very well recognised. Statistical tests are reported as superscripts to the values in Table 7, such that a plus sign indicates that the significance test supports the claim that an expression was well recognised, whereas a minus sign indicates the failure of the significance test to support such a claim. The 5-point scales and their associated significance tests are as follows.¹⁰

Magnitude. A “1” in the magnitude columns of Table 7 indicates that the modal response for a sample did not match prediction, hence the expression is unlikely to be universally recognised. A “2” indicates that the modal choice was as predicted, but at a level below 40% (which could result from guessing among three alternatives). A “3” indicates agreement with prediction at a moderate level: 40–59.9%. A “4” indicates strong agreement with prediction (60–79.9%), and a “5” indicates very strong agreement with prediction (80–100%). A plus sign superscript indicates that the modal choice was greater than 1/3 by binomial test with

¹⁰ For purposes of comparisons across expressions, the other exploratory expressions are tentatively assigned to “predicted” affect words as follows: embarrassment/lajya for the tongue-bite, shame/lajya for the face-cover, and disgust for the gape.

TABLE 7

Pattern Analyses: Magnitude, Similarity, and Discreteness across 4 analyses and 14 Photographs, with Significance Tests

	Word Analyses										Situational Analyses				A			
	(1) Forced choice (Table 2)					(2) Free Response (Table 3)					(3) Domains (Table 5)		(4) Subcodes (Table 6)		V			
	S		i			D		S			i		S		S			
	Mag	W	O	m	W	O	W	O	m	W	O	W	O	m	E			
<i>Ekman's basic 7 expressions</i>																		
1. Anger	5 ⁺	5 ⁺	5 ⁺	5 ⁺	5 ⁺	5 ⁺	5 ⁺	5 ⁺	5 ⁺	5 ⁺	5 ⁺	4 ⁺	4 ⁺	4 ⁺	3	1 ⁻	3 ⁻	4.4
2. Fear	3 ⁺	3 ⁺	4 ⁺	2	4 ⁺	4 ⁺	2 ⁻	3 ⁻	3 ⁺	2 ⁻	4 ⁺	4 ⁺	4 ⁺	3	2 ⁻	3 ⁺	3.1	
3. Happiness	4 ⁺	3 ⁻	4	5 ⁺	2 ⁻	5 ⁺	5 ⁺	5 ⁺	5 ⁺	5 ⁺	5 ⁺	5 ⁺	5 ⁺	3 ⁺	1	3 ⁻	4.1	
4. Sadness	5 ⁺	3 ⁻	3 ⁻	5 ⁺	5 ⁺	3	3 ⁻	3 ⁺	2 ⁻	4	4 ⁺	2 ⁻	4	3 ⁻	1 ⁻	2 ⁻	3.3	
5. Disgust	4 ⁺	5 ⁺	5 ⁺	5 ⁺	5 ⁺	4 ⁺	5 ⁺	4 ⁺	3	5 ⁺	4 ⁺	5 ⁺	5	3 ⁺	3 ⁺	4 ⁺	4.3	
6. Surprise	5 ⁺	3 ⁻	4 ⁻	5 ⁺	2 ⁻	5 ⁺	4 ⁺	5 ⁺	5 ⁺	5 ⁺	3	3 ⁻	4 ⁺	3 ⁻	3 ⁻	4 ⁺	3.9	
7. Contempt	1 ⁺	4 ⁺	3 ⁻	1	4 ⁺	1 ⁻	4 ⁺	2 ⁻	1 ⁻	5 ⁺	3	3 ⁻	4 ⁺	2 ⁻	2 ⁻	3 ⁺	2.7	
<i>Recently studied expressions</i>																		
8. Embarrass.	3 ⁻	3 ⁺	4 ⁺	2	5 ⁺	4 ⁺	4 ⁺	4 ⁺	5 ⁺	3	3	3 ⁻	4 ⁺	2 ⁻	2 ⁻	3 ⁺	3.4	
9. Shame	3 ⁺	1 ⁻	3 ⁻	3 ⁺	1	1 ⁻	1 ⁻	3 ⁺	1 ⁻	1 ⁻	1 ⁻	1 ⁻	3 ⁺	1 ⁻	1 ⁻	3 ⁻	1.8	
10. Compassion	1 ⁻	1 ⁻	3 ⁻	1 ⁻	1	1 ⁻	1 ⁻	4 ⁺	1 ⁻	1 ⁻	3	1 ⁻	3 ⁻	2 ⁻	1 ⁻	1 ⁻	1.6	
11. Amusement	3 ⁻	4 ⁺	3	2 ⁻	4 ⁺	1 ⁺	1 ⁺	4 ⁺	1 ⁻	1 ⁺	5 ⁺	4 ⁺	4 ⁺	1 ⁻	1 ⁻	3 ⁺	2.6	
<i>Other exploratory expressions</i>																		
12. Tongue-bite	1 ⁻	1 ⁻	3 ⁻	1	1 ⁻	1 ⁻	1 ⁻	3 ⁺	1 ⁻	1 ⁻	1 ⁻	3 ⁻	2 ⁻	1 ⁻	3 ⁻	2 ⁻	1.6	
13. Face-cover	3 ⁻	2 ⁻	3 ⁻	2 ⁻	2 ⁻	1 ⁺	3 ⁻	3 ⁺	1 ⁻	2 ⁻	3 ⁺	2 ⁻	4 ⁺	2 ⁻	2 ⁻	3 ⁺	2.4	
14. Gape	3 ⁻	1 ⁻	2 ⁻	2 ⁻	1 ⁻	1 ⁻	1 ⁻	3 ⁺	1 ⁻	1 ⁻	3 ⁻	2 ⁻	3 ⁺	1 ⁻	1 ⁻	2 ⁺	1.8	
<i>Average</i>	3.1	2.8	3.5	2.9	3.0	2.6	2.9	3.6	2.5	2.9	3.4	3.0	3.8	2.1	1.7	2.8	2.8	

Note: Mag, magnitude of modal response; Sim, similarity across cultural groups; Discr, discreteness of modal response; W, Wisconsin; O, Orissa. Data from Tables 2, 3, 5, and 6 are converted to 5-point scales where 5 indicates a finding strongly consistent with the Discrete Affect Program Hypothesis (i.e. high magnitude, discreteness, or cross-cultural similarity), and 1 indicates findings contrary to the University Thesis (i.e. low magnitude, discreteness, or cross-cultural similarity). Significance tests, described in the text, are reported in superscripts which indicate support or absence of support for the University Thesis: In the magnitude and discreteness columns, ⁺ means $P < .01$, and ⁻ means n.s. ($P > .05$). In similarity columns, ⁺ means no significant difference between groups ($P > .05$), and ⁻ means that the two groups picked the same mode at a significantly different rate ($P < .01$). A double-minus sign (⁻) means the two groups picked different modes.

$P < .01$,¹¹ suggesting that participants were not guessing from among three equally likely alternatives. (Note that the binomial test is applied even when the modal category was not as predicted, allowing an evaluation of un-predicted modes.)

Discreteness. A “1” indicates that the modal response for a sample did not match prediction, hence the expression is not likely to be universally recognised. A “2” indicates that the modal choice was as predicted, but at a low level of discreteness: Less than twice the rate of the second choice. A “3” indicates a moderate level of discreteness: 2–2.9 times the rate of the second choice. A “4” indicates a high level of discreteness: 3–3.9 times the rate of the second choice. A “5” indicates a very high level of discreteness: The modal choice was at least 4 times as frequent as the second choice. A plus-sign superscript indicates that the difference between the first and second choice was significant by a chi-square test.¹² We did not calculate discreteness for the situational analyses of Tables 5 and 6 as most appraisal theorists do not predict a one-to-one mapping of faces to situation types, as they do for faces and word-clusters. A situation type (e.g. failing a test) might be expected to trigger several appraisal patterns, and several facial expressions.

Similarity. This can be quantified in many ways. We chose to focus on the degree of overlap between the Oriya and Wisconsin responses, rather than on whether or not the two samples chose the same modal response. We used a “dance-hall” analogy, asking what percentage of participants we could pair up between the two samples. For example, the contempt photo in Table 2 elicited the word *disgust* from 55% of Wisconsin respondents but from only 17.5% of Oriya respondents. We took the lower of these two numbers, meaning that we could pair up 17.5% of each sample on the word *disgust*. We then repeated this procedure on the second choice Wisconsin word, *contempt*, which allowed us to pair up an additional 35%, bringing the total to 52.5%. We then did the same for the top two choices made in Orissa (which are *contempt* and *disgust*, already covered, so no additional pairings were made). For each photo we performed this pairing procedure

¹¹ A statistical test is associated with each of the 224 entries in Table 7. As partial protection against Type I errors we set $\alpha = .01$, which lowers the expected number of significant findings due to chance to 2. We think that a full Bonferroni adjustment (dividing .05 by 224) is not warranted, because the acceptance or rejection of the Universality Thesis is determined not by any one test but by the pattern of results across all 224 cells of Table 7.

¹² All responses that were neither the modal choice nor the second choice were removed, and then a chi-square statistic was used to test the null hypothesis that the first and second choices were equally likely.

for all categories that were the first or second choice of either sample.¹³ We then divided these percentages into quintiles, which are reported in the Similarity columns of table 7 (i.e. “1” indicates a percentage between 0 and 20, “5” indicates a percentage between 80 and 100).

In cases where the two samples had the same modal response, Mann–Whitney *U*-tests were performed to determine whether the response rates were statistically distinguishable. A minus sign in the similarity columns of Table 7 indicates that the modal responses *were* significantly different at $P < .01$, because a difference is *not* supportive of the Universality Thesis. A plus sign indicates that the modal responses were *not* significantly different ($P > .05$). A double minus sign indicates that the two samples did not have the same modal response, hence no significance test could be performed.

The Overall Pattern, across 14 Photos and Four Analyses

The rightmost column of Table 7 shows the average across all 16 columns of Table 7, providing a summary measure of the degree to which each expression can be considered a robust and cross-culturally recognisable facial expression. Some expressions (anger, disgust, and happiness) did extremely “well” across methods and cultures, eliciting the predicted modal response at high levels of magnitude, discreteness, and similarity. Others (gape, tongue-bite, compassion, and shame) did very “poorly”, eliciting responses with low levels of magnitude, similarity, and discreteness. The rest of the expressions elicited moderate or mixed levels of cross-cultural recognisability.

It is noteworthy that of the seven most recognisable expressions (i.e. average values above 3.0), six are Ekman et al.’s original (1969) six expressions. Contempt, Ekman and Friesen’s (1986) more recent addition, falls below 3.0, but embarrassment, recently studied by Keltner (1995), yields an average value of 3.4, similar to the scores of fear and sadness.

Figure 2 presents some of the data from Table 7 in the form of a line graph, facilitating an assessment of the pattern across all 14 photos. The solid line shows the gradient that results when the photos are sorted in descending order on the basis of the rightmost column of Table 7. This gradient can be interpreted as a *gradient of recognition*, that is, the degree

¹³ The pairing process could be extended to all categories used by at least one member of each sample, however this would inflate the final percentage with chance pairings. We chose to limit the pairing to the top two choices in each sample. Other limits (e.g. the top 3 choices) produce essentially the same results.

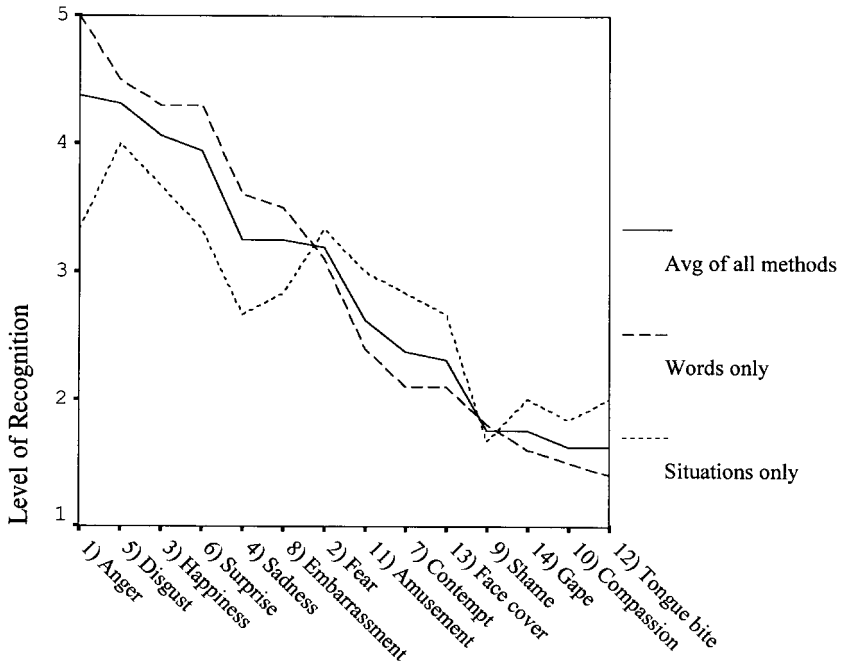


FIG. 2. The gradient of recognition across 14 photos. Photos sorted by declining value of their average across all analyses in Table 7 (solid line), along with values from word-based analyses only, and situation-based analyses only.

to which each expression elicited judgements of high magnitude, discreteness, and cross-cultural similarity. The gradient appears to be relatively even, with no sharp discontinuity between high and low values. The two other lines in Fig. 2 show the averages from the word-based analyses (data columns 1–10 of Table 7) and the situation-based analyses (data columns 11–16). The two lines both show a general downward trend with no sharp break, but with several interesting points of divergence. The gaps between the two lines show that the anger, sadness, and embarrassment expressions did “better” in the word-based analyses, while the contempt and face-cover expressions did “better” in the situation-based analyses.

Exploration of Similarities and Differences across Cultures

Our main goal in designing this study was to use open-ended methods that would allow participants to tell us what they saw in the photos. Reading through the transcripts of the interviews we are struck primarily by the similarities in responses across cultures, but also by the clear yet

interpretable differences. The anger expression, for example, elicited extremely high recognition rates in both cultures on the word-based tasks. Out of 32 Oriya participants who spontaneously used any affect word when discussing this photo, 24 used *raga* (anger) and two used the English word *anger*. No other affect word or word-cluster was mentioned by three or more participants. The situational analyses confirm that the anger expression is seen in both cultures as an other-critical expression (Table 5), and a closer inspection reveals that the majority of codable responses in both samples describe situations of conflict, quarreling, or fighting, often between friends and family members. Yet this closer inspection also reveals a clear difference: Most Wisconsin participants cited an offence or violation of the self's rights, committed by another person, as the cause of the anger (e.g. being stood up by a friend, getting cut off in traffic, getting woken up at night, getting pinched). In Orissa only four participants described an offence against the self, and two of these cases had a distinctly Indian flavour (anger at a child for disobedience, and hurt feelings "when nobody cares what he has to say"). Anger in Wisconsin seems therefore to involve an individual defending territories of the self, consistent with Lazarus's appraisal condition: "a demeaning offence against me and mine". *Raga* in Orissa, however, may be less individualistic, less defensive, and more about the status and health of ongoing relationships.

Cultural differences of this sort can be found in response to several of the other photos. The happiness expression in Wisconsin elicited primarily stories about individuals who achieved their goals or got something desirable (e.g. an A on a test, a job, a raise, a date), consistent with the goal-focused nature of Lazarus's appraisal condition for happiness: "making reasonable progress towards the realisation of a goal". These situation-types (P1: Success) also occurred in Orissa, but they were outnumbered by situations describing reunions between friends and family (P2: Social pleasure). The Oriya reading of a smiling face appears to be less focused on the ups and downs of personal fortune, and more focused on the intrinsic pleasures of ongoing relationships, consistent with Markus and Kitayama's (1991) finding that many non-Western cultures have a more interdependent sense of self than do North Americans.

The happiness and anger expressions provide examples in which both groups easily recognised the expressions as pertaining to one and only one emotion, although they differed in the particular social elicitors of that emotion. The sadness photo, in contrast, provides an example of an expression that appeared to be more easily read in Wisconsin. The sadness photo elicited the highest forced-choice recognition rate of any photo in Wisconsin (87.5%, Table 2), but did relatively poorly in Orissa (42.5%). The sadness photo was the only one of the seven Ekman expressions to

score significantly lower in Orissa than in Wisconsin in three out of the four analyses (see similarity columns of Table 7). If there is a modal sadness expression (akin to a modal colour chip for red in the work of Berlin & Kay, 1969), then our sadness photo appears to have captured it in Wisconsin, but not in Orissa.

However, there were striking similarities between the two groups, even for expressions that were not previously thought to be universally recognised. The embarrassment expression stands out as having elicited similar patterns of responses in Wisconsin and Orissa, across all four analyses. The modal situation-type in both groups was S2:self-exposure, and both groups gave examples of being praised in front of others, or being in an awkward social situation, particularly the awkwardness of male-female interactions (flirting in Wisconsin, the first meeting in an arranged marriage in Orissa). An important cultural difference seems to arise as the Oriya language lacks single words to distinguish between what Americans call shame and embarrassment, but on closer inspection Oriya participants seemed to distinguish between two forms of *lajya*, as shown by their responses to the embarrassment and face-cover expressions. Both of these expressions were labelled as *lajya* in Tables 2 and 3, and both of these expressions were assigned to the self-conscious domain in Table 5. Yet for the embarrassment expression the additional words used were *happiness*, *love*, and *amusement* (Tables 2 and 3) and the second-choice domain was positive. For the face-cover, however, *lajya* was followed by words for *sadness*, *worry*, and *fear*, and the second choice situation domain was *Negative*. As one Oriya explicitly stated when looking at the embarrassment expression: "This is not the *lajya* felt when you do something wrong. This is *lajya* on hearing one's own praises being spoken". It appears, then, that the presence or absence of a lexical distinction between shame and embarrassment may not constrain the distinctions participants make spontaneously.

DISCUSSION

We can summarise the findings of this study by returning to, and answering, the two questions raised in the first paragraph of this paper.

1. *Which Expressions are Recognised Cross-culturally?* The present study suggests that the answer to this question is partially dependent on the method used to collect data. The two word-based analyses (Tables 2 and 3) found that the most easily recognised expressions were, in order: anger, disgust, happiness, surprise, embarrassment, sadness, and fear (see the dashed line in Fig. 2). However, the situational analyses (Table 5 and 6)

lead to the selection of a slightly different set, in a different order: disgust, happiness, anger, fear, surprise, amusement, contempt, and embarrassment (see the dotted line in Fig. 2). We find it striking that the word-based analyses, which are more similar to the methods previously used by Ekman and others, confirm Ekman's selection of his original list of six basic emotions (plus embarrassment). However, the situation-based analyses provide a list that includes the amusement, contempt, and embarrassment expressions, and lacks the sadness expression. We assume that other methods (e.g. linking faces to action tendencies) would yield related yet slightly different lists. We conclude, therefore, that Ekman and Friesen's original set of six expressions was a very good choice, but that the boundaries of this set may be somewhat fuzzy, and are partially dependent on the methods and purposes of the set maker.

The present study suggests several modifications and additions to the commonly used set of emotional expressions, particularly in the domains of self-conscious and positive emotion. The display of embarrassment, modelled on previous work (Keltner, 1995), proved to be distinct from related displays of shame and amusement. Likewise, at least in the forced-choice findings, the laugh was more consistently labelled as amusement and the smile as happiness, consistent with longstanding yet little explored claims that the laugh and smile may relate to distinct positive emotions (e.g. Keltner & Bonanno, 1997; Van Hooff, 1972).

The present study also found that several expressions were read very differently across cultures, demonstrating that the methods used did not automatically produce cross-cultural agreement. In particular, the iconic display of a tongue-bite, thought to signal embarrassment and related states in parts of Asia (La Barre, 1947), was indeed read in Orissa, but not Wisconsin, as a sign of having made a blunder or mistake. This finding suggests that culturally specific emotion displays may in general be those that can be voluntarily produced. However, some voluntarily produced displays may still elicit similar readings across cultures, as occurred to some extent for the face-cover (photo 13) in the present study.

2. Does the "Forced-choice" Method yield Valid Evidence about Cross-cultural Recognition? The answer given by the present study is yes. Russell (1994) wrote a far-reaching critique of the extant research on cross-cultural recognition of facial expressions, and of the theories of emotion that are based on that research. Russell raised the possibility that previous findings of high recognition could be artefacts of the "standard method" used in that research, and that these findings might not be robust across methods. The present study altered many key aspects of earlier methodologies, yet still found a high degree of similarity between an American and an Indian sample in the reading of a small set of facial expressions. Our forced-choice

methodology used a longer and more culturally balanced list of response choices than has been used in previous research, along with a “none-of-the-above” response, yet it replicated previous forced-choice findings (Table 2). More to the point, essentially the same results were found using a free-response methodology (Table 3), in which participants were not even asked to provide affect words. Participants in Wisconsin and Orissa used the words *anger/raga*, *fear/bhaya*, *happiness/sukha*, *sadness/dukha*, *disgust/grhna*, and *surprise/ascharjya* (or very close synonyms) when discussing posed photos of these expressions. This finding replicates the earlier free-response findings of Izard (1971) while using a more open-ended methodology and a stricter set of word-clustering rules.

Further evidence of robustness across methods came from an analysis of the situations participants provided as potential elicitors of each expression (Table 5). Participants in both cultures provided other-critical situations for anger and contempt, negative situations for fear and sadness, positive situations for happiness and amusement, cognitive situations for surprise, and self-conscious situations for embarrassment and the face-cover. Taken together, these converging lines of evidence suggest that prior findings of cross-cultural similarity are not primarily due to methodological artefacts of the forced-choice method.

However, against this backdrop of similarity the present study also found evidence of cultural differences in the reading of facial expressions. First, if we look at the six “basic” expressions that were the focus of Russell’s (1994) meta-analysis, we found, as did Russell, that the expressions were better recognised by Americans than by non-Westerners. The average “correct” labelling score was higher in Wisconsin than in Orissa by 17.9% in Table 2, and by 9.0% in Table 3. These findings are similar to the 12% difference that Russell found between Western and non-Western samples. Second, when we look at the specific situations (subcodes in Table 6) that are said to elicit each of the seven Ekman expressions, we find that participants in Wisconsin matched the prediction in all seven cases, whereas in Orissa the prediction was matched only four out of seven times. These findings are consistent with Russell’s claim that Western emotion theories work better in the West than they do elsewhere. There may be alternative explanations for the overall difference in recognition rates, such as the fact that Oriya participants were mostly non-students, were older, and were judging American faces. Correlational analyses among Oriya participants show that performance on the forced-choice task was unrelated to age or years of education, although a simple split of the Oriya sample found that the 20 participants who had some exposure to college were slightly more “accurate” at labelling the six original Ekman expressions (64%) than were the 19 participants who had no college experience (56%). This difference was not significant, [$t(37) = 1.01$], but

the 8% difference is consistent with Russell's (1994) suggestion that education levels matter, even though it suggests simultaneously that some portion of the higher recognition rates found in Wisconsin may be due to education, rather than culture.

Limitations of the Present Study

The findings of the present study are in general supportive of the work of Ekman, Izard, and their colleagues. However, because the present study incorporated only a few of Russell's (1994) many suggestions and criticisms, his basic charge still warrants further research. Like previous studies, we used posed (not spontaneous) expressions, a within-subjects design, and we asked participants to judge photographs without any social context. Carroll and Russell (1996) have already demonstrated the importance of context, and Fernández-Dols and Ruiz-Belda (1997) have demonstrated some surprising absences of spontaneous facial expressions in emotionally powerful real-life situations. Furthermore, the present study's findings about specific expressions are limited by the fact that we used only two photographs for each expression (one poser of each sex). Similarly, the strong performance of our embarrassment expression and the mixed results of our contempt expression will require replication with other variants of each expression.

Implications for Future Research

The present study has several implications for future research. First, it strongly suggests that earlier cross-cultural findings by Ekman and others are not artefacts of the forced-choice method.

Second, the study demonstrates that the methods used to study emotion influence the conclusions reached. Word-based comparisons led to slightly different conclusions than situation-based analyses. We believe that emotion words are often poor anchors for cross-cultural comparisons, yet they are the most commonly used anchors. We hope that future researchers will continue the trend towards using several points of comparison in cross-cultural work (e.g. Heider, 1991; Mesquita, *in press*).

Third, the study demonstrates the value of looking beyond the six most commonly studied emotions. In particular the self-conscious emotions and the positive emotions seem to be promising and underexplored areas of emotional life. The embarrassment expression emerged in the present study as an expression that was as well recognised as several Ekman expressions, yet had been largely overlooked until recently (e.g. Edelman & Hampson, 1979; Keltner, 1995).

Fourth, Ekman's interpretation of the contempt expression is supported. The unilateral lip raise was labelled as *tachalya*/contempt in Orissa, consistent with findings reported for other cultures by Ekman and Heider (1988) and Matsumoto (1992a). However, Russell's (1991c) observation (also made by Alvarado & Jameson, 1996) that English speakers do not label this expression with the word "contempt" was confirmed in our Wisconsin sample, using both the free-response and forced-choice methods. The resolution of this paradox appears to be the conclusion advocated by Rosenberg and Ekman (1995, p. 128), namely, that the word "contempt" is either used infrequently or is poorly understood by English speakers, although "the situational precursors of this expression might be more accessible than its verbal label". Our open-ended cross-cultural results support this conclusion, because participants in both groups gave other-critical and unpleasant-social events as the elicitors of the contempt expression. Yet, even studies that bypass the word "contempt" (Frijda & Tcherkassof, 1997) frequently find that its expression is not as well understood as the other "basic" emotions, supporting our contention that expressions are best viewed as falling along a gradient of recognition, rather than as being members of a set with clear boundaries.

Fifth, the present study shows the value of seeking out non-Western theories of emotion, and using them to generate hypotheses that might not have occurred to monocultural researchers. For example, the *Natyashastra* discusses the intriguing emotion of *utsaha* (enthusiasm, or dynamic energy), said to be triggered by heroes and heroic deeds. *Utsaha* may point to an unexplored or unlexicalised region of American emotional space.

In conclusion, we hope that cross-cultural research will soon become more than a way of testing Western theories of emotion. We look forward to the next wave of empirical research on culture and emotion, using multiple methods to examine multiple emotions, and incorporating insights from around the world.

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REFERENCES

- Alvarado, N., & Jameson, K. (1996). New findings on the contempt expression. *Cognition and Emotion*, 10, 379-407.
- Berlin, B., & Kay, P. (1969). *Basic color terms: Their universality and evolution*. Berkeley, CA: University of California Press.
- Biehl, M., Matsumoto, D., Ekman, P., Hearn, V., Heider, K., Kudoh, T., & Ton, V. (1997). Matsumoto and Ekman's Japanese and Caucasian facial expressions of emotion

- (JACFEE): Reliability and cross-national differences. *Journal of Nonverbal Behavior*, 21, 3–21.
- Boucher, J.D., & Brandt, M.E. (1981). Judgment of emotion: American and Malay antecedents. *Journal of Cross-Cultural Research*, 12, 272–283.
- Boucher, J.D., & Carlson, G.E. (1980). Recognition of facial expression in three cultures. *Journal of Cross-Cultural Psychology*, 11, 263–280.
- Carroll, J.M., & Russell, J.A. (1996). Do facial expressions signal specific emotions? Judging emotion from the face in context. *Journal of Personality and Social Psychology*, 70, 205–218.
- Darwin, C. (1965). *The expression of the emotions in man and animals*. Chicago, IL: University of Chicago Press. (Original work published 1872)
- Doi, L.T. (1981). *The anatomy of dependence* (J. Bester, Trans.). Tokyo: Kodansha International.
- Edelmann, R.J., & Hampson, S.E. (1979). Changes in non-verbal behavior during embarrassment. *British Journal of Social and Clinical Psychology*, 18, 385–390.
- Eisenberg, N., Fabes, R.A., Miller, P.A., Fultz, J., Shell, R., Mathy, R.M., & Reno, R.R. (1989). Relation of sympathy and distress to prosocial behavior: A multimethod study. *Journal of Personality and Social Psychology*, 57, 55–66.
- Ekman, P. (1994a). Strong evidence for universals in facial expressions: A reply to Russell's mistaken critique. *Psychological Bulletin*, 115, 268–287.
- Ekman, P. (1994b). All emotions are basic. In P. Ekman & R.J. Davidson (Eds.), *The nature of emotion: Fundamental questions* (pp. 15–19). New York: Oxford University 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. (1976). *Pictures of facial affect*. Palo Alto, CA: Consulting Psychologists Press.
- Ekman, P., & Friesen, W.V. (1986). A new pan-cultural facial expression of emotion. *Motivation and Emotion*, 10, 159–168.
- Ekman, P., Friesen, W.V., O'Sullivan, M., Chan, A., Diacoyanni-Tarlatzis, I., Heider, K., Krause, R., LeCompte, W.A., Pitcairn, T., Ricci-Bitti, P.E., Scherer, K., & Tomita, M. (1987). Universals and cultural differences in the judgments of facial expressions of emotion. *Journal of Personality and Social Psychology*, 53, 712–717.
- Ekman, P., & Heider, K. (1988). The universality of a contempt expression: A replication. *Motivation and Emotion*, 12, 303–308.
- Ekman, P., O'Sullivan, M., & Matsumoto, D. (1991). Confusions about context in the judgment of facial expression: A reply to "The contempt expression and the relativity thesis". *Motivation and Emotion*, 15, 169–176.
- Ekman, P., Sorensen, E., & Friesen, W.V. (1969). Pan-cultural elements in the facial displays of emotion. *Science*, 164, 86–88.
- Fernández-Dols, J.M., & Ruiz-Belda, M.-A. (1997). Spontaneous facial behavior during intense emotional episodes: Artistic truth and optical truth. In J.A. Russell & J.M. Fernández-Dols (Eds.), *The psychology of facial expression* (pp. 255–274). Cambridge, UK: Cambridge University Press.
- Fridlund, A. (1994). *Human facial expression*. San Diego, CA: Academic Press.
- Fridlund, A., Ekman, P., & Oster, H. (1987). Facial expression of emotion: Review of the literature, 1970–1983. In A.W. Siegman & S. Feldstein (Eds.), *Nonverbal behavior and communication* (pp. 143–224). Hillsdale, NJ: Erlbaum.
- Frijda, N.H. (1953). The understanding of facial expression of emotion. *Acta Psychologica*, 9, 294–362.
- Frijda, N.H., & Tcherkassof, A. (1997). Facial expressions as modes of action readiness. In J.A. Russell & J.M. Fernández-Dols (Eds.), *The Psychology of Facial Expression* (pp. 78–102). Cambridge, UK: Cambridge University Press.

- Heider, K.G. (1991). *Landscapes of emotion: Mapping three cultures of emotion in Indonesia*. Cambridge, UK: Cambridge University Press.
- Izard, C.E. (1971). *The face of emotion*. New York: Appleton-Century-Crofts.
- Izard, C.E. (1977). *Human emotions*. New York: Plenum.
- Izard, C.E. (1994). Innate and universal facial expressions: Evidence from developmental and cross-cultural research. *Psychological Bulletin*, 115, 288–299.
- Keltner, D. (1995). Signs of appeasement: Evidence for the distinct displays of embarrassment, amusement, and shame. *Journal of Personality and Social Psychology*, 68, 441–454.
- Keltner, D., & Bonanno, G. (1997). A study of laughter and dissociation: Distinct correlates of laughter and smiling during bereavement. *Journal of Personality and Social Psychology*, 73, 687–702.
- Keltner, D., & Buswell, B.N. (1996). Evidence for the distinctness of embarrassment, shame, and guilt: A study of recalled antecedents and facial expressions of emotion. *Cognition and Emotion*, 10, 155–171.
- Keltner, D., & Harker, L.A. (1998). The forms and functions of the nonverbal signal of shame. In P. Gilbert & B. Andrews (Eds.), *Shame: Interpersonal behaviour, psychopathology, and culture*. Oxford, UK: Oxford University Press.
- La Barre (1947). The cultural basis of emotions and gestures. *Journal of Personality*, 16, 49–68.
- Lazarus, R.S. (1991). *Emotion and adaptation*. New York: Oxford University Press.
- Lewis, M. (1993). Self-conscious emotions: Embarrassment, pride, shame, and guilt. In M. Lewis & J. Haviland (Eds.), *Handbook of emotions* (pp. 563–573). New York: Guilford Press.
- Lutz, C. (1988). *Unnatural emotions*. Chicago, IL: University of Chicago Press.
- Lutz, C., & White, G. (1986). The anthropology of emotions. *Annual Review of Anthropology*, 15, 405–436.
- Mahapatra, M. (1981). *Traditional structure and change in an Orissan temple*. Calcutta, India: Punthi Pustak.
- Markus, H.R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, 98, 224–253.
- Masson, J.L., & Patwardhan, M.W. (1970). *Aesthetic rapture: the Rasadhyaaya of the Natyasastra*. Poona, India: Deccan College.
- Matsumoto, D. (1992a). More evidence for the universality of a contempt expression. *Motivation and Emotion*, 16, 363–368.
- Matsumoto, D. (1992b). American-Japanese cultural differences in the recognition of universal facial expressions. *Journal of Cross-Cultural Psychology*, 23, 72–84.
- Mauro, R., Sato, K., & Tucker, J. (1992). The role of appraisal in human emotions: A cross-cultural study. *Journal of Personality and Social Psychology*, 62, 301–317.
- Menon, U., & Shweder, R.A. (1994). Kali's tongue: Cultural psychology, cultural consensus and the meaning of "shame" in Orissa, India. In H. Markus & S. Kitayama (Eds.), *Culture and the Emotions* (pp. 241–284). Washington DC: American Psychological Association.
- Mesquita, B. (in press). *Cultural variations in emotions*. New York: Oxford University Press.
- Mesquita, B., Frijda, N.H., & Scherer, K.R. (1997). Culture and emotion. In P.R. Dasen & T.S. Saraswathi (Eds.), *Handbook of cross-cultural psychology*. Boston, MA: Allyn & Bacon.
- Rosenberg, E., & Ekman, P. (1995). Conceptual and methodological issues in the judgment of facial expressions of emotion. *Motivation and Emotion*, 19, 111–138.
- Rozin, P., Lowery, L., & Ebert, R. (1994). Varieties of disgust faces and the structure of disgust. *Journal of Personality and Social Psychology*, 66, 870–881.
- Ruch, W. (1993). Exhilaration and humor. In M. Lewis & J.M. Haviland (Eds.), *Handbook of emotion* (pp. 605–616). New York: Guilford Press.

- Russell, J.A. (1991a). The contempt expression and the relativity thesis. *Motivation and Emotion, 15*, 149–168.
- Russell, J.A. (1991b). Culture and the categorization of emotions. *Psychological Bulletin, 110*, 426–450.
- Russell, J.A. (1991c). Negative results on a reported facial expression of contempt. *Motivation and Emotion, 15*, 281–291.
- Russell, J.A. (1994). Is there universal recognition of emotion from facial expression? A review of the cross-cultural studies. *Psychological Bulletin, 115*, 102–141.
- Russell, J.A. (1995). Facial expressions of emotion: What lies beyond minimal universality? *Psychological Bulletin, 118*, 379–391.
- Russell, J.A., Suzuki, N., & Ishida, N. (1993). Canadian, Greek, and Japanese freely produced emotion labels for facial expressions. *Motivation and Emotion, 17*, 337–351.
- Scherer, K.R. (1997a). Profiles of emotion-antecedent appraisal: Testing theoretical predictions across cultures. *Cognition and Emotion, 11*, 113–150.
- Scherer, K.R. (1997b). The role of culture in emotion-antecedent appraisal. *Journal of Personality and Social Psychology, 73*, 902–922.
- Scherer, K.R., Wallbott, H.G., & Summerfield, A.B. (Eds.) (1986). *Experiencing emotion: A cross-cultural study*. Cambridge, UK: Cambridge University Press.
- Shweder, R.A. (1993). The cultural psychology of the emotions. In M. Lewis & J. Haviland (Eds.), *Handbook of emotions* (pp. 417–431). New York: Guilford Press.
- Tangney, J.P. (1991). Moral affect: The good, the bad, and the ugly. *Journal of Personality and Social Psychology, 61*, 598–607.
- Tangney, J.P. (1992). Situational determinants of shame and guilt in young adulthood. *Personality and Social Psychology Bulletin, 18*, 199–206.
- Tangney, J.P., Miller, R.S., Flicker, L., & Barlow, D.H. (1996). Are shame, guilt and embarrassment distinct emotions? *Journal of Personality and Social Psychology, 70*, 1256–1269.
- Van Hooff, J.A.R.A.M. (1972). A comparative approach to the phylogeny of laughter and smiling. In R.A. Hinde (Ed.), *Non-verbal communication* (pp. 209–237). Cambridge, UK: Cambridge University Press.
- Wierzbicka, A. (1992). *Semantics, culture and cognition*. New York: Oxford University Press.
- Wolfgang, A., & Cohen, M. (1988). Sensitivity of Canadians, Latin Americans, Ethiopians and Israelis to interracial facial expressions of emotions. *International Journal of Intercultural Relations, 12*, 139–151.