Canadian, Greek, and Japanese Freely Produced Emotion Labels for Facial Expressions[1]

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Observers in Canada (n = 50), Greece (n = 38), and Japan (n = 50) were shown seven of Matsumoto and Ekman's (1988) photographs reported to show universally recognizable facial expressions of basic emotions. Observers were asked to name the emotion expressed with any single emotion label they wanted. Across cultures, recognition (percentage of observers agreeing with prediction) was high (>80%) for the happy *expression (indicating that observers understood the task), low for the* contempt *expression (0 to 2%), and intermediate for the others (14 to 80% for* surprise, sadness, anger, disgust, *and* fear). *Recognition for some facial expressions varied with the culture of the observer: For example, recognition of the* fear *expression was moderate to high in the two Western samples (62 to 87%) but low in the Japanese (14%); indeed, the Japanese modal response was* surprise *rather than* fear.

One of the most pivotal conclusions reached so far in the psychology of emotion has been that specific emotions are signaled by specific facial expressions and that these signals are universally recognized (Ekman, 1984; Izard, 1977). Various lines of evidence have been cited as support for this conclusion, including studies in which facial expressions were shown to ob-

servers who came from different cultures and spoke different languages (Ekman & Friesen, 1971; Ekman, Sorenson, & Friesen, 1969; Izard, 1971). However, in most such studies, observers were provided with a short list of emotions and were asked to choose one label from the list for each facial expression shown. Although this forced-choice procedure has its advantages, it also has disadvantages (Russell, 1989, 1993a, in press). One disadvantage is that we cannot infer how the observer would spontaneously label that same facial expression. Forced choice might funnel a range of somewhat different interpretations into a single response category, thereby exaggerating the degree of recognition. We are especially uncertain when the observer is from a different culture and speaks an unfamiliar language. Moreover, forced choice requires the observer to treat the emotion choices offered as mutually exclusive, something actual emotion categories are not. The forced-choice format has been shown capable of yielding consensus on different emotions for one and the same expression: for instance, the *anger* expression was classified as *anger* when observers were given one list of options, but as *frustration* given another list, *disgust* given another, and *contempt* given still another (Russell, 1993a). At the very least, the results generated by a forced-choice format must be replicated with other response formats.

Researchers have therefore sought to supplement the forced-choice data with freely produced labels. Observers can easily produce appropriate labels for common vehicles and animals without the aid of a short list of alternatives; recognition scores ranged from 80% to 100% (Russell, 1993b). Early attempts by Darwin (1872/1965) and Frijda (1953) to gather freely produced labels for facial expressions yielded mixed results, but they might not have used the best examples of prototypical facial expressions. Three later studies that report free-label data uses carefully selected expressions (Boucher & Carlson, 1980; Izard, 1971; Sorenson, 1976).

Izard (1971) obtained freely chosen labels from American, English, French, and Greek college students for 32 still photographs of eight different types of facial expression. Izard specifically directed his subjects to provide an emotion label for each photograph. Still, only 53% of responses overall were considered correct by a generous scoring scheme ("generous" because, for example, 28 terms including *crying, distress, loneliness, pain, pity, uneasiness,* and *worry* were considered correct for the *sad* expression). The figure of 53% was less than that obtained when the same observers responded to the same photographs with a forced-choice procedure. Also unlike what occurred with forced choice, Izard found a statistically significant main effect for type of expression with the freely chosen labels, indicating that some expressions are more "recognizable" than others.

Boucher and Carlson (1980) obtained freely chosen labels from 30 Malay observers. Recognition was greater than chance for most types of facial expression, but not for the *fear* expression. Recognition was again less than that which had resulted from a forced-choice procedure. (The results from forced-choice were 68.8% for American posers, 60.0% for Malay posers. However, the authors did not specify the exact results obtained with free label.) Boucher and Carlson did not specify the precise criteria used to decide which responses were correct and which incorrect.

Sorenson (1976) obtained freely chosen labels from two cultures largely isolated from Western influence. The more isolated group, the Bahinemo, showed no association between facial expression and emotion, except for a tendency to label all facial expressions as showing *anger*. The less isolated group, the Fore, gave the predicted label as their modal response for the expressions of *happiness, anger,* and *fear* (with recognition scores ranging from 23% to 82%), but not for expressions of *surprise, sadness, contempt,* or *disgust.* Sorenson did not specify how responses were scored as correct or incorrect.

To summarize, if facial expressions are a universal signaling system and if people everywhere can easily recognize specific emotions from facial expressions, then recognition should be detectable through a variety of response formats. Observers should not need a short list of emotion names to choose from. Put more formally, convergent validity requires that evidence on the universality hypothesis not be limited to one method of gathering observers' responses. Available data on freely produced labels for facial expressions suggest that (a) observers respond with a range of labels, (b) overall recognition is less than implied by forced choice, (c) recognition varies with type of facial expression, and (d) recognition might vary with the culture of the observer. The available evidence with free labeling is thus insufficient to provide the needed support for the universality hypothesis, and that hypothesis is sufficiently important to warrant the gathering of further data, which was the purpose of the present study.

One key step in doing so is having the right portrayals of the facial expressions. Matsumoto (1992) reviewed various studies (Eiland & Richardson, 1976; Kilbride & Yarczower, 1980, 1983; Shimoda, Argyle, & Ricci Bitti, 1978; Wolfgang & Cohen, 1988) that found cultural *differences* in recognition and criticized them on just this issue. In selecting the expressions to be studied, Matsumoto required that "the facial expressions must meet some criteria for validly and reliably portraying the universal emotions. It is necessary that the faces contain only those muscle movements related to universal emotions, with no extraneous movements, and be consistently judged as portraying the emotions by a large percentage of judges" (p. 73). To fulfill this requirement, Matsumoto chose the set called

Japanese and Caucasian Facial Expressions of Emotion (JACFEE; Matsumoto & Ekman, 1988). The procedures used to develop that set had "ensured that both the type and intensity of the facial muscle movements of all expressions corresponded to those of the universal emotions" (Matsumoto, 1992, p. 75). The present study too drew its photographs from JACFEE. The first question addressed in the present study was thus the extent to which freely produced labels would agree with Matsumoto and Ekman's predicted label.

Two further, more specific questions were also addressed. First, a dispute has arisen over the status of a reported facial expression of contempt. Ekman and Friesen (1986) claimed to have discovered a universal facial expression, a unilateral lip curl, that is "unique to contempt." Various aspects of their claim have been challenged (Izard & Haynes, 1988; Ricci Bitti, Brighetti, Garotti, & Boggi-Cavallo, 1989; Russell, 1991b, 1991c). In the Russell (1991c) study, free-response data failed to replicate what Ekman and Friesen had obtained with a forced-choice response format. Ekman, O'Sullivan, and Matsumoto (1991) considered this failure to replicate a trivial problem attributable to the peculiarities of the English word *contempt*. They expressed confidence that their result would replicate in other languages.

Second, Japanese observers have generally yielded "recognition scores" (percentage of judgments agreeing with prediction) similar to those of English speakers for facial expressions reported to signal *happiness, surprise,* and *sadness,* but lower than those of English speakers for *anger, disgust,* and *fear* (Ekman et al., 1987; Izard, 1971; Matsumoto, 1992; Matsumoto & Ekman, 1989). The question was whether this cultural difference would replicate with free response, and, if so, whether the difference might be clarified by the responses obtained.

In the present study, observers in Canada, Greece, and Japan were each shown seven still photographs from JACFEE and asked to label the emotion of each person shown. The method was chosen to remain close to the methods commonly used by past researchers, so that the new results could be meaningfully compared with the old. This decision entailed the sacrifice of ecological validity. Thus, the observers were shown preselected still photographs of posed facial expressions, received no further information about the expresser or the context in which the expression took place, saw an unrelated series of facial expressions each reportedly of a different emotion at high intensity, had as much time as they wanted to make their judgments, and were specifically asked, "What emotion or mood is this person feeling?" This method has little if anything to do with the way facial expressions are encountered and interpreted in the nonexperimental world.

We did take one small step toward ecological validity: The observers were from the general public rather than college students.

METHOD

Subjects

Subjects were 50 English-speaking Canadians, 38 Greeks, and 50 Japanese who were approached individually in public places in their respective countries and asked to volunteer 5 min of their time. Only native speakers over the age of 16 were included.

Facial Expressions

Seven photographs of facial expressions, one for each emotion, were taken from Matsumoto and Ekman's (1988) *Japanese and Caucasian Facial Expressions of Emotion.* All posers were Caucasian; four were women; three were men.

Procedure

The experimenter described the study as concerned with how persons in different cultures understand facial expressions. All seven photographs were then shown slowly one after the other in a separate random order for each subject. The subject was asked to look at each one carefully. The photographs were collected, shuffled, and reshown, one at a time, with the question posed each time, "What emotion or mood is this person feeling?" If the subject gave several words or a phrase, the experimenter said, "Can you give me the single best word to describe how this person is feeling?"

RESULTS AND DISCUSSION

All nonidiosyncratic responses, and the frequency with which they occurred, are listed in Table I. (Syntactic form was ignored in this count.)

Table I. Freely Produced Emotion Labels for Seven Facial Expressions[a,b]

English-speaking Canadian (n = 50)	Greek (n = 38)	Japanese (n = 50)
The *happy* expression		
Happy 44 (idiosyncratic 6)	**Hara (joy) 31 **Evthimia (cheerful) 2 (**idiosyncratic 2) (idiosyncratic 3)	**Tanoshii (delight) 11 **Ureshii (glad) 10 **Yorokobi (pleasure) 10 *Warai (smile) 5 **Shiawase (happiness) 4 Pouze (posed) 2 Yuujou (friendliness) 2 Niyaketeiru (foppish) 2 (*idiosyncratic 2) (idiosyncratic 2)
The *surprise* expression		
**Surprise 35 *Shock 6 *Amazed 2 *Astonished 2 *Startled 2 (*idiosyncratic 1) (idiosyncratic 2)	**Ekplixi (surprise) 21 Xafniasmenos (fright) 6 Fovo (fear) 3 Enthousiasmos (enthusiastic) 2 Anavdhos (speechless) 2 (idiosyncratic 4)	**Odoroki (surprise) 24 *Bikkuri (startle) 15 *Kyoutan (wonder) 2 (*idiosyncratic 6) (idiosyncratic 3)
The *fear* expression		
Fear 11 **Scared 9 Surprised 8 **Fright 4 *Anxiety 3 Shocked 2 (idiosyncratic 3) (*idiosyncratic 1) (idiosyncratic 9)	**Fovo (fear) 18 **Tromos (terror) 13 Ekplixi (surprise) 3 **Xafniasma (fright) 2 (idiosyncratic 2)	Odoroki (surprise) 19 Bikkuri (startle) 10 **Kowai (fear) 5 Kanashimi (sorrow) 2 **Obiete iru (frightened) 2 (idiosyncratic 12)
The *sadness* expression		
Sad 24 *Disappointed 5 **Sorrow 3 Upset 3 Unhappy 2 Pain 2 (idiosyncratic 2) (*idiosyncratic 1) (idiosynratic 8)	**Lipi (sad) 14 *Klameni (crying) 6 Stenohoria (worry) 6 *Thlipsi (grief) 5 *Melagholia (melancholy) 2 (*idiosyncratic 1) (idiosyncratic 4)	**Kanashimi (sorrow) 31 Komaru (perplexed) 4 *Kuyashii (regret) 2 *Shitsubou (disappointment) 2 (*idiosyncratic 5) (idiosyncratic 6)

Table I. Continued

English-speaking Canadian (n = 50)	Greek (n = 38)	Japanese (n = 50)
The *anger* expression		
Anger 16 *Frustration 12 **Mad 10 Disappointed 2 (idiosyncratic 1) (idiosyncratic 9)	**Thimos (anger) 22 Nevrikos (nervous) 7 **Oryi (rage) 2 (idiosyncratic 7)	**Ikari (anger) 21 Komatta (perplexed) 7 Gaman (patience) 4 Kangae te iru (thinking) 4 Omoi dasu (remembering) 2 *Shikaru (scolding) 2 (*idiosyncratic 1) (idiosyncratic 10)
The *disgust* expression		
Disgust 28 Dislike 3 Anger 3 *Distaste 2 Unhappy 2 (idiosyncratic 3) (idiosyncratic 9)	**Aidhia (disgust) 26 (idiosyncratic 12)	**Iya (dislike, disgust, disagreeable) 25 Shimatta (having failed) 4 Ken-o (hate, dislike, disgust) 3 Kirai (dislike) 2 Mabushii (bedazzled) 2 (idiosyncratic 14)
The *contempt* expression		
Indifferent 5 Bored 4 Disbelief 3 Skeptical 3 Disgust 2 Nonchalant 2 Undecided 2 Curious 2 Irritated 2 Resigned 2 Frustrated 2 Doubt 2 (*idiosyncratic 1) (idiosyncratic 18)	Skeptikos (skeptical or thoughtful) 16 Provlimatismos (troubled) 3 Ironia (ironic) 3 Dhignomos (uncertain, of two minds) 3 Amfivolia (doubtful) 2 (idiosyncratic 12)	Mu hyoujou (no expression) 7 Nattoku (agreement) 2 Nigamushi (sour face) 2 Kangae te iru (thinking) 2 Komatta na (perplexed)2 (idiosyncratic 35)

[a]*Scored correct in the broad criterion; **scored correct both in the broad and narrow criteria.
[b]In English, idiosyncratic responses scored as correct were *jovial, cheerful, gleeful, amused, joy*, and *pleasure* for *happy; stunned* for *surprise; depressed, hopeless*, and *grief* for *sadness; aggravated* for *anger; grossed, repelled*, and *yukky* for *disgust; panicky, trepidation, worried*, and *apprehensive* for *fear;* and *disdain* for *contempt.*
In Greek, idiosyncratic responses scored as correct were *evoria* and *evtihia* for *happiness;* and *katathlipsi* for *sad.*
In Japanese, idiosyncratic responses scored as correct were *akarui kanji* and *jou kigen* for *happiness; eeh! aa souda, chuumoku, masaka, akireta*, and *azen* for *surprise; mijime, yuu-utsu sou, zan-ne-n, hikan teki*, and *renbin* for *sadness;* and *tousou shin* for *anger.*

Scoring of Responses

A difficult issue in analyzing free-response data is deciding which responses to score as "correct." Izard (1971) counted loosely related words as supportive ("correct"), whereas Ekman and Friesen (1988) argued that only "exact synonyms" or words that vary only in a dimension such as intensity can establish the relation between a specific emotion and a specific facial expression. Thus, Ekman and Friesen criticized Izard for considering words such as *scorn* and *disdain* as reasonable synonyms of *contempt*. The issue is not just methodological, but concerns the meaning of the hypothesis of universal recognition. For example, should the word *startle* be considered a synonym for *surprise*? According to Tomkins, *surprise* and *startle* are the same emotion, whereas according to Ekman, *surprise* is an emotion but *startle* is not (see Ekman, Friesen, & Simons, 1985). Should *frustration* be considered a synonym for *anger*? *Frustration* might strictly speaking be considered a situation that could lead to various responses (e.g., *depression, resignation, sadness, anger*). Neither Izard nor Ekman and Friesen have stated strict criteria for deciding how to score actual responses. We therefore devised both narrow and broad coding schemes, with an eye toward estimating the range of possible recognition scores. The reader, of course, can rescore the responses in Table I for other analyses.

The present data were first scored by a "narrow" criterion: Responses were scored correct only when observers produced the term used by Matsumoto and Ekman (1988) or an exact synonym or a word that varied only in intensity. The words considered correct are indicated by a double asterisk in Table I.

A "broader" scoring system, closer to that used by Izard (1971), was also devised. For each language, two native speakers, with the help of dictionaries, decided whether each response was or was not close to the predicted term. Disagreements were discussed until a consensus was reached. The Japanese words *kuyashi (regret* or *disappointment)* and *yuu-utsu sou (gloomy* or *depressed)* were originally judged as not close enough to the English *sad* to be scored correct. This scoring was reversed when the results from all three languages were collated in order to maintain a uniform standard. Responses that were scored correct included all those considered correct by the narrow criterion. Additional items considered correct only by the broader criteria are marked with one asterisk in Table I.

Recognition scores determined through these two methods are shown in Table II. The recognition scores presented here are not considered definitive, but serve as a rough guide to use in assessing how well the Matsumoto and Ekman (1988) predictions are supported by freely given labels. Because the narrow criterion yielded disappointingly low recognition scores

Table II. Percentages of Judgments Agreeing with Prediction[a]

Label of photograph[b]	(English-speaking) Canadian	Greek	Japanese
Narrow criterion			
Happy	100	92	70
Surprise	70	55	48
Fear	54	87	14
Sadness	58	37	62
Anger	54	63	42
Disgust	62	68	50
Contempt	00	00	00
Mean	57	57	41
Broad criterion			
Happy	100	92	84[c]
Surprise	96	55[c]	94
Fear	62	87	14[d]
Sadness	70	75	80
Anger	78	63	48[c]
Disgust	66	68	56
Contempt	02	00	00
Mean	68	63	54

[a]Labels scored as agreeing with prediction are given in Table I. A χ^2 on the frequency of correct and incorrect labels (as determined by the broad criterion) was used to compare the Canadian sample with each of the other two, separtely for each photograph.
[b]Label is that predicted by Matsumoto & Ekman (1988).
[c]$p < .05$.
[d]$p < .01$.

(overall 52% average), only results from the broader definition of correct were analyzed further. To explore cultural differences, χ^2 was used to examine differences in the frequencies of correct and incorrect responses between the Canadian sample and each of the other two. Results are discussed first by type of expression, then by culture.

Expression

Happiness. In each language, the modal response to the *happy* expression was as predicted, and the percentage of predicted responses was over 80%. Recognition was thus within the range achieved for common animals and vehicles. This result indicates that subjects understood the instructions

and could perform the task *per se*. Nevertheless, a small cultural difference emerged. The Japanese "incorrect" responses were especially interesting, suggesting a broader range of interpretations of the smile than was evident in the Canadian or Greek responses.

Surprise. Again, a cultural difference emerged. In English and Japanese, almost all responses were as predicted for the surprise photograph. In Geek, surprise was the modal response, but over a quarter of responses were a variant of *fear.*

Fear. A large cultural difference appeared for the expression labeled by Matsumoto and Ekman (1988) as *fear.* Greeks chose mainly fear-related words, Japanese chose mainly surprise-related words and a few fear-related ones, and Canadians chose both. Thus, there was considerable overlap in the labels freely produced for the *surprise* and *fear* expressions.

Sadness. The three samples gave similar responses to the *sadness* expression, with 70 to 80% scored as correct. Note, however, such nonemotions as *disappointment (shitsubou* in Japanese) were counted as correct.

Anger. A cultural difference again emerged. In English, the word *frustration* was scored as correct, and, indeed, this categorization was needed in order for even 24% of the responses to be included as correct. The Japanese interpretation, however, did not emphasize *frustration* but cognitive processes such as, in translation, *perplexed, thinking, remembering.*

Disgust. Disgust was the modal response in all three cultures, although the number of idiosyncratic responses was large.

Contempt. In no language did subjects label the JACFEE *contempt* expression as *contempt.* The most common responses were *indifferent* and *bored* in English; *thoughtful/skeptical* and *troubled* in Greek; and *expressionless* in Japanese. Only one response, *disdain,* given by one English speaker, was judged close to the predicted response. Freely chosen labels thus did not replicate the results repeatedly obtained by Ekman and his colleagues with a forced-choice response format. The forced-choice format can therefore yield nonreplicable results, and the convergent validity of claims regarding the *contempt* expression is in question. Because of this uniformly negative result, the *contempt* expression is not considered in the following discussion of culture.

Culture

Canadian. The English-speaking Canadian sample produced "recognition" scores of 96% for the *surprise* expression and 100% for the *happy* expression. They clearly understood the task. These English speakers produced recognition scores from 60% to 78% for the facial expressions re-

ported to be of *sadness, anger, disgust,* and *fear.* Thus, despite the use of an easily performed response task and the latest set of photographs, 20% to 40% of responses for these four negative expressions remain unaccounted for by the Matsumoto and Ekman (1988) hypothesis. Nevertheless, these normative results are the highest recognition scores obtained to date with free labeling.

Greek. The Greek sample produced a recognition score of 92% for the smile and thus clearly understood the task. For the facial expressions of *surprise, sadness, anger, disgust,* and *fear,* recognition scores ranged from 55% to 87%. Thus 13% to 45% of responses remain unaccounted for. Unlike the Canadian data, fear-related words appeared in response to the *anger, sad,* and *surprise* expressions as well as the *fear* expression.

Japanese. The Japanese sample produced recognition scores of 84% and 94% for the facial expressions of *happiness* and *surprise,* respectively, and clearly understood the task. As noted earlier, previous evidence had suggested a language or cultural difference in the response to the expressions labeled *fear, anger,* and *disgust.* The range of predicted responses was 62% to 78% in the Canadian and 63% to 87% in the Greek sample, but noticeably lower in the Japanese: 14% to 56%. Thus, for these three expressions, 44% to 86% of Japanese responses remain unaccounted for.

The freely produced labels suggest that no one explanation accounts for the lower recognizability of *fear, anger,* and *disgust* expressions by the Japanese. The Japanese often (62%) gave *surprise* as a response to the *fear* photograph. The Japanese base rate for *odoroki/surprise* may be quite high; it may be a highly accessible category. The Japanese base rate for *kowai (fear)* might be low. Note that in contrast to the results from Greece, the Japanese never gave *kowai/fear* as a response to the *surprise* photograph.

The Japanese response to the *anger* expression was *anger* in almost half the cases, but the majority chose some other label—*perplexed, enduring, remembering, thinking*—that was not always a clear emotion despite the explicit request for an emotion label.

The Japanese response to the *disgust* expression typically involved the word *iya,* which includes *disgust* as a meaning and was therefore scored correct, although its meaning is broader, including *dislike.* The remaining labels were quite varied: *feeling of having failed, glaring, embarrassed,* or *angry,* for example.

CONCLUSION

Izard (1977, p. 501) wrote, "people in the course of normal development should become capable of easily recognizing facial expressions of the

emotions and it should be easy to demonstrate this recognition experimentally." The photographs used here were the latest developed by Ekman and his associates. These still, color photographs have been claimed to portray universal facial signals of basic emotions reliably and validly and with no extraneous muscle movements. The observers studied here were adult native speakers given a preview of the set of facial expressions. They had as much time as they wanted to study the photographs and they were specifically directed to name the emotion conveyed.

Each language group produced a majority of responses easily understood in Izard's framework. In 17 of 21 cases, the modal response was as predicted. Undoubtedly some readers will take these results as further evidence for the theories of Ekman (1972) and Izard (1971). Nevertheless, the present results cannot be taken as definitive support for the classical theories. The difficulties encountered in scoring the data reveal that the universality hypothesis is not yet completely and consensually specified. A trade-off exists such that broadening the list of predicted responses yields higher recognition scores but at the cost of a vaguer hypothesis; a specific response for a given expression can be predicted but with lower recognition scores. The lack of ecological validity of the method used here and in previous studies of freely produced labels means that we could not generalize the results, even if perfect, to the spontaneous recognition of naturally occurring facial expressions. And, even with this method, each group produced a large number of responses not so easily understood within the traditional framework. These results can thus be taken as a stimulus to develop a theory that could account for a larger proportion of the data.

When the present results are considered in combination with those reported by Izard (1971), Sorenson (1976), and Boucher and Carlson (1980), they confirm four suggestions from previous studies.

First, observers responded with a range of labels to a given facial expression. Thus, recognition scores, being either–or, might hide variation in response within each type of expression (a variation similarly hidden by a forced-choice response format). This result is reminiscent of Woodworth and Schlosberg's (1954) contention that facial expressions are interpreted in terms of broad, overlapping clusters of emotion labels rather than specific, discrete basic emotions. Russell and Bullock (1986) argued for a similar approach phrased in terms of fuzzy sets.

Second, the overall recognition scores obtained with freely produced labels were lower than had been obtained with forced choice, even with a broad rather than narrow definition of what to count as a correct label. Moreover, in at least one case (contempt), forced-choice and free labels were highly discrepant.

Third, degree of recognition varied with type of expression. The traditional account did better for some types of expression (happiness) than for others (contempt). Together, previous and present results indicate that intermediate recognition scores with free label are a reliable finding for most facial expressions. The only consistent exceptions were the happy expression at the high end and contempt at the low.

And fourth, recognition for particular types of facial expression varied with culture. Cultural differences thus remain despite the use of the latest set of photographs. For example, the fear expression may be recognizable in American, Canadian, French, and Greek cultures, but not or only minimally recognizable in non-Western cultures. Consider the non-Western samples for whom free-label data are available: Recognition of the fear expression was 14% in the present Japanese sample; it was nonsignificant in Boucher and Carlson's (1980) Malaysian sample and in Sorenson's (1976) Bahemino sample; recognition scores in Sorenson's (1976) Fore sample were 23%, 30%, and 54% for those Fore with least, intermediate, and most contact with the West, respectively.

There appeared to be no one explanation of cultural differences seen here and the lack of a one-to-one correspondence between face and emotion label. Undoubtedly many possibilities exist, but one possibility concerns the meaning of the face. It may be no coincidence that the photographs and hypothesis examined here were developed by English speakers and that English-speaking observers gave the highest support for that hypothesis. In some cases, the Greek and Japanese observers gave more varied interpretations to a given face, as if the "signal" was not as clear. Why the signals would be clearer in some cultures than another has not been a focus of traditional theories. All faces shown here were Caucasian, and the Japanese respondents might have been unfamiliar with judging Caucasian faces. (Of course, familiarity is not considered a major factor in the classical theories of Ekman and Izard.) Moreover, for some facial expressions, the Greek or Japanese interpretation was not simply more diffuse but shifted.

Another possibility is that emotion concepts vary with language (Russell, 1991a), despite the appearance to the contrary implied by their being translated one for one. For example, concepts might vary in accessibility (Bruner, 1957) or in breadth or in the degree to which they overlap. Consider the responses seen here to the fear and surprise expressions. The overlap of responses for the expressions of surprise and fear confirm previous findings that these two types of expression are sometimes labeled equivalently (Ekman, 1972; Woodworth, 1938; Woodworth & Schlosberg, 1954). However, rather than conclude that observers confused the two, we believe it is possible that the concepts of fear and surprise overlap. The Greek emotion concept related to fear (fovo, nevrikos, stenohoria, tromos)

may be broader in scope than the English word *fear,* in the sense that Greek *fear* words may apply to a broader range of cases. Thus, some fear-related word appeared in response to the *sad* expression [*stenohoria* (worry)] and to the *anger* expression [*nevrikos* (nervous)] as well as to the *surprise* and *fear* expressions. In contrast, the Greek counterpart of *surprise* is narrower in scope than the English word *surprise.* Japanese concepts show the opposite pattern. The Japanese cluster related to *surprise (odoroki)* might be somewhat broader in scope than its English translation here, *surprise,* and much broader than its Greek counterpart. Thus, *odoroki* was found by some Japanese observers to apply to both *fear* and *surprise* expressions. In contrast, *kowai,* translated here as *fear,* would be narrow, applying to fewer events.

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