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Toward a Dialect Theory: Cultural Differences in the Expression and Recognition of Posed Facial Expressions

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Two studies provided direct support for a recently proposed dialect theory of communicating emotion, positing that expressive displays show cultural variations similar to linguistic dialects, thereby decreasing accurate recognition by out-group members. In Study 1, 60 participants from Quebec and Gabon posed facial expressions. Dialects, in the form of activating different muscles for the same expressions, emerged most clearly for serenity, shame, and contempt and also for anger, sadness, surprise, and happiness, but not for fear, disgust, or embarrassment. In Study 2, Quebecois and Gabonese participants judged these stimuli and stimuli standardized to erase cultural dialects. As predicted, an in-group advantage emerged for nonstandardized expressions only and most strongly for expressions with greater regional dialects, according to Study 1.

Keywords: emotion, expression, recognition, dialects, in-group advantage

An enduring question in the study of emotional facial expressions is the extent to which these expressions are universal (e.g., Darwin, 1872/1965) versus culturally determined. A considerable body of research supports the conclusion that the expression of emotion is largely universal and biologically evolved, for example, through similarities between human and nonhuman emotional expressions (e.g., Chevalier-Skolnikoff, 1973; Darwin, 1872/1965; Redican, 1982) and the mutual recognition of emotional signals across species boundaries (e.g., Itakura, 1994; Linnankoski, Laasko, & Leinonen, 1994). Across cultures, classic studies by Ekman, Izard, and their colleagues (Ekman, 1972, 1994; Ekman et al., 1987; Izard, 1971) have demonstrated that displays of basic emotions are well recognized even across cultures that have relatively little contact with each other. This view contrasts with perspectives viewing emotional behavior as determined completely by cultural influences on social prescriptions (e.g., Lutz & White, 1986; Wierzbicka, 1994).

Many approaches take an intermediate position (e.g., Ekman, 1972; Fiske, Kitayama, Markus, & Nisbett, 1998; Fridlund, 1994; Mesquita, Frijda, & Scherer, 1997; Rosenthal, Hall, DiMatteo, Rogers, & Archer, 1979), acknowledging both universals and cultural variations in the expression and recognition of emotion. The current article focuses on one such intermediate perspective: the dialect theory of communicating emotion. Dialect theory proposes the presence of cultural differences in the use of cues for emotional expression that are subtle enough to allow accurate communication across cultural boundaries in general, yet substantive enough to result in a potential for miscommunication (Elfenbein & Ambady, 2002b, 2003).

Elaborating the Dialect Theory

In linguistics, dialects are the variants or varieties of a language used by different speakers who are separated by geographic or social boundaries (Francis, 1992; Romaine, 1994). Although there is an old adage that a language is simply a dialect with its own army and navy (Fasold, 1984)—suggesting a sometimes arbitrary distinction between the two concepts—linguists argue that dialects but not languages should allow basic mutual comprehension (O'Grady, Archibald, Aronoff, & Rees-Miller, 2001). Accordingly, the dialect theory of communicating emotion argues that the language of emotion is universal. As with other languages, different cultures can express themselves in different dialects, which is the first proposition of dialect theory. The second proposition is that the presence of dialects has the potential to make the recognition of emotion less accurate across cultural boundaries.

Again using concepts imported from linguistics to articulate this theoretical framework, even small changes in language can create confusion. A *minimal pair* consists of "two forms with distinct

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meanings that differ by only one segment found in the same position in each form" (O'Grady et al., 2001, p. 65). Words in a minimal pair are easily confused with each other when enunciated differently, sometimes through very small shifts (Burquest & Payne, 1993). For example, one of the authors had a family friend—with a French accent and newly arrived in the United States via an ocean cruise—who created bemusement when, on being complimented on a wool sweater, responded that she had knit it on the shēp (ship/sheep). There would have been no bemusement if the two words had not differed only in this small shift in pronunciation.

Extending these verbal concepts to the nonverbal communication of emotion, some expressions may be relatively easily confused with others taking a similar form. For example, posed facial expressions of fear and surprise are frequently confused with each other within a cultural group, but even more frequently in cross-cultural judgments (Elfenbein, Mandal, Ambady, Harizuka, & Kumar, 2002). Likewise for posed vocal expressions—confusions of fear with sadness and joy with neutral are common within a single cultural group, but the same confusions are more common in judgments crossing cultural boundaries (Scherer, Banse, & Wallbott, 2001). In contrast, facial expressions of happiness are rarely confused with other facial expressions, because this expression is too distinct from other expressions, just as words with greater redundancy and distinction from others may be understood even when several phonemes are mispronounced. Thus, not all variations between forms may lead to problems in recognition, but sometimes small changes may entrain considerable potential for confusion.

In the current research, we aimed to test the propositions of dialect theory. To date, these propositions—that there can exist subtle emotional dialects across cultures with the potential to reduce cross-cultural emotion recognition—have been inferred rather than tested explicitly. Below we describe the base of research supporting these propositions.

Cross-Cultural Differences in Emotional Expressions

Evidence for the dialect theory so far is indirect and essentially stems from some of the same research that supports the notion of universality. Specifically, in the classic studies on universals in emotional expression mentioned above, samples outside the United States rarely achieved accuracy rates as high as American samples when viewing these American stimuli. Ekman and colleagues reported accuracy rates ranging from 86% for Americans (Ekman, 1972) to 53% for tribespeople in New Guinea (Ekman, Sorensen, & Friesen, 1969). In the most extreme case, the Bahinemo tribe they tested could not respond to the individual photographs and labeled them all as "angry" (Sorensen, 1975). Thus, members of different cultures judging American emotional expressions appear to vary substantially in their recognition accuracy. Elfenbein and Ambady's (2002b) meta-analysis of cross-cultural emotion recognition studies found—across different research procedures and nonverbal channels—that individuals were better at recognizing emotional expressions from members of their own cultural group (see also Elfenbein & Ambady, 2002a; Matsumoto, 2002). Geographical proximity and cross-cultural contact seemed to reduce the extent of this in-group advantage. Accordingly, Elfenbein and Ambady (2002b, 2003) speculated that the in-group advantage might stem from subtle variations in the style of encoding across cultures, such that judgments are faster and more accurate for perceivers familiar with these subtle variations. They argued that the universal language of emotion could have dialects that differ subtly from each other, following Tomkins and McCarter's (1964) metaphor that cultural differences in emotional expression are like "dialects" of the "more universal grammar of emotion" (p. 127; see also Rosenthal et al., 1979).

A further observation providing indirect support for the existence of cultural dialects is that the in-group advantage disappears in cases in which stimulus materials from different groups are constrained to have an identical appearance across cultures (e.g., Beaupré & Hess, 2005; Biehl et al., 1997), suggesting a connection between cultural differences in emotional expression style and the in-group advantage in recognition accuracy. However, no research has directly described dialects in posed facial expressions and documented their potential to decrease recognition rates. This was the goal of the present research.

Cultural Familiarity Versus Perceiver Effects

The differences in emotion recognition rates for cultural in-group versus out-group expressions might alternately be explained through other mechanisms. The first researchers to note an in-group advantage in their data referred to it as ethnic bias (e.g., Kilbride & Yarczower, 1983; Markham & Wang, 1996), suggesting that perceivers are less motivated to accurately decode emotional expressions from members of visibly different cultural groups. This fits evidence that decoders are more accurate in their judgments of emotions they believe to have been expressed by in-group rather than out-group members (Hess, Senécal, & Kirouac, 1996; Thibault, Bourgeois, & Hess, in press). Furthermore, stereotypes about the likely emotions experienced by members of different cultural groups (Kirouac & Hess, 1999) may reduce the comprehension of out-group emotional expressions. For example, a stereotype that Germans have no sense of humor could lead observers to make too few attributions of amusement to German expressors, and this response bias could influence their overall judgment accuracy—for the worse if the base rate of expressions presented includes many that are humorous.[1] Alternately, such bias could increase accuracy if the expressions viewed are not humorous in the least. Yet, other empirical results demonstrate in-group advantage that is difficult to attribute to stereotype bias. For example, in studies of still facial expressions among multiple Caucasian groups (e.g., Ekman, 1972; Izard, 1971), participants did not know the origin of stimulus persons and thus could not apply such stereotypes, yet there was evidence of an in-group advantage. They could plausibly respond to the emotional expressions as being from out-group members only if the expressions themselves contained some cues to cultural group membership. These data allow us to infer that the in-group advantage is about culture per se, and not about ethnicity. If bias against individuals from another ethnicity—or small morphological differences across ethnic groups—were to create the in-group advantage, then one would not expect to see the effect among multiple cultural groups of the same ethnicity.

The language used by the decoders may also have an impact on decoding accuracy. When emotion concepts are translated from one language to another, the labels applied may evoke subtly different

[1] We thank Gernot Horstmann for this example.

connotations and thereby bias decoding (Matsumoto & Assar, 1992; Mesquita & Frijda, 1992). Yet, as with ethnic bias, some studies show in-group advantage in settings in which decoder groups share the same native language (Elfenbein & Ambady, 2002b).

Another account for cross-cultural differences in the recognition of emotion focuses on the impact of *display rules* and *decoding rules* (Buck, 1984). Display rules (Ekman, 1972) are "management techniques" (p. 225) that allow individuals to "decouple their expressions from their feelings" (p. 127). They are defined

> as procedures learned early in life for the management of affect displays and include deintensifying, intensifying, neutralizing, and masking an affect display. These rules prescribe what to do about the display of each affect in different social settings; they vary with the social role and demographic characteristics, and should vary across cultures. (Ekman et al., 1969, p. 87)

That is, display rules interrupt the full coherence between emotional experience and emotional display. Contrary to display rules, nonverbal dialects are subtle variations in the appearance of a display of the same emotion. That is, dialects involve differences in the expressive elements used to convey a particular emotion rather than an adjustment of an expression's intensity or the substitution of a qualitatively different emotion. For example, a display rule in Western cultures is that boys are not supposed to cry. Thus boys are more likely than girls to suppress their tears and to put on a brave front by smiling. In opposition, the notion of a cultural dialect does not propose to suppress or minimize an expression, but rather predicts that the morphological features of the full-blown and freely shown expression will differ subtly across cultural groups.

Expanding the concept of display rules to the perception of emotion, decoding rules are management techniques that allow individuals to decouple the acknowledged perception of emotion from their sincere judgment. Decoding rules allow individuals to substitute a different emotional state or attribute differences in intensity to the expressions that they perceive (Buck, 1984). For example, Matsumoto (1989) argued that members of collectivistic cultural groups inhibit their ability to understand negative expressions that could threaten to damage social harmony. Decoding rules have not been proposed to account for the in-group advantage effect that the dialect theory seeks to explain, because to be consistent with the data for in-group advantage it would be necessary for decoding rules to reduce accuracy less for in-group than for out-group judgments. However, the theoretical foundation for decoding rules generally suggests the opposite—that is, as they are applied in the service of maintaining group harmony, they would be preferentially applied to the in-group. The presence of an in-group advantage for positive emotion (Elfenbein & Ambady, 2002b) further speaks to the difficulty of explaining the in-group advantage via decoding rules, which have been posited largely in terms of regulating negative emotion. Even so, it is important to control for the possible influences of decoding rules in research that attempts to evaluate the dialect theory.

Given these proposed influences on cultural variation in the accuracy of recognizing emotional expressions, it is important to conduct any test of dialect theory in contexts that limit alternative explanations. The present research tested groups that were culturally dissimilar yet shared the same primary language of communication and had comparable age and education levels. Second, we accounted for the possible impact of stereotype bias and decoding rules by using two sets of stimulus materials—one in which expressions may show cultural dialects and one in which expressions have been standardized to erase possible cultural dialects (Beaupré & Hess, 2005). The standardized expressions served as a control for the perceiver effects discussed above—such as greater motivation or preference for one's own perceived ethnic group, stereotypes about the likely emotions experienced by different groups, and decoding rules—which should all be equal when judging these two sets of expressions.

Thus, a finding of in-group advantage for the dialect expressions, but not for the standardized expressions, would allow the inference that the in-group advantage resulted from cross-cultural differences in expressive style rather than other possible factors.

Dialects Across Emotions

Although the discussion above does not distinguish between different emotional states, emotional dialects may not affect all emotional expressions equally. Emotions differ regarding the type of social intention communicated (e.g., Fridlund, 1994). Facial emotion displays are inherently polyvalent. They do not only serve to signal emotional states, but may also be used as emblems (Ekman, 1979), as interjections (Motley, 1993), and as signals to indicate that one empathizes with and understands another person's state (Bavelas, Black, Lemery, & Mullett, 1986). In their role as interactional signals, emotion expressions also serve to establish and maintain aspects of relationships between interaction partners. For example, facial expressions of anger serve to communicate high dominance and low affiliation, whereas expressions of happiness communicate both high dominance and high affiliation (Hess, Blairy, & Kleck, 2000; Knutson, 1996).

For these reasons, we argue that regional dialects may vary in their impact across emotions. Considering verbal expressions in terms of the function of a message, Bühler (1934) made a distinction among three roles: the symbolic function, the symptomatic function, and the appeal function. The first refers to the sign content of the message and conveys information directed at the interaction partner. The second, the symptomatic function, corresponds to a readout of the individual's state. The third function serves as a possible request for action by the interaction partner. Clearly, the expression of each emotion has the potential to span all three of these functions, which would vary on the basis of the specific contexts and elicitors (see Hess, Banse, & Kappas, 1995). However, some emotions are more likely than others to serve in some rather than other functions.

We argue that those emotional signals serving more often and more explicitly as social signals and appeals are the most likely to develop regional variation over time, versus innate emotional signals that reflect reflexes and strongly biological components. We distinguish between those emotions mainly elicited in social interactions versus those that are often elicited by nonsocial events.[2] For example, contempt is an emotion generally used as a means of social sanction and should therefore have more room to lend itself to variations. Shame, embarrassment, and happiness are likely to have a social object as well. Like contempt, anger also serves a strong role as social sanction, even though its display has

[2] We thank an anonymous reviewer for this form to articulate our hypothesis.

some features that are shared across species, such as the stare. By contrast, some emotions appear to be more strongly linked to reflexes and less explicitly directed at a social object. For example, both disgust and surprise share the majority of their features with reflexes closely linked to the typical elicitators of these emotions, the gustofacial reflex for disgust and the startle reflex for surprise (but see also Ekman, Friesen, & Simons, 1985). Again, the possible impact of cultural dialects on such expressions may be muted. Likewise, as Darwin (1872/1965) noted, displays of fear are very similar across mammals, hence they should not be expected to vary much across cultural groups.

Overview of Studies

In this article, we present two studies designed to test directly the two propositions of dialect theory: that there are subtle differences in emotion expressions across cultures and that these subtle dialects have the potential to reduce decoding accuracy. Study 1's goal was to highlight reliable differences in the facial activation used in posing emotional expression across cultural groups that exist alongside a broad degree of universality. Study 2 tested the hypothesis that these reliable differences, in turn, lead to reduced accuracy in interpersonal judgments. Thus, the present research proposes a two-pronged approach to examining both encoding and decoding differences.

Participants were male and female university students from sub-Saharan Africa (Gabon) and North America (Quebec, Canada). These two groups are culturally dissimilar, thus providing a setting that enhances the extent of possible cultural effects. In both regions, the language of education is French, and students tend to be first-generation university attendees. Thus, the groups are comparable along factors that can create decoding differences, such as gender, language, age, and education level (Fridlund, 1994; Hall, 1978, 1984; Izard, 1971; Kirouac & Doré, 1985; Mesquita & Frijda, 1992).

We used posed facial expressions in these studies for two reasons. First, the cross-cultural research on emotion recognition that serves as the foundation for dialect theory has relied largely on posed expressions (Fridlund, 1994; Russell, 1994). Most cross-cultural research on emotional expression has used stimuli in which expressors were free to provide their own interpretation and best portrayal of an appropriate emotional display (e.g., Mandal, Bryden, & Bulman-Fleming, 1996; Markham & Wang, 1996; Scherer et al., 2001), although some previous research has used expressions in which posers received explicit instructions that were usually derived from studies of intense spontaneous expression (e.g., Ekman & Friesen, 1976). Because the current studies attempted to test a proposed mechanism for a previously documented effect, it was important to conduct this test using methods comparable to the majority of that work.

Second, given theoretical foundations for facial expressions serving both signal and social communication functions (e.g., Fridlund, 1994; Jakobs, Manstead, & Fischer, 2001), posing is a method that can elicit purposeful expressions created to communicate an emotional state clearly to a social audience in a way that is consistent for all participants. Such expressions are intended to communicate what is socially normative within each cultural group. Indicating the intended emotional state to participants also avoids the potentially idiosyncratic appraisals by participants of the eliciting situations in studies designed to examine spontaneous emotion. In fact, given the inevitable differences in goal states and coping potential among participants, it is almost impossible to constrain emotion-eliciting situations such that all participants will appraise the situation in the same way. Yet, if specific appraisals entrain specific facial actions (e.g., Scherer, 2001), then differences in expressive behavior may result simply from differences in the perception of the emotion-eliciting situation. Although professional actors can provide highly clear and recognizable emotional portrayals, their expressions can be influenced by extraneous factors such as specific schools or norms of professional training that can vary across cultural groups. Therefore, the present protocol asked laypersons to pose expressions according to verbal labels with the goal of being well understood by friends so as to elicit culturally normative emotional displays in both groups.

We operationally defined the presence of cultural dialects in terms of systematic differences across cultures in the facial muscles activated to pose the same intended emotions. If participants aimed to show the same emotional display to a comparable social audience, but that display nonetheless showed systematic differences in its physical form across cultures—differences in expressive style beyond differences in intensity or the complete substitution of another emotional state—this provides evidence for the presence of nonverbal dialects.

Study 1

The dialect theory of communicating emotion argues that cultural differences in the expression of emotion are like dialects of a universal language. Accordingly, Study 1 tested two hypotheses derived from this theory.

> *Hypothesis 1:* There are differences in the facial activation used to portray emotional expression across cultural groups.

Consistent with earlier arguments, we also expected to find differences in the extent to which there are dialects across emotions that are mainly elicited by social interactions versus nonsocial events:

> *Hypothesis 2:* Differences in facial activation will emerge for anger, contempt, shame, embarrassment, happiness, sadness, and serenity. By contrast, differences are not expected for disgust, fear, and surprise.

Method

Participants. Fifteen men and 15 women were recruited at each location (University of Quebec at Montreal, Quebec, Canada, and Omar Bongo University, Libreville, Gabon). All participants were undergraduate or graduate students, with ages ranging from 20 to 30 years (Gabonese: $M = 26.1$, $SD = 2.6$; Quebecois: $M = 26.1$, $SD = 4.5$), and all were competent speakers of French who had acquired the language before the age of 6 and spoken it consistently to adulthood.

Procedure. The protocol asked participants to provide displays intentionally designed to communicate their emotional state clearly to a consistent social audience, to pose emotional expressions such that "their friends would be able to understand easily what they feel." For each pose, participants received the emotion

label and a dictionary definition of the emotion term from a standard French dictionary (Petit Robert, 2004). Participants were allowed to use a mirror to test various expressions. Participants were filmed throughout the session. Once they were satisfied with their pose, they pressed a button that rang a bell, and the experimenter provided them with the next label. Experimenters kept out of view of the participants during the posing phases and did not provide feedback or recommendations of any kind. Using this protocol, each participant posed 10 emotional states: anger (*colère*) contempt (*mépris*), disgust (*dégoût*), embarrassment (*embarrass*), fear (*peur*), happiness (*joie*), sadness (*tristesse*), serenity (*sérénité*), shame (*honte*), and surprise (*surprise*). These consisted of the 6 states largely agreed to represent basic emotions (anger, disgust, fear, happiness, sadness, and surprise; e.g., Ekman, 1972, 1992) and two states considered by some but not all theorists as basic emotions (contempt and shame; e.g., Izard, 1971; Izard & Haynes, 1988; Matsumoto, 1992; Ricci Bitti, Brighetti, Garotti, & Boggi-Cavallo, 1989; Russell, 1991), along with two secondary emotions included for exploratory purposes and to increase the number of positive states under consideration (embarrassment and serenity; e.g., Hess, Senécal, et al., 2000; Keltner & Buswell, 1997).

Coding of emotional expressions. As described above, we operationally defined the presence of cultural dialects in facial expressions as reliable differences across cultures in the facial muscles activated to pose the same intended emotions. To measure these possible cultural differences, the apex expressions of the attempt for which participants signaled their satisfaction were coded by means of Ekman and Friesen's (1978) Facial Action Coding System (FACS) by a certified FACS coder. These codes allow a detailed description of the expressive features of the face. Apex expressions, defined as the point of maximal intensity of the expression at or close to the participants' auditory signal, were digitized and saved as still photographs. Of the expressions, 10% were also coded by a second certified FACS coder, yielding a 82.2% agreement level that compares favorably with the average interrater reliability of 75.6% cited in the FACS manual (Ekman & Friesen, 1978). Facial action units (AUs) that were shown by at least 5 participants were dummy coded for absence and presence for each participant for inclusion in analyses. All AUs related to head or eye movements were grouped together unless they reached the criterion of being shown by at least 5 individuals. Any AU shown by fewer than 5 expressors was coded as "other."

Results

Table 1 summarizes the count of facial AU enervation for each emotional state for each cultural group. Although the discriminant analyses described below include only those AUs shown by at least 5 participants, Table 1 includes all AUs to provide a complete description of the data. In Figure 1, the first column shows the AU pattern of the prototypical emotion expressions that have been used in cross-cultural emotion recognition studies (e.g., Ekman et al., 1987) or that have been proposed to be universal in other contexts (Keltner, 1995; Wiggers, 1982). Columns 2 and 3 present the displays determined to be the most representative dialects in the analyses below. Speaking to emotional expression as a universal language, the final row of Table 1 illustrates sizable profile correlations (Galati, Scherer, & Ricci-Bitti, 1997) between the AUs activated by the two groups (average $r = .87$).

The first hypothesis was that the universal language of emotion contains dialects in the form of reliable differences in the AUs enervated to express the same emotional states. To test this hypothesis, we performed discriminant analyses on the AUs separately for each emotional state, excluding those AUs displayed by fewer than 5 participants ($M = 10.5$ AUs included in each analysis, $SD = 3.7$). Such an analysis is akin to a logistic regression performed once for each emotion, in which the participant is the unit of analysis, the cultural group is the dependent variable, and the series of facial AUs—present versus absent—serve as predictor variables. If posers can be classified on the basis of the absence and presence of specific expressive elements in their poses, then this would indicate a systematic regional variation in the profile of expressions. In support of this proposition, Table 2 summarizes the discriminant function analyses for each emotion. As goodness-of-fit statistics, smaller values of Wilks's lambda and larger values of chi-square represent better discrimination between the two cultural groups on the basis of their facial expressions. The tests for these values evaluate the significance of the overall models and adjust for the large number of FACS codes entered as coefficients. Table 2 also illustrates the percentage correctly classified from the original sample, in total and for each encoder group, for all significant analyses.[3] In support of Hypothesis 1, Quebecois and Gabonese encoders could be reliably distinguished on the basis of their pattern of expressions for 7 of the 10 emotions tested. This indicates that differences in the style of posing affective displays were not merely idiosyncratic, but that there were systematic differences across the two cultural groups.

The second hypothesis was that evidence for cultural differences would vary across the emotional states tested. Significant regional variation emerged in six of the seven predicted emotional states—in decreasing order, serenity (93.3%), contempt (86.7%), sadness (81.7%), happiness (76.7%), shame (76.7%), and anger (71.7%)—and failed to emerge in two of the three states predicted—disgust and fear. Contrary to prediction, weak yet significant variation emerged for surprise that was better than chance in classifying only one of the two groups, and no variation emerged for embarrassment.

We followed up on this overall analysis by examining the extent to which there were reliable group differences across each AU. Table 3 presents tests for each emotion for any AU that was displayed by at least 5 participants, using Barnard's unconditional exact test (Suissa & Shuster, 1985).[4] Below we describe for each emotion the modal expressions and reliable differences.

Serenity. Serenity expressions shown by Quebecois encoders were characterized by a slight smile, whereas the modal Gabonese expression was a more relaxed face without activation detectable via FACS.

Contempt. The prototypical contempt expression has been described as a unilateral lip curl (AU14). In fact, none of the encoders in the sample showed that expression. The most common combination for Gabonese encoders was AU10 (upper lip raiser)

[3] These values are likely to be overestimates of the percentage correctly classified if the same discriminant function is generalized to new posers sampled from the same population.

[4] We thank an anonymous reviewer for alerting us to the Barnard unconditional exact test.

Table 1
Facial Action Units Appearing in Posed Culturally Normative Expressions of Emotion From Participants in Gabon and Quebec: Study 1

	No. posers with enervation of the action unit																			
	Anger		Contempt		Disgust		Embarrass		Fear		Happiness		Sadness		Serenity		Shame		Surprise	
Action unit	Q	G	Q	G	Q	G	Q	G	Q	G	Q	G	Q	G	Q	G	Q	G	Q	G
1. Inner brow raiser	1	6	9	2	5	2	16	8	19	20	1	4	8	4	0	2	9	2	26	27
2. Outer brow raiser	1	0	4	2	3	1	10	7	18	18	2	4	1	0	0	1	2	2	27	27
4. Brow lowerer	27	27	21	9	24	23	8	7	9	10	0	2	20	10	0	0	12	5	0	0
5. Upper lid raiser	14	18	4	2	3	6	8	5	28	25	0	0	1	0	0	1	3	3	24	22
6. Cheek raiser	1	0	1	0	8	6	4	0	3	0	16	8	0	1	0	0	4	0	0	0
7. Lid tightener	12	7	10	3	9	7	5	3	1	0	3	1	9	5	4	2	2	2	0	0
8. Lips toward each other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9. Nose wrinkler	1	2	2	4	14	15	0	0	0	0	0	0	0	0	0	0	1	0	0	0
10. Upper lip raiser	1	2	13	21	12	12	3	1	3	0	0	0	1	1	0	0	1	1	0	0
11. Nasolabial porrow deepener	0	0	0	2	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
12. Lip corner puller	0	0	5	4	7	6	10	7	4	2	30	30	0	1	28	5	2	4	26	19
13. Sharp lip puller	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
14. Dimpler	0	0	2	1	2	0	4	6	0	1	1	0	1	0	0	0	6	6	0	0
15. Lip corner depressor	2	0	3	9	3	7	3	0	0	0	0	0	12	5	0	0	2	0	0	0
16. Low lip	5	0	0	0	0	2	1	0	2	2	1	0	0	0	0	0	0	0	0	0
17. Chin raiser	6	6	14	19	11	14	8	5	0	0	0	0	9	6	2	0	6	4	0	0
18. Lip pucker	3	9	1	2	2	1	4	1	2	2	0	0	0	2	0	1	1	0	1	1
19. Tongue show	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20. Lip stretcher	0	0	0	0	1	1	2	0	5	2	0	0	0	0	0	0	3	0	0	0
21. Neck tightener	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
22. Lip fummeler	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
23. Lip tightener	4	1	0	0	0	1	2	1	0	0	1	0	0	0	0	0	1	0	0	1
24. Lip presser	5	1	3	0	1	0	3	0	0	0	0	0	0	0	0	0	2	0	0	0
25. Lips part	7	2	0	0	9	7	4	4	6	4	6	20	1	0	3	0	2	1	2	1
26. Jaw drop	0	0	0	0	6	5	2	1	17	13	14	7	1	0	0	0	0	0	20	26
27. Mouth stretch	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
28. Lip suck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29. Jaw thrust	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30. Jaw sideways	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
31. Jaw clencher	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32. Lip bite	0	1	1	1	0	1	3	7	0	2	0	0	0	1	0	0	5	3	0	0
33. Cheek blow	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
34. Cheek puff	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35. Cheek suck	0	0	0	0	0	0	1	0	0	0	0	0	1	2	0	0	2	0	0	0
36. Tongue bulge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
37. Lip wipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38. Nostril dilator	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39. Nostril compressor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41. Lid droop	0	0	4	0	0	0	0	0	0	0	1	0	0	0	3	0	1	0	0	0
42. Slit	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43. Eyes closed	1	0	1	0	3	0	1	1	0	0	1	0	3	0	4	0	2	0	0	0
44. Squint	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45. Blink	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46. Wink	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51. Head turn left	2	0	1	3	0	0	2	1	1	1	0	0	0	1	0	0	0	0	1	0
52. Head turn right	0	3	3	5	2	2	6	3	0	1	0	1	1	3	1	2	5	6	1	0
53. Head up	0	1	5	0	0	1	0	3	1	0	1	1	1	0	8	5	0	0	1	0
54. Head down	5	5	0	6	2	5	5	8	1	5	0	0	5	7	1	1	10	19	3	5
55. Head tilt left	0	1	2	0	0	3	2	3	0	0	0	0	0	4	4	1	1	6	0	0
56. Head tilt right	0	0	0	3	0	1	0	3	0	0	0	2	0	13	2	2	0	4	0	1
57. Head forward	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58. Head back	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61. Eyes turn left	0	1	1	2	0	0	0	3	0	0	0	0	0	0	0	0	0	3	0	0
62. Eyes turn right	0	0	0	2	0	0	5	1	0	1	0	0	0	1	0	0	2	2	0	0
63. Eyes up	0	1	0	1	0	0	0	4	0	1	0	0	0	0	0	2	1	1	0	0
64. Eyes down	0	0	0	5	2	0	3	4	0	2	0	0	5	4	0	0	6	9	0	0
65. Walleye	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
66. Cross-eye	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
None	0	1	0	0	0	0	0	0	0	1	0	0	2	0	0	14	0	0	0	0
r	.91		.72		.95		.77		.97		.87		.66		.35		.70		.98	

Note. $n = 30$ for each group. Q = posers from Quebec; G = posers from Gabon.

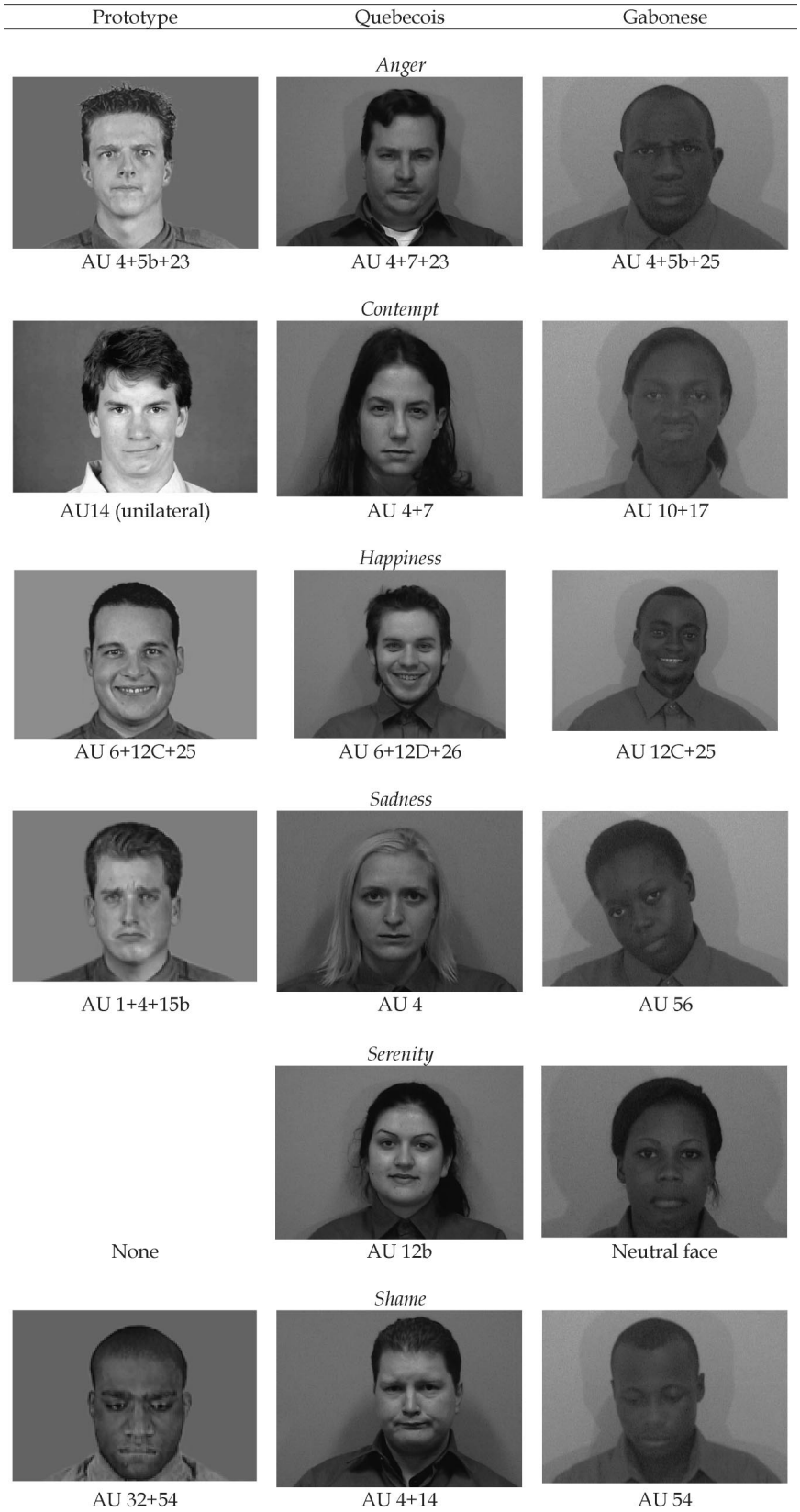

Figure 1. Illustrative examples of regional dialect variations for anger, contempt, happiness, sadness, serenity, and shame. AU = action unit.

Table 2
Results of Discriminant Analyses Comparing Culturally Normative Facial Expressions of Emotion From Quebecois Versus Gabonese Posers: Study 1

Emotion	Wilks's λ	Chi-square	*p*	*df*	Canonical correlation	% Correctly classified		
						Overall	Quebecois	Gabonese
Serenity	.29	66.76	.001	8	.84	93.3	100.0	86.7
Sadness	.52	35.05	.001	9	.69	81.7	93.3	70.0
Contempt	.56	30.37	.004	13	.67	86.7	90.0	83.3
Shame	.61	26.11	.004	11	.60	86.7	66.7	76.7
Happiness	.76	15.29	.004	5	.49	76.7	83.3	70.0
Anger	.63	23.72	.022	12	.61	71.7	66.7	76.7
Surprise	.79	13.00	.043	6	.46	66.7	50.0	83.3
Disgust	.75	14.90	.385	14	.50			
Fear	.83	10.00	.441	10	.42			
Embarrassment	.74	14.72	.615	17	.51			

Note. As goodness-of-fit statistics, smaller values of Wilks's lambda and larger values of chi-square represent better discrimination between the two cultural groups on the basis of their pattern of facial muscle activation. The canonical correlation is an index of effect size for the accurate distinction between groups. The percentage correctly classified represents those expressors whose cultural background was classified accurately using a logistic regression with coefficients representing the likelihood of members of each group using particular facial muscles. Percentage correctly classified is not listed for nonsignificant discriminant analyses. Each analysis includes those action units displayed by at least 5 participants, so that the degrees of freedom vary by emotion.

combined with either AU15 (lip corner depressor; 10%) and/or AU17 (chin raiser; 47%). The most common expressive elements for Quebecois encoders were AU4 (eyebrow frown; 70%) and AU10 (43%), which occurred in combination with a variety of other AUs.

Sadness. For sadness, the prototype combination of AU1 + AU4 + AU15 was shown by 17% of the Quebecois encoders but by only 3% of the Gabonese encoders. The two elements that distinguished the groups were the presence of head movements other than AU54 (head down) and AU4 (eyebrow frown). A Gabonese dialect involving head movement other than head down exists for sadness (69%), whereas Quebecois encoders tended to show an eyebrow frown (AU4) with or without AU1 (inner brow raiser; 67%).

Happiness. An extensive literature has suggested that "felt" happiness is characterized by a smile (AU12) combined with wrinkles around the eye (AU6). This was the expected prototype, and this expression was shown by 53% of the Quebecois. However, only 27% of the Gabonese encoders showed this pattern, with 90% of the Gabonese encoders showing an open-mouthed smile.

Shame. Differences in shame were less marked, but the groups could be distinguished by the presence of idiosyncratic AUs and differential use of head movements. In fact, 60% of the Quebecois, but only 20% of the Gabonese, showed an idiosyncratic expressive element. Furthermore, Gabonese more often showed head and gaze down as well as other head movements. None of the other AUs, with the exception of AU4 (eyebrow frown), was shown by more than 30% of the encoders of either group. Hence, although a Gabonese dialect appears to be characterized by different signs of appeasement, Quebecois expressions were characterized by the greater presence of idiosyncratic movements, often combined with AU4. Yet, no single specific pattern emerged as modal for either group.

Anger. Differences in anger expressions were also less well distinguishable but still showed significant discriminant functions and above-chance classification for both groups. Of participants from both groups, 90% showed AU4 (eyebrow frown), which has been identified as a facial sign of goal obstruction (e.g., Darwin, 1872/1965; Pope & Smith, 1994), a central aspect of anger appraisals (Scherer, 1999). Thus, this component generalized across groups. The two other AUs for the prototype expression, AU5 (upper lid raiser) and AU23 (lip tightener), were considerably less frequent. The most common combination for Gabonese encoders was AU4 + AU5, usually in combination with one or more idiosyncratic AUs (53%). The most common combination for Quebecois encoders was AU4 with either AU5 or AU7 (lid tightener) in combination with either AU23 or AU24 (lip tightener and lip presser, respectively; 27%).

We had predicted that emotion expressions that are either very similar across mammals or that share expressive components with a reflex related to their typical elicitors would be less likely to show regional variation. This was predicted for fear, as fear expressions tend to be rather similar across mammals, as noted by Darwin (1872/1965), as well as disgust (gustofacial reflex) and surprise (startle reflex). This was indeed the case. Although a significant discriminant expression emerged for surprise, Quebecois encoders were classified only at chance level.

Fear. The most common fear expression was actually the prototype for surprise (AU1 + AU2 + AU5 with mouth open) and was shown by 43% of encoders from both groups.

Surprise. For surprise poses, 50% of the Quebecois and 60% of the Gabonese encoders showed the prototypical expression.

Disgust. Thirty percent of the Quebecois and 27% of the Gabonese encoders showed the disgust prototype, but a combination with AU10 (upper lip raiser) was also common (Quebecois, 23%, and Gabonese, 10%).

Embarrassment. Given the social functions of embarrassment displays, it is noteworthy that no significant discriminant function emerged. This may be due to the fact that for this expression, even more than for the shame expressions described above, a variety of highly idiosyncratic patterns emerged. However, it is noteworthy that one element proposed by Wiggers (1982) for shame and by Keltner (1995) for embarrassment, the lip bite (AU32; Quebecois,

Table 3
Tests of Difference Between Action Unit (AU) Usage for Quebecois and Gabonese Posers

	Quebecois (%)		Gabonese (%)		
Action unit	*M*	*SD*	*M*	*SD*	*p*
		Anger			
AU1	3	18	20	41	.055
AU16	17	38	0	0	.023
AU18	10	31	30	47	.060
		Contempt			
AU1	30	47	7	25	.023
A4	67	48	30	47	.006
AU7	33	48	10	31	.031
AU10	40	50	70	47	.023
AU15	10	31	30	47	.060
		Disgust			
AU1	23	43	7	25	.092
AU51–58	13	35	33	48	.076
		Embarrassment			
AU6/7	30	47	10	31	.060
		Fear			
AU50–58	3	18	20	41	.055
AU61–66	0	0	13	35	.047
		Happiness			
AU25/26	67	48	90	31	.031
		Sadness			
AU4	67	48	33	48	.013
AU15	40	50	17	38	.055
AU50–58	7	25	67	48	.000
		Serenity			
AU12	93	25	17	38	.000
AU41–46	23	43	0	0	.006
		Shame			
AU1	30	47	7	25	.023
AU4	43	50	17	38	.027
AU54	33	48	63	49	.027
AU50+ AU64	20	41	50	51	.017
Other	60	50	20	41	.002
		Surprise			
AU12	87	35	63	49	.041
Other	40	50	7	25	.003

Note. $N = 60$, 30 Gabonese and 30 Quebecois. Significance levels (p) based on Barnard's unconditional exact test (Suissa & Shuster, 1985). Tests conducted for all AUs shown by at least 5 participants; only significant or marginally significant differences are presented.

10%, and Gabonese, 23%), was found with some frequency for both embarrassment and shame, but for no other emotion. Even so, this AU appeared relatively rarely and, when shown, was contained within a variety of patterns.

Discussion

Study 1 provided evidence in support of the first proposition of a new dialect theory of communicating emotion. As in previous

studies of spontaneous expressions (Camras, Oster, Campos, Miyake, & Bradshaw, 1997; Ekman, 1972), posed emotional expressions converged greatly across cultural groups, in support of basic universality. However, reliable cultural differences also emerged. Thus, the study provided direct empirical support for a central proposition of dialect theory, to date supported only by indirect evidence from emotion recognition studies (e.g., Elfenbein & Ambady, 2002b). Differences were not merely idiosyncratic to individual posers but shared common elements systematically across cultures. The extent of these regional variations differed across the 10 emotional states tested, with greater evidence for cultural variation in those emotions mainly elicited as a signal in social interactions—such as anger, contempt, happiness, sadness, serenity, and shame—versus those that are often elicited as a symptom of internal experience or biological reflex by nonsocial events—such as disgust and fear. Contrary to prediction, a weak difference emerged for surprise, and no difference emerged for embarrassment.

As Figure 1 shows, there were many common elements yet also significant differences between these expressions and those previously posited as universal prototypes (Ekman & Friesen, 1978). However, the expressions appear to be more similar to the prototypes than previous investigations of voluntary facial expressions in which participants used imagery techniques designed to invoke the corresponding feeling state. In doing so, Galati et al. (1997) found wider variation in the portrayals and, indeed, few specific AUs that were used by a majority of participants. By contrast, the current protocol did not attempt to invoke an emotional state, but rather a social communicative function that is more likely to follow prototypical expressions.

Study 2

Study 1 provided evidence for the presence of cultural differences in the appearance of emotional expressions, yet there is another step to demonstrate before such differences can be definitively considered as nonverbal dialects. Dialects, by their definition, affect the accuracy of cross-cultural emotion judgments. Study 2 was designed to test this second proposition of the dialect theory of communicating emotion by mapping differences in emotion expression onto differences in emotional recognition. Differences in expressions do not necessarily translate into differences in recognition. Thus, it is important to examine the recognition impact of the cultural differences in expressions found in Study 1 before concluding that they are expression dialects.

We tested the expressions generated in Study 1 alongside a control series of prototype emotional expressions to control for a number of alternative explanations that have been proposed to account for the observed in-group advantage and other differences in emotion recognition across perceiver groups, such as motivational factors and decoding rules. Caucasian and African individuals—corresponding to the visible ethnic backgrounds of the Quebecois and Gabonese cultures in the current studies—posed identical prototypes via a standardized directed facial action task. Thus, if there is an in-group advantage for the culturally normative poses collected in Study 1—but not a same-ethnicity advantage for the standardized poses—then we can infer that the in-group advantage resulted from cross-cultural differences in expressive style rather than other factors. Thus, we predicted that there would be greater in-group advantage for those expressions containing greater systematic cultural differences in their appearance. In particular,

> *Hypothesis 1:* There will be greater in-group advantage among the culturally normative poses for those emotional states with strongest regional differences in Study 1.
>
> *Hypothesis 2:* There will be greater in-group advantage for culturally normative poses than same-ethnicity advantage in standardized facial expressions.

Method

Participants. Twenty men and 20 women each were recruited at the University of Quebec at Montreal, Quebec, Canada, and at Omar Bongo University, Libreville, Gabon. Participants were undergraduate or graduate students, ranging in age from 20 to 30, and were competent speakers of French who had acquired the language before the age of 6 and spoken it consistently to adulthood.

Stimulus materials. A total of 648 black-and-white photographs of facial expressions served as the stimulus materials. *Culturally normative stimuli* consisted of expressions collected in Study 1. Digitizing and saving still photographs from the apex expression for each of the encoders resulted in 600 expressions (60 encoders $\times$ 10 emotions). *Standardized facial expressions* consisted of expressions from the Montreal Set of Facial Displays of Emotion (MSFDE; Beaupré & Hess, 2005) and included the emotional states of anger, sadness, fear, disgust, happiness, and shame/embarrassment for male and female posers from Quebec and sub-Saharan Africa (6 emotions $\times$ 2 sexes $\times$ 4 posers $=$ 48 photographs). The MSFDE was created by instructing participants via a directed facial action task to contract specific muscles so as to create a specific expressive pattern based on prototypes proposed by Ekman and Friesen (1978) and Wiggers (1982). FACS coding confirmed that the appearance of the facial expressions in these photographs is standardized across ethnic groups. To prevent fatigue, each decoder viewed only half of the set of expressions, and these were presented in a randomized order differing for each participant.

Procedure. Participants individually viewed the photographs on a computer screen and entered a key corresponding to 1 of the 10 emotion labels to indicate their judgments. Each photograph remained on the screen until the participant entered a response. Although there are well-documented concerns regarding this forced-choice method (e.g., Frank & Stennett, 2001; Russell, 1994), it was used in this case for consistency with the majority of research showing in-group advantage, for which the current study attempted to document the mechanism. Responses were scored as correct if the response matched the intended emotional state of the poser.

Results

The appropriate test for the in-group advantage effect is the Encoder $\times$ Decoder Group interaction term (Elfenbein et al., 2002), corresponding to the definition of in-group advantage as the extent to which emotion judgments are relatively more accurate when the perceiver is a member of the same cultural group in

which the expressions originated. Because the cell means for judgment accuracy represent the cumulative impact of both the Expressor × Perceiver interaction and the two main effects for expressors and perceivers, the absolute means can sometimes be misleading. For example, in the present case, the standardized photographs originated from prototypes developed by Western researchers (Ekman & Friesen, 1978; Wiggers, 1982), which could create an artifact in the form of a main effect in which Quebecois perceivers are more accurate overall than Gabonese perceivers.

Previously, researchers have distinguished between an *absolute in-group advantage*, in which same-group accuracy levels are in all cases higher than different-group accuracy levels, versus a *relative in-group advantage,* where one group of expressions or perceivers is more accurate overall, but there is still significantly greater accuracy when judging expressions originating from the same cultural group (Beaupré & Hess, 2005; Matsumoto, in press). An absolute in-group advantage can be observed directly in the mean accuracy levels, whereas a relative in-group advantage can be observed in the interaction residuals after the subtraction of main effects. Owing to the present focus on the relative advantage of cultural groups, Table 4 presents the results for the 2 (expressor group) × 2 (perceiver group) analysis of variance (ANOVA) conducted on the proportion of judgment accuracy for the 10 culturally normative expressions. All interaction effects went in the expected direction, in which accuracy is greater for judgments of in-group expressions, with the exception of nonsignificant trends for embarrassment and happiness. Table 5 shows the means and standard deviations for judgment accuracy for each expression, expressor group, and perceiver group.

The first hypothesis was that there would be greater in-group advantage among the culturally normative poses for those emotional states with strongest regional differences in Study 1. By visual inspection, one can see that four of the five emotions with the largest canonical correlations from the discriminant function analysis also have the largest effect size correlation for the in-group advantage. For a formal analysis, in a 2 (expressor group) × 2 (perceiver group) × 10 (emotion) ANOVA examining judgment accuracy, the Expressor Group × Perceiver Group × Emotion interaction term tested the variation in in-group advantage across emotions, $F(9, 684) = 5.76$, $p < .01$.[5] Within this unfocused F test, we tested the contrast (Rosenthal & Rosnow, 1991) that the emotions in the top vs. bottom half in terms of the canonical correlation effect size, as listed in Table 2, have greater in-group advantage than those in the bottom half, $F(1, 684) = 12.89$, $p < .01$. These results suggest reasonable consistency between the results of the two studies. The emotional states for which there were greater differences in appearance across cultural groups were generally also those with the greatest degree of in-group advantage in judgments.

The second hypothesis was that there would be greater in-group advantage for culturally normative poses than same-ethnicity advantage in standardized facial expressions, which do not contain any group differences in appearance. These standardized expressions can serve as a control condition to assess the influence of decoder biases due to decoding rules or stereotypes about individuals from a visibly different ethnicity, which should have an impact on the judgment of all expressions including these prototypes. Mean values and ANOVA tests for prototypes are also summarized in Tables 4 and 5, respectively. Consistent with their status as highly recognizable ideals—rather than frequent or average versions of actual emotional displays (Horstmann, 2002)—these prototypical expressions were better recognized than the culturally normative expressions that laypersons posed without specific instructions. Even so, the prototypes did not show ceiling effects and were recognized comparably with other research showing in-group advantage. Consistent with the Western origin of the prototypical expressions, Quebecois decoders were more accurate than Gabonese decoders, $t(78) = 4.97$, $p < .01$. Furthermore, expressions by African encoders were slightly better recognized than were expressions by Caucasian encoders, $t(79) = 2.55$, $p = .13$. However, consistent with prediction, the ANOVA models presented in Table 4 for standardized expressions reveal no evidence for a same-ethnicity advantage. The one interaction term that reached marginal significance, disgust, was actually a case of other-ethnicity advantage, in that Quebecois participants were better at decoding disgust expressions posed by Africans than by Caucasians, $t(39) = 4.21$, $p < .01$, whereas Gabonese decoders' accuracy did not vary across groups. Thus, the in-group advantage found for culturally normative poses does not appear to result from decoder bias.

Table 6 presents a confusion matrix plotting correct-answer categories in one dimension and participant judgments in the other dimension. Overall, the same types of confusions were found for both in-group and out-group judgments, only more so for out-group judgments. That is, the in-group advantage does not appear to involve qualitatively different confusions for out-group expressions, but rather a quantitative increase in the same types of confusions.

Discussion

The goal of Study 2 was to demonstrate empirically that the cultural differences in facial expressions identified in Study 1 were, in fact, nonverbal dialects—that is, regional differences in the appearance of emotional expressions that can be recognized more easily and accurately by individuals with greater cultural familiarity. We examined the decoding of expressions that either did or did not contain clearly measurable cultural differences. In the case of the culturally normative emotional expressions collected in the first study, we found generally that the clearer the evidence for cultural differences in expression in Study 1, the clearer the evidence for an in-group advantage in decoding in Study 2. The lack of a same-ethnicity advantage for expressions standardized to erase cultural differences supports the argument that the observed in-group advantage in decoding resulted from cultural differences in expressive style. Because any decoder biases should equally affect decoders' judgments of both standardized and normative expressions, these results for standardized expressions also argue against possible alternate explanations for the findings with culturally normative expressions. We conclude that the in-group advantage for culturally normative expressions is unlikely to result from decoder biases alone.

One exception to this coherence was happiness, for which the two cultural variants were recognized equally well across groups. In terms of dialect theory, happiness was not part of a minimal pair

[5] The degrees of freedom are adjusted to reflect missing data points.

Table 4
Analysis of Variance of Judgments of Facial Expressions of Emotion From Gabon and Quebec by Perceivers From Gabon and Quebec: Study 2

	Expressor effect		Perceiver effect		Expressor × Perceiver interaction		
Emotion	$F(1, 78)$	p	$F(1, 78)$	p	$F(1, 78)$	p	r
Culturally normative expressions							
Anger	54.61	.001	0.06	.81	19.74	.001	.45
Contempt	7.92	.006	0.08	.78	36.99	.001	.57
Disgust	6.75	.011	17.76	.001	36.35	.001	.56
Embarrassment	0.03	.873	1.95	.166	0.02	.897	−.02
Fear	39.70	.001	0.79	.377	0.23	.630	.05
Happiness	2.70	.104	5.27	.024	0.10	.750	−.04
Sadness	4.09	.047	2.24	.139	4.75	.032	.24
Serenity	1.44	.234	1.27	.264	10.25	.002	.34
Shame	6.30	.014	0.27	.606	1.48	.228	.14
Surprise	0.42	.517	3.93	.051	3.68	.059	.21
Standardized expressions							
Anger	7.67	.007	1.85	.178	1.28	.261	.13
Disgust	13.01	.001	27.74	.001	3.93	.051	−.22
Fear	2.68	.106	7.25	.009	1.28	.261	−.13
Happiness	9.04	.004	2.37	.128	1.59	.212	.14
Sadness	9.20	.003	26.76	.001	.09	.767	−.03
Shame	1.98	.163	5.01	.028	.32	.574	.06

Note. Poses of contempt, embarrassment, serenity, and surprise were not available in the Montreal Set of Facial Displays of Emotion (Beaupré & Hess, 2005) set of standardized expressions.

or even a near-minimal pair. Without a plausible distracter, differences in expressions do not necessarily translate into differences in recognition. Thus, this variant may be better considered a *nonverbal accent* (Marsh, Elfenbein, & Ambady, 2003), in which a difference in the appearance of emotional expressions across cultural groups may be visible but does not necessarily interrupt recognition. A second exception was disgust, for which both an in-group and an out-group advantage in recognition emerged. Given that the disgust prototype was the modal expression shown by the encoders in Study 1, the main difference between the two stimulus sets is that the disgust expressions from Study 1—for which a relative in-group advantage emerged—are less intense than the standardized prototype expressions—for which an out-group advantage was found. We speculate that strong expressions of disgust may create greater confusion or may invoke decoding rules that do not apply to weak expressions. Specifically, showing

Table 5
Means and Standard Deviations for Percentage of Judgment Accuracy With Culturally Normative Expressions as a Function of Intended Emotion, Expressor Cultural Group, and Perceiver Cultural Group: Study 2

	Culturally normative									Prototypical								
	Quebecois				Gabonese					Caucasian				African				
	Quebecois		Gabonese		Quebecois		Gabonese			Quebecois		Gabonese		Quebecois		Gabonese		
Intended emotion	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	In-group advantage	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	Same-ethnicity advantage
Anger	47	19	39	22	26	16	33	26	8	78	30	66	32	65	30	60	33	3
Contempt	37	17	23	14	29	17	42	22	14									
Disgust	54	17	30	18	40	16	35	19	10	52	32	29	29	71	27	35	30	−7
Embarrassment	31	17	28	18	31	16	26	16	−1									
Fear	34	20	28	17	19	18	18	15	3	63	31	49	37	73	32	50	36	−5
Happiness	80	18	70	27	78	17	68	33	0	86	20	74	34	90	20	86	27	4
Sadness	39	18	29	18	38	18	38	21	5	66	32	36	31	76	23	45	31	−1
Serenity	55	17	43	20	50	21	53	27	8									
Shame	28	11	28	15	21	13	25	18	2	64	31	47	39	56	30	44	34	3
Surprise	56	13	45	23	54	15	50	23	4									
Total	46	17	36	19	39	17	39	22	5	68	29	50	34	72	27	53	32	0

Table 6
Emotion Recognition Matrix for the Perception of Culturally Normative Expressions From Gabon and Quebec by Perceivers From Gabon and Quebec: Study 2

Expressed emotions	Perceived emotions (%)											
	Anger	Contempt	Disgust	Embarrassment	Fear	Happiness	Sadness	Serenity	Shame	Surprise	Total	Missing
Quebecois expressions												
Quebecois judges												
Anger	**47**	20	6	9	4	0	6	2	3	3	100	1
Contempt	14	**37**	14	12	1	1	10	6	3	2	100	1
Disgust	6	15	**54**	7	4	0	8	1	4	1	100	1
Embarrassment	5	11	8	**31**	5	9	3	5	11	12	100	1
Fear	2	2	6	5	**34**	2	1	2	2	46	100	1
Happiness	0	0	0	2	0	**80**	0	13	0	4	100	1
Sadness	5	13	5	12	2	0	**39**	6	18	1	100	1
Serenity	1	9	1	6	0	17	6	**55**	4	1	100	1
Shame	7	8	6	25	5	0	14	5	**28**	3	100	1
Surprise	0	1	1	4	3	33	0	3	0	**56**	100	1
Gabonese judges												
Anger	**39**	7	7	11	4	2	8	9	9	5	100	4
Contempt	14	**23**	10	17	3	1	10	12	7	3	100	4
Disgust	11	18	**30**	11	9	2	10	3	7	2	100	4
Embarrassment	7	7	7	**28**	7	8	7	12	11	7	100	4
Fear	3	2	5	10	**28**	4	4	4	10	38	100	4
Happiness	1	2	2	6	2	**70**	2	10	3	4	100	5
Sadness	10	7	3	10	5	3	**29**	13	16	3	100	4
Serenity	2	5	2	8	4	16	12	**43**	8	3	100	4
Shame	9	5	4	22	4	2	11	12	**28**	5	100	4
Surprise	1	2	1	5	5	31	2	5	3	**45**	100	5
Gabonese expressions												
Quebecois judges												
Anger	**26**	19	4	10	6	0	16	6	6	7	100	1
Contempt	6	**29**	26	11	1	3	12	6	6	1	100	1
Disgust	10	15	**40**	7	4	5	12	1	3	5	100	1
Embarrassment	2	9	2	**31**	1	5	13	13	13	11	100	1
Fear	2	5	2	13	**19**	1	8	6	9	36	100	0
Happiness	0	1	0	2	0	**78**	1	14	0	5	101	1
Sadness	2	11	1	15	1	1	**38**	15	14	1	100	1
Serenity	5	13	2	9	1	1	12	**50**	3	4	100	1
Shame	2	9	0	27	1	4	22	12	**21**	1	100	0
Surprise	0	2	1	6	3	24	2	6	1	**54**	100	1
Gabonese judges												
Anger	**33**	7	4	12	4	2	12	11	5	9	100	5
Contempt	5	**42**	19	9	2	2	8	5	5	2	100	4
Disgust	7	21	**35**	9	6	3	6	2	4	7	100	4
Embarrassment	5	5	5	**26**	3	8	12	13	10	11	100	4
Fear	3	2	2	11	**18**	2	9	9	6	37	100	5
Happiness	1	1	1	4	2	**68**	2	13	3	6	100	5
Sadness	4	5	2	12	1	6	**38**	21	10	1	100	5
Serenity	4	3	1	8	2	3	15	**53**	6	4	100	4
Shame	3	3	1	18	3	3	27	14	**25**	3	100	5
Surprise	2	2	1	5	3	23	4	7	6	**50**	100	4

Note. Boldface denotes values representing the hit rate accuracy coefficients. Values may not add to 100% due to rounding.

strong disgust in the North American culture may be socially sanctioned unless used as a substitute for anger or contempt. Hence, these strong expressions of disgust are mislabeled, whereas weaker expressions are not.

General Discussion

Two studies tested the hypotheses that facial expressions of emotions show subtle regional variants, similar to dialects in language, and that the presence of these variations leads to lower cross-cultural recognition of emotional expressions. Taken together, these studies support the predictions and thereby provide the first direct support for the two propositions of the dialect theory of communicating emotion.

In support of the first proposition of dialect theory, Study 1 documented systematic cultural differences in the stylistic elements—facial muscle AUs—used by members of different cultural groups in freely posed emotional expression displays. Devi-

ations from the universal prototypes were not merely idiosyncratic, but rather participants from each group appeared to share culturally distinct expressions. These systematic differences appeared to be stronger for emotions that are more frequently used as signals for a social audience, such as contempt and anger, and least likely for expressions typically invoked by nonsocial elicitors that have strong reflex components, such as disgust and surprise, or that are very similar in appearance across mammals, such as fear.

These dialects were distinct from display rules—which involve changes to the intensity of an emotional display or the qualitative substitution of another emotional state—in that they consisted of systematic cultural differences in the facial muscle configurations used to display the same emotional state. Although the term *display rule* has shifted over time to describe a range of differences in expression style, strictly speaking Ekman's (1972) original coinage excludes the subtle differences in muscle movement in posing the same intended affective display that were found in the current study. Whereas the broader use of the term *display rules* can overlap with the notion of dialects, for conceptual clarity we retain the original definition. Display rules are explicit social norms about which emotions to display and to what extent—such as the British stiff upper lip and never letting them see you sweat—in contrast with dialects, which are subtle differences in the appearance of the same emotional display. Both of these constructs are helpful—yet distinct—for understanding cultural variations in the expression of emotion.

Central to the idea of nonverbal dialects is the second proposition, that such cultural differences create a potential for decoding errors among those who are less familiar with these regional differences in style. Study 2 provided the first direct empirical support for this proposition of dialect theory. The relative advantage for perceivers in judging expressions originating from their own cultural group was greater for those expressions in which reliable regional differences had been identified in the first study. Furthermore, there was no evidence for a same-ethnicity advantage in judging prototypical expressions that contained identical facial muscle activation. This allows us to infer that the in-group advantage resulted from cultural differences in expressive style rather than factors such as ethnic bias or decoding rules.

These dialects were also distinct from decoding rules, management techniques that bias the perception of emotion and allow individuals to attribute different emotional content than that initially perceived (Buck, 1984), which have been implicated to explain decreases in the accuracy of emotion recognition across cultures (Matsumoto, 1989). We controlled for the possible impact of decoding rules by including prototypical stimuli standardized across encoder ethnic groups using a directed facial action task. Any decoding biases should be present equally when judging both types of expressions, and no evidence of same-ethnicity advantage emerged for the standardized expressions.

Limitations and Future Work

The present studies have some limitations that should be addressed by future work. To increase generality, researchers should sample additional cultural groups, particularly those that are culturally distant yet share the same visible ethnic characteristics. Future work should also use trained actors or other methods to increase the average clarity of culturally normative poses. This would reduce differences in overall recognition levels with respect to prototypical stimuli, even though such factors result only in main effects that are controlled when examining interaction terms. Future studies should also include prototypes for additional states such as contempt and embarrassment. The number of stimulus items of each type should be increased—particularly among the standardized set—to ensure that analyses meet the statistical assumptions of the ANOVA. It would be worthwhile to include nonverbal channels of communication other than the face, such as vocal tone and body movement. It would also be helpful to supplement quantitative work with a qualitative understanding of how emotion words are used across cultures. Although both groups in this study had spoken French from childhood, it may also be possible to have regional dialects in the use of language terms for emotions across cultural groups that share the same spoken language.[6]

Consistent with the behavioral ecology view of emotion as a method of communicating behavioral intentions from the sender to the audience of the message (Fridlund, 1994), we used posed expressions in the current studies to elicit culturally normative expressions and to match the methods largely used by previous research documenting the in-group advantage on which the dialect theory of communicating emotion is based. Cross-cultural studies of spontaneously elicited emotion would also provide complementary data to benefit the larger field (Fridlund, 1994; Russell, 1994) and the dialect theory in particular. Voluntary control can be a challenging skill that may require feedback from one's social environment (Galati et al., 1997; Rinn, 1984), in which case cultural differences could emerge in such voluntary control. Indeed, one critique that could be leveled at the current work is that the two cultural groups differed in their degree of voluntary muscular control, which would explain the main effect by which the Quebecois expressions were generally better recognized overall.[7] Although this is possible, such a difference in voluntary control alone would not explain why judges from groups with poor control would be relatively better able to judge enactments from their in-group than the presumably superior enactments of the out-group. In such a case, we would expect voluntary muscular control to lead solely to main effects in expressive accuracy.

Cultural Dialects and Cultural Learning

There are times when one wants to send clear signals and times when one wants to read clearly the signals of others. At a basic level, nonverbal dialects can serve as a challenge to effective communication across cultural groups. Although the present research documents this greater difficulty, it also provides guidance for overcoming this limitation. If the in-group advantage indeed results from greater familiarity with culturally specific elements of nonverbal expression, then training and intervention programs should be able to increase familiarity with these elements—and thus to eliminate the in-group advantage. Such speculation is consistent with evidence that the in-group advantage is lower across cultural groups that enjoy greater physical proximity or cross-group communication, lower for individuals who live in

[6] We thank two anonymous reviewers for this point.

[7] We thank an anonymous reviewer for raising this point.

another country to attend university, and lower after participants are provided with feedback (Elfenbein, in press; Elfenbein & Ambady, 2002b, 2003). By contrast, if the in-group advantage resulted from motivation or bias—rather than information and familiarity—then the phenomenon would be harder to correct. Thus, the current findings suggest optimism for the functioning of multicultural societies.

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