CROSS-CULTURAL EMOTION RECOGNITION AMONG CANADIAN ETHNIC GROUPS

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This study aims to investigate cultural differences in recognition accuracy as well as the in-group advantage hypothesis for emotion recognition among sub-Saharan African, Chinese, and French Canadian individuals living in Canada. The participants viewed expressions of happiness, anger, sadness, fear, disgust, and shame selected from the Montreal Set of Facial Displays of Emotion. These data did not support the in-group advantage hypothesis under the condition of stimulus equivalence. However, both encoder and decoder effects were found. Specifically, French Canadians were more accurate for the decoding of expressions of shame and sadness. Moreover, fear expressions were best recognized when shown by sub-Saharan Africans, suggesting an effect of salience of expressive cues due to morphological features of the face.

Keywords: culture; emotion; recognition; facial expression; in-group advantage; in-group bias

Cross-cultural research on emotion recognition has provided evidence for both considerable pan-cultural similarities as well as cross-cultural differences (e.g., Ekman et al., 1987; Matsumoto, 1993; Matsumoto & Ekman, 1989). One of the explanations for this cross-cultural variation has been based on the observation of higher recognition accuracy rates in cases where both the decoder and the encoder belonged to the same cultural group (e.g., Elfenbein & Ambady, 2002a, 2002b; Elfenbein, Mandal, Ambady, Harizuka, & Kumar, 2002; Kilbride & Yarczower, 1983; Markham & Wang, 1996). This tendency for an in-group advantage has recently received meta-analytical support (Elfenbein & Ambady, 2002a, but see also Matsumoto, 2002, for a different perspective).

There are a number of reasons why individuals may be generally more accurate at recognizing expressions by members of their own ethnic group. First, the advantage may be due to cultural differences in encoding. That is, there may be subtle differences in expressive style between members of different cultural groups that make it more difficult to decode expressions by cultural out-group members (e.g., Elfenbein & Ambady, 2002a). Conversely, an in-group advantage may be caused by cultural differences in decoding. For instance, individuals may use more efficient modes of processing when judging emotion expressions of in-group members, due to such factors as familiarity with facial morphology or even higher motivation to decode expressions by in-group members.

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It should, however, be noted that studies based on stimulus equivalence (i.e., equivalent facial muscular components and intensity of expression across encoder groups) frequently yield null results in the test of the in-group advantage (see Matsumoto, 2002, for a discussion). In contrast to Elfenbein and Ambady's (2002a) in-group advantage account, Matsumoto (2002) posited, based on several studies using equivalent stimuli across encoder groups, that cross-cultural variation in emotion recognition may be mostly attributable to general cultural decoding differences (see Matsumoto, 2002, for a discussion). For instance, among the reported differences between Asian and Caucasian groups in such studies, Caucasians are generally found to be more accurate at recognizing anger, sadness, and fear expressions (e.g., Biehl et al., 1997; Matsumoto, 1992; Russell, Suzuki, & Ishida, 1993). These general cultural decoding differences have been attributed to culturally learned display rules (Ekman & Friesen, 1969), that is, the cultural norms that prescribe emotion displays in social situations. Thus, lower recognition accuracy for negative emotions by members of collectivistic cultures, such as Asian individuals, has been associated with a cultural rule against displaying and acknowledging these emotions in others that is prevalent in these cultures (e.g., Matsumoto, 1992; McAndrew, 1986).

In this context, it is important to carefully define what is meant by stimulus equivalence. For example, Elfenbein et al. (2002) used stimuli that were created to be highly recognizable and were indeed recognized at high levels of accuracy across cultures. Yet they did not actually assure that these expressions were morphologically identical. Hence, it is quite possible that the expressions were, although sufficiently similar to allow for high rates of recognition, not in fact identical—under such circumstances, differences in decoding accuracy may rather be related to subtle cultural differences in encoding.

Furthermore, it is important to note that the physiognomy of the face may make certain expressions more or less difficult to decode. For example, prominent eyebrows facilitate the detection of frowns, and thus, anger expressions by members of cultural groups with facial features that include prominent eyebrows may therefore be overall more accurately identified. This study used stimulus material that was carefully constructed to be morphologically equivalent, that is, all actors showed expressions that were assessed to be identical using the Facial Action Coding System (FACS; Ekman & Friesen, 1978). Although this procedure raises issues related to the use of posed expressions in general (Russell, 1994), it is quite impossible to obtain expressions that are identical with regard to both the expressive components involved and the intensity of the expression when using spontaneous expressions.

However, as no control of the physiognomy of the actors is feasible, it is still possible that some actors' expressions were more or less easy to detect due to differences in facial—rather than expressive—morphology. Yet this effect would result in an encoder main effect and not in the encoder by decoder interaction posited by dialect theory (Elfenbein & Ambady, 2002a, 2003). Thus, in this study, only the decoder account of the in-group hypothesis was tested, as encoder differences in the morphology of the expressions (i.e., what Elfenbein and Ambady refer to as dialects) were systematically excluded.

Furthermore, the in-group advantage hypothesis has been tested using different statistical approaches. For example, Elfenbein et al. (2002) tested the interaction effect after removing main effects of encoder and decoder group, the former showing that all groups in their study recognized expressions by Americans better than expressions by Indian and Japanese expressers. That is, they tested a relative in-group advantage. However, this approach ignores the true overall levels of recognition accuracy, which are of pertinence for actual interactions with in- and out-group members in everyday life. In contrast, for this study, we defined the in-group advantage as the tendency to be more accurate when decoding

expressions by cultural in-group members than expressions by individuals of any other cultural group. In the context of this study, this hypothesis will be examined by using the true overall levels of recognition accuracy.

A further important consideration is related to the relationship between encoder and decoder groups. In fact, group status may moderate cross-cultural emotion recognition accuracy (see Elfenbein & Ambady, 2002a; and Wolfgang & Cohen, 1988, for a discussion). For example, members of minority cultural groups may recognize emotion expressions displayed by individuals of the majority cultural group more efficiently than members of the majority can in return recognize expressions of the minority group (Elfenbein & Ambady, 2002a). Furthermore, in some cases, an out-group advantage occurs such that members of minority groups recognize the majority's emotion expressions better than they recognize their own (Elfenbein & Ambady, 2002a). For instance, Asian Canadians have been shown to be more accurate when judging intense emotions displayed by Caucasian compared to Asian expressers (Bourgeois, Herrera, & Hess, 2005).

Moreover, as mentioned previously, Elfenbein and Ambady (2002a) suggest that greater familiarity with in-group members (i.e., more contact and experience with cultural in-group versus out-group members) may explain the in-group advantage. Thus, it could also be questioned whether greater familiarity with a specific type of expression increases how accurately the expression is recognized. In fact, Biehl et al. (1997) proposed that the ability to recognize facial expressions of emotion may be linked to the frequency of occurrence of these expressions in real life. More specifically, the degree of accuracy in recognizing emotions may depend on the amount of practice one has in making such judgments. This hypothesis will be addressed in the context of this study. Moreover, general differences in perceived probability of occurrence as a function of type of expression and cultural group membership of the decoder will also be evaluated.

The majority of studies on cultural differences in the recognition of facial expressions of emotion have compared members of different ethnic groups living in different countries (Matsumoto, 1993). However, intercultural interactions are gaining in frequency in most industrialized nations. Yet misunderstandings in the communication of emotions among members of different cultural groups can generate relational problems in everyday cross-cultural interactions (Winkel, 1991; Wolfgang, 1979). Hence, within-country analyses of emotion expression and recognition are becoming increasingly important.

This study aims to investigate cultural differences in the recognition of facial expressions of emotion and, specifically, the in-group advantage hypothesis, for French Canadians, and two large visible minority groups in Canada: first generation immigrants from China and first generation immigrants from sub-Saharan Africa. According to the 2001 Canadian census (Statistics Canada, 2001), individuals of the Black visible minority make up 16.6% of the Canadian population of visible minorities, which makes this group the third most represented visible minority immediately behind the Chinese (25.8%) and South Asian (23.0%) communities.

In sum, this study had four main goals. The first goal was the assessment of the in-group advantage hypothesis under conditions of stimulus equivalence. This is therefore a test of the decoder biases account of the in-group advantage as encoder differences have been eliminated. The second goal was to assess the presence of cross-cultural encoder effects, due to differences in facial morphology. The third goal was to assess decoder effects (i.e., biases in emotion recognition). For example, members of collectivistic cultures are generally less accurate in the decoding of negative emotional expressions (see Matsumoto, 1992, for a discussion); thus, we expected that immigrants from African and Asian cultures, which

generally favor collectivistic values (Hofstede, 1980), will recognize negative emotion expressions less accurately than members of the French Canadian host community. Finally, we assessed cross-cultural differences in the familiarity with different types of expressions as well as the effect of such differences on recognition accuracy.

METHOD

PARTICIPANTS

Twenty each African, Chinese, and French Canadian men and women participated in the study. The three groups of participants were recruited in the city of Montreal, Canada. The mean age for the participants of African, Chinese, and French Canadian origin was 28.3 (*SD* = 8.3), 30.8 (*SD* = 10.9), and 27.9 (*SD* = 10.9) years, respectively. The mean number of years of education was 16.7 (*SD* = 3.0), 15.4 (*SD* = 2.5), and 14.6 (*SD* = 2.3) years, respectively. The French Canadian participants were recruited from the host community, whereas the African participants were French-speaking first generation immigrants from the sub-Saharan region of Africa and the Chinese participants were first generation immigrants from China or Hong Kong. All participants could read and speak the French language fluently. The mean number of years of residence in Canada was 5.1 (*SD* = 6.2) for the African participants and 8.2 (*SD* = 7.30) for the Chinese participants.

MATERIAL

Facial expressions of happiness, anger, sadness, fear, disgust, and shame shown by four male and four female French Canadian, Chinese, and sub-Saharan African young adults were selected from the Montreal Set of Facial Displays of Emotion (MSFDE; Beaupré, Cheung, & Hess, 2000). This set is made up of emotional facial expressions by French Canadian, Chinese, and sub-Saharan African young adults who were instructed, via a directed facial action task, to pose facial expressions of emotions.[1] The total set of 144 stimuli (3 expresser groups × 6 types of facial expressions × 2 gender of expresser × 4 actors) was broken down into 2 blocks. Each block was made up of expressions by 2 male and 2 female expressers from each cultural group. The stimuli were presented in a different random order for each participant. Each participant rated only one block. The stimuli were presented as 7.6 × 12.6 cm photos on a 30 cm computer screen using Authorware 3.5. An example of each type of facial expression is provided in Figure 1.

PROCEDURE

After completing the consent form, participants received written instructions. Each facial stimulus was presented for 5 seconds. Following stimulus presentation, the participants rated the intensity of each stimulus on a series of emotions on an emotion profile. The 10 emotion labels of the profile were happiness, serenity, anger, sadness, fear, surprise, disgust, contempt, shame, and embarrassment. In addition, the presumed probability of occurrence of each facial expression in everyday life was assessed.[2] The level of emotion intensity as well as the level of presumed probability of occurrence were measured on continuous scales ranging from 0 to 100. The intensity scales were anchored with *emotion not at all present* and

Figure 1: Examples of Facial Displays of Emotion From the Montreal Set of Facial Displays of Emotion for Each Type of Expression
SOURCE: Beaupré, Cheung, and Hess (2000).

emotion expressed very intensely, whereas the probability of occurrence scale was anchored with *not at all* and *very high.*

DEPENDENT MEASURES

The dependent measures were emotion recognition accuracy and the presumed probability of occurrence of the facial expression in everyday life. The level of accuracy was calculated from the intensity scales such that when the target scale received the highest score, the

judgment was considered as accurate and a score of 1 was given; otherwise, a score of 0 was given.

RESULTS

RECOGNITION ACCURACY

The mean overall hit rate for expressions by African, Chinese, and French Canadian encoders was 58%, 57%, and 56%, respectively. Thus, recognition accuracy was significantly above chance (chance accuracy = .11)[3] for the African, $t(39) = 21.48$, $p < .001$; Chinese, $t(39) = 16.33$, $p < .001$; and French Canadian, $t(39) = 23.42$, $p < .001$, decoders. For the analyses of cross-cultural differences in emotion recognition accuracy, we used the arcsine transformed unbiased hit rate proposed by Wagner (1993) as the dependent variable. The unbiased hit rate represents the joint probability that a stimulus category is correctly identified, given that it is presented at all and that a response is correctly used. Table 1 shows the mean accuracy scores (raw unbiased hit rate) for the different types of emotion expressions as a function of the cultural group membership of both the encoder and the decoder.

To assess cross-cultural differences in emotion recognition accuracy, a 3 (decoder group) $\times$ 3 (encoder group) $\times$ 6 (type of expression) analysis of variance with repeated measures on the last two factors was conducted.[4] A cultural in-group advantage would be reflected by a significant decoder by encoder group interaction, with higher recognition accuracies for matching encoder and decoder groups. This interaction was found to be nonsignificant, hence not providing evidence for an in-group advantage.

To assess whether there is partial support for an in-group advantage in a subset of the data, a series of a priori comparisons of accuracy rates obtained when judging expressions of cultural in- versus out-group members was conducted for each of the six types of emotional expressions separately for each cultural group. Only cases where a specific emotion expression was better recognized in in-group members than out-group members of both cultural out-groups were considered as valid cases of an in-group advantage. No support for the in-group advantage hypothesis was found for French Canadian and Asian decoders. The only case of an in-group advantage was found for the African decoders who recognized fear expressions more accurately when they were displayed by an in-group member than by an out-group Chinese, $F(1, 39) = 10.00$, $p < .003$, or French Canadian, $F(1, 39) = 4.56$, $p < .039$, expresser. However, for this group, a marginally significant case of an out-group advantage was found for sadness expressions, which were more accurately decoded when displayed by French Canadian, $F(1, 39) = 4.77$, $p < .035$, and Chinese, $F(1, 39) = 3.58$, $p < .066$, expressers than by in-group expressers. In sum, out of a possible total of 18 cases in which an in-group advantage could have emerged (3 cultural groups of decoders $\times$ 6 types of expressions), an in-group advantage was found for only one case (5.6% of cases), together with a case of an out-group advantage. In sum, these data do not support the in-group advantage hypothesis.

However, both encoder and decoder effects were found. Thus, a significant main effect of type of expression, $F(4, 473) = 62.03$, $p < .001$, as well as significant interactions between decoder group and type of expression, $F(8, 590) = 3.82$, $p < .001$, and encoder group and type of expression, $F(8, 986) = 2.52$, $p < .009$, emerged. Post-hoc tests ($p < .05$) revealed that participants recognized happiness expressions with greater accuracy than any other expression. Moreover, French Canadians were more accurate at decoding sadness expressions than either Chinese or African decoders as well as more accurate at decoding shame expressions

TABLE 1
Mean Unbiased Hit Rates and Standard Deviations as a Function of Emotion Expression as Well as the Culture of the Decoder and the Expresser

		Cultural Group of the Decoder						
		Chinese		*Caucasian*		*Sub-Saharan African*		
Type of Facial Expression	*Cultural Group of the Encoder*	M	SD	M	SD	M	SD	*Overall* M
Anger	Chinese	.46	.32	.49	.30	.43	.29	.46
	Caucasian	.47	.31	.51	.29	.47	.30	.48
	sub-Saharan African	.41	.29	.51	.33	.57	.30	.50
	overall	.45		.50		.49		
Happiness	Chinese	.70	.34	.70	.28	.73	.29	.71
	Caucasian	.67	.32	.63	.31	.78	.25	.69
	sub-Saharan African	.76	.30	.68	.29	.78	.28	.74
	overall	.71		.67		.76		
Sadness	Chinese	.42	.27	.65	.25	.31	.26	.46
	Caucasian	.31	.28	.52	.29	.32	.24	.38
	sub-Saharan African	.40	.27	.52	.27	.24	.22	.39
	overall	.38		.56		.29		
Fear	Chinese	.27	.33	.27	.25	.20	.23	.25
	Caucasian	.27	.30	.37	.31	.26	.25	.30
	sub-Saharan African	.30	.30	.36	.32	.35	.26	.34
	overall	.28		.33		.27		
Disgust	Chinese	.54	.30	.55	.32	.54	.29	.54
	Caucasian	.47	.31	.59	.32	.43	.31	.50
	sub-Saharan African	.47	.31	.55	.30	.42	.34	.48
	overall	.49		.56		.46		
Shame	Chinese	.46	.33	.59	.33	.46	.32	.50
	Caucasian	.41	.35	.58	.29	.52	.35	.50
	sub-Saharan African	.43	.34	.51	.34	.48	.33	.47
	overall	.43		.56		.49		

than Chinese decoders. Further, sadness expressions by Chinese encoders were more accurately recognized than sadness expressions by French Canadian and African encoders, whereas fear expressions by African encoders were more accurately recognized than those by Chinese and French Canadian encoders.

MAIN DIFFERENCES IN INACCURATE JUDGMENTS: AN INVESTIGATION OF MISIDENTIFICATIONS

To further investigate the encoder and decoder effects, we assessed whether recognition errors were random or showed some pattern as a function of encoder or decoder group. A 3 (decoder group) × 3 (encoder group) analysis of variance with repeated measures on the last factor was conducted separately for each possible type of misidentification. The results of these ANOVAs are presented in Table 2. Among the possible 47 types of misidentifications,[5] differences linked to the cultural group of the decoder or the encoder or to an interaction between these factors were found for 17 types of misidentifications. Table 3 shows the mean

TABLE 2
***F* Values and Significance Levels for the Two-Way Analysis of Variance Conducted on Each Type of Emotion Misidentification**

DC				*EC*			*DC × EC*		
Type of Misidentification	df	F	p	df	F	p	df	F	p
Serenity-anger	2	10.06	.001	2	.25	n.s.	4	2.14	n.s.
Serenity-sadness	2	18.07	.001	2	2.58	n.s.	4	1.82	n.s.
Serenity-fear	2	11.06	.001	2	.13	n.s.	4	1.49	n.s.
Serenity-shame	2	3.76	.026	2	9.12	.000	4	2.80	.033
Surprise-sadness	2	3.62	.030	2	2.05	n.s.	4	.52	n.s.
Surprise-fear	2	.78	n.s.	2	3.01	n.s.	4	3.41	.010
Surprise-disgust	2	.64	n.s.	2	3.32	.044	4	.41	n.s.
Surprise-shame	2	4.29	.016	2	3.13	n.s.	4	2.01	n.s.
Contempt-anger	2	6.61	.002	2	3.34	.041	4	.45	n.s.
Contempt-disgust	2	4.69	.011	2	9.00	.000	4	.62	n.s.
Disgust-anger	2	7.03	.001	2	1.03	n.s.	2	.52	n.s.
Disgust-fear	4	3.63	.030	2	.96	n.s.	2	1.12	n.s.
Sadness-disgust	4	3.10	.049	2	.27	n.s.	2	.69	n.s.
Sadness-shame	4	.50	n.s.	2	22.87	.001	2	.97	n.s.
Anger-sadness	4	6.63	.002	2	.15	n.s.	2	.46	n.s.
Fear-anger	4	.62	n.s.	2	3.34	.046	2	.14	n.s.
Happiness-disgust	4	1.08	n.s.	2	3.76	.033	2	.56	n.s.

NOTE: DC = decoder culture; EC = encoder culture; n.s. = nonsignificant.

rates and standard deviations for only those misidentifications that varied as a function of cultural group. In general, French Canadians made less recognition errors than did African and Chinese participants, but they showed the frequently documented tendency to misattribute contempt and disgust to anger expressions. African decoders made more misidentifications than members of the other groups. The most frequent error made by the African decoders was to misattribute serenity to various negative emotions. Moreover, Chinese decoders also tended to misattribute serenity and surprise to shame expressions as well as surprise to fear expressions and disgust to anger expressions. Certain misidentifications also occurred as a function of the encoder group. In sum, with the exception of the contempt-disgust type of misidentification, there were fewer recognition errors for French Canadian encoders compared to both Chinese and sub-Saharan African encoders.

PERCEIVED PROBABILITY OF OCCURRENCE OF DIFFERENT FACIAL DISPLAYS OF EMOTION: INTERCULTURAL DIFFERENCES

To evaluate the possible effect of perceived frequency of occurrence of the different types of facial expressions in everyday life on the ability to recognize these expressions, we computed a simple regression with perceived probability of occurrence as the predictor variable and overall accuracy as the dependent variable. The analysis revealed a nonsignificant effect of perceived frequency of occurrence (ß = .12, $p = .222$).[6]

TABLE 3
Mean Rates and Standard Deviations for Emotion Misidentifications for Which Differences Emerge as a Function of the Cultural Group Membership of the Expresser or the Decoder

		Cultural Group of the Decoder						
		Chinese		*Caucasian*		*Sub-Saharan African*		
Type of Error	*Cultural Group of the Expresser*	M	SD	M	SD	M	SD	*Overall* M
Serenity-anger	Chinese	.02	.07	.01	.04	.11	.19	.04
	Caucasian	.04	.13	.00	.00	.11	.18	.05
	sub-Saharan African	.05	.14	.01	.06	.06	.11	.04
	overall	.04		.01		.09[ab]		
Serenity-sadness	Chinese	.02	.09	.01	.04	.14	.24	.06
	Caucasian	.04	.10	.01	.04	.10	.16	.05
	sub-Saharan African	.01	.06	.00	.00	.07	.13	.03
	overall	.03		.00		.10[ab]		
Serenity-fear	Chinese	.01	.06	.00	.00	.08	.14	.03
	Caucasian	.01	.06	.00	.00	.07	.13	.03
	sub-Saharan African	.03	.09	.02	.07	.05	.10	.03
	overall	.02		.01		.07[ab]		
Serenity-shame	Chinese	.07	.19	.03	.09	.16[bf]	.24	.08
	Caucasian	.09[f]	.17	.02	.07	.09[bf]	.24	.07
	sub-Saharan African	.04	.13	.00	.00	.03	.13	.02
	overall	.06		.01		.09		
Surprise-sadness	Chinese	.04	.11	.01	.04	.04	.10	.03
	Caucasian	.05	.12	.03	.10	.09	.17	.06
	sub-Saharan African	.04	.09	.03	.08	.05	.10	.04
	overall	.04		.02		.06[b]		
Surprise-fear	Chinese	.25	.20	.29	.22	.29[f]	.20	.28
	Caucasian	.34[d]	.22	.24	.22	.29[f]	.22	.29
	sub-Saharan African	.29[c]	.23	.25	.20	.18	.18	.24
	overall	.30		.26		.25		
Surprise-disgust	Chinese	.03	.10	.07	.15	.03	.08	.04
	Caucasian	.02	.09	.03	.10	.03	.09	.03
	sub-Saharan African	.05	.13	.06	.15	.06	.13	.06[e]
	overall	.03		.05		.04		
Surprise-shame	Chinese	.06	.18	.00	.00	.03	.10	.03
	Caucasian	.04	.13	.01	.04	.00	.00	.02
	sub-Saharan African	.01	.04	.00	.00	.01	.06	.01
	overall	.04[b]		.00		.01		
Contempt-anger	Chinese	.10	.15	.21	.25	.14	.22	.15[f]
	Caucasian	.06	.16	.20	.21	.10	.15	.12
	sub-Saharan African	.07	.18	.14	.20	.08	.12	.10
	overall	.08		.18[ac]		.10		
Contempt-disgust	Chinese	.09	.19	.15	.22	.21	.21	.15
	Caucasian	.16	.24	.23	.28	.33	.32	.24[df]
	sub-Saharan African	.13	.20	.14	.21	.23	.25	.17
	overall	.13		.17		.26[a]		
Disgust-anger	Chinese	.13	.20	.05	.14	.03	.08	.07
	Caucasian	.09	.19	.06	.14	.02	.09	.06
	sub-Saharan African	.11	.15	.08	.13	.05	.10	.08[d]
	overall	.11[bc]		.06[c]		.03		

continued

TABLE 3
Continued

		Cultural Group of the Decoder						
		Chinese		*Caucasian*		*Sub-Saharan African*		
Type of Error	*Cultural Group of the Expresser*	M	SD	M	SD	M	SD	*Overall* M
Disgust-fear	Chinese	.10	.18	.03	.08	.03	.08	.05
	Caucasian	.08	.17	.04	.11	.03	.08	.05
	sub-Saharan African	.08	.14	.06	.12	.07	.11	.07
	overall	.09[c]		.05		.04		
Sadness-disgust	Chinese	.03	.08	.01	.06	.03	.08	.02
	Caucasian	.03	.08	.00	.00	.03	.09	.02
	sub-Saharan African	.03	.09	.00	.00	.04	.11	.02
	overall	.03		.00		.03[b]		
Sadness-shame	Chinese	.15	.24	.10	.18	.11	.17	.12
	Caucasian	.23	.28	.19	.20	.19	.26	.21[d]
	sub-Saharan African	.30	.31	.34	.33	.24	.29	.29[de]
	overall	.23		.21		.18		
Anger-sadness	Chinese	.03	.10	.01	.04	.06	.12	.03
	Caucasian	.04	.11	.00	.00	.07	.15	.04
	sub-Saharan African	.03	.08	.02	.07	.06	.14	.04
	overall	.03		.01		.06[b]		
Fear-anger	Chinese	.05	.12	.04	.09	.04	.09	.04[e]
	Caucasian	.03	.08	.01	.06	.03	.08	.02
	sub-Saharan African	.06	.11	.04	.09	.06	.13	.05[e]
	overall	.05		.03		.04		
Happiness-disgust	Chinese	.02	.07	.01	.04	.00	.00	.01[e]
	Caucasian	.00	.00	.00	.00	.00	.00	.00
	sub-Saharan African	.02	.07	.01	.06	.01	.06	.01[e]
	overall	.01		.01		.00		

NOTE: For each type of error, the first term refers to the emotion that was chosen, and the second term refers to the target emotion. According to the Tukey test ($p < .05$), mean rate is significantly higher than the following: a = Chinese decoders, b = French Canadian decoders, and c = African decoders. According to within-subject contrasts ($p < .05$), mean rate is significantly higher than the following: d = Chinese expressers, e = Caucasian expressers, and f = African expressers.

To assess whether the perception of the probability of occurrence of certain types of facial displays varies as a function of type of expression as well as cultural group membership, a 3 (decoder group) × 6 (type of expression) ANOVA with repeated measures on the last factor was conducted.[7] The results revealed a significant main effect of type of expression, $F(2, 250) = 84.10$, $p < .001$, as well as a marginally significant interaction between decoder group and type of expression, $F(4, 367) = 2.04$, $p < .085$. The means of perceived probability of occurrence of the facial expression for the three groups of decoders are presented in Table 4.

The main effect of type of expression can be explained by an overall higher perceived probability of occurrence of happiness expressions, $F(1, 117) = 125.55$, $p < .001$. Moreover, differences in perceived probability of occurrence were found for sadness, $F(2, 117) = 3.33$, $p < .039$, and disgust expressions, $F(2, 117) = 3.24$, $p < .043$, as well as marginally significantly for anger expressions, $F(2, 117) = 2.89$, $p < .06$. In general, Chinese decoders

TABLE 4
Mean Perceived Probability of Occurrence Rates as a Function Type of Facial Expression and Cultural Group of the Decoder

	Cultural Group of the Decoder						
	Chinese		*Caucasian*		*Sub-Saharan African*		
Type of Facial Expression	M	SD	M	SD	M	SD	*Overall* M
Anger	42.72	15.47	50.96	18.89	51.88	21.48	48.52
Happiness	65.43	14.50	68.47	15.32	65.97	20.02	66.62
Sadness	43.54	15.17	52.82	18.70	52.41	20.29	49.59
Fear	44.45	16.82	49.24	19.63	52.59	22.43	48.76
Disgust	42.75	17.16	51.52	18.59	52.94	22.10	49.07
Shame	45.75	16.50	52.83	19.22	52.67	20.97	50.42

considered sadness, disgust, and anger expressions to be less probable than did French Canadian and sub-Saharan African decoders (Tukey; $p < .05$).

DISCUSSION

One goal of this study was to test the in-group advantage hypothesis for members of three cultural groups residing in Canada. In concordance with other studies using equivalent stimuli across encoder groups (e.g., Biehl et al., 1997; Matsumoto, 1992), the pattern of results of this study does not support the in-group advantage hypothesis (Elfenbein & Ambady, 2002a, 2002b). Thus, any in-group advantage should mostly be attributable to cross-cultural differences in expressive style as well as to individuals' greater familiarity with the expressive style adopted in their own culture. Specifically, the absence of an in-group advantage under the condition of stimulus equivalence strongly suggests that differential decoding processes implicated in judging in- versus out-group members' expressions do not account for the advantage. Given that African, Chinese, and French Canadian participants showed comparable accuracy when judging expressions of both cultural in- and out-group members, this study does not support the notion that the in-group advantage is explained by differential motivation or decoding strategies when decoding cultural in- and out-group others' expressions. One should note, however, that these findings are not in contradiction with dialect theory (Elfenbein & Ambady, 2002a, 2002b), which presupposes the presence of encoding differences across cultures.

Despite the absence of evidence in favor of the in-group advantage, a number of encoder and decoder effects emerged, showing that there are differences in recognition accuracy as a function of both encoder and decoder cultural groups, although those differences tend to not favor the in-group. Specifically, French Canadian participants recognized sadness expressions more accurately than did the Chinese and African participants as well as shame expressions more accurately than did the Chinese participants. The finding that French Canadian individuals are more accurate at recognizing shame expressions is interesting, because it adds shame to the list of negative emotions that are more accurately recognized by Caucasian

individuals. Moreover, with regard to recognition accuracy in the judgment of sadness expressions, these findings concord with the results by Biehl et al. (1997), who found similar differences between members of Caucasian and Asian cultures (i.e., American versus Japanese). It is interesting that this study shows that participants of the sub-Saharan African culture, which is also considered collectivistic (Hofstede, 1980), also have more difficulty in identifying sadness expressions.

Moreover, although the presumed probability of occurrence of emotion displays in everyday life was not shown to be a valid predictor of the accuracy with which these displays were recognized, interesting differences among cultural groups emerged. More specifically, expressions of sadness, disgust, and fear were considered by Chinese individuals as less probable in everyday interactions. Although these findings do not yield direct evidence for the notion that these expressions are proscribed in Asian cultures (Ekman, 1973; Matsumoto, 1992), it does suggest that members of Asian cultures may be less frequently exposed to these facial expressions.

In contrast to the well-documented finding that Asians recognize anger expressions less accurately than Caucasians (e.g., Biehl et al., 1997; Matsumoto, 1992), the Asian participants in our study did not show this tendency. However, Bourgeois et al. (2003) showed that lower intensity anger expressions are equally well recognized by Asian and Caucasian participants, and it should be noted that the expressions from the MSFDE (Beaupré et al., 2000) are of lower intensity than those of the more commonly used Japanese and Caucasian Facial Expressions of Emotion (JACFEE; Matsumoto & Ekman, 1988). Thus, these findings support Bourgeois et al.'s finding that lower intensity expressions, which are possibly less threatening to group harmony, are not discounted by Asian participants in the same way that intense anger expressions are.

It is interesting to note that recognition errors are not random across emotions. Specifically, African decoders showed a strong tendency to confuse negative facial affect such as expressions of sadness, anger, fear, and shame with serenity, a positive emotion. African decoders also in some cases made other less commonly observed errors such as misattributing surprise to sadness expressions and sadness to disgust expressions. Chinese participants, in turn, displayed a tendency to misattribute serenity and surprise to shame expressions as well as surprise to fear expressions and disgust to anger expressions. In contrast, French Canadian decoders' most common error was to confuse disgust and contempt with anger, a semantically related concept. These observations provide complementary evidence for the notion that Caucasians recognize negative facial affect more accurately than do members of more collectivistic cultures (e.g., Biehl et al., 1997; Matsumoto, 1992).

Different explanations can be formulated to account for the observation that African and Chinese decoders use more nontarget emotion labels when decoding basic emotions. First, Leu, Mesquita, Masuda, Ellsworth, and Karasawa (2003) showed that Asians use more emotion words than Caucasians to describe expressions from the MSFDE (Beaupré et al., 2000). According to Leu et al. (2003), this is because Asians hold a more holistic view of their social environment. Specifically, their attention is more attuned to the field and interrelationships within the field, in comparison to Westerners, who attend to more salient target objects, which reflects a more analytical mode of thought (Ji, Peng, & Nisbett, 2000; Nisbett, Peng, Choi, & Norenzayan, 2001). According to Leu et al. (2003), this suggests that Asians are more attuned to the presence of different emotions (and their interrelations) within an emotional expression, in comparison to Westerners, who would be attuned to the most salient emotion category.

However, this holistic view explanation does not appear to be the most appropriate account for the emotional misidentifications in our study. Although there is evidence that the dialectical way of thinking that is specific to Asian cultures sees emotions of opposite valence (e.g., happiness and anger) as less incompatible than in Western philosophy (Schimmack, Oishi, & Diener, 2002), the African participants in our study, who are immigrants from African cultures that are generally known as nondialectical cultures (Schimmack et al., 2002), also confused what appear to be incompatible emotions according to Western philosophy. Moreover, because a holistic view is based on a perception of continuities, overlapping of elements, as well as relationships, it could be speculated that in an emotion recognition task, individuals with a more holistic view would perceive more nontarget emotions that are somewhat close to the target emotion such as contempt and anger or contempt and disgust than Caucasians. However, this was not the case in our study because the Chinese participants did not overall make these types of misidentifications more frequently than French Canadian participants.

In contrast to the holistic view explanation, it could be argued that the lower recognition accuracy and the more frequent emotion misidentifications among Asian and African participants might be related to the types of expressions used in our study. More specifically, although our stimuli were recognized with well above chance accuracy among the cultural groups in our study, it remains possible that they mostly represent North American emotional expressions (Elfenbein & Ambady, 2002a, 2002b). Specifically, the expressions of the MSFDE are standardized to represent the emotion prototypes described by Ekman and Friesen (1978) as well as Izard (1979). These prototypes were developed based on very detailed and extensive studies of expressive behavior; however, the majority of the data came from North American populations. It is therefore plausible that these prototypes are somewhat biased toward a North American expressive style, thereby affording the French Canadian decoders with a certain advantage.

Altogether, these findings on the perception of facial expressions of emotion within the Canadian multicultural context provide support for both the universality and culture-specific standpoints. More specifically, although members of African, Chinese, and French Canadian cultural groups living in Canada all showed above chance recognition accuracy, some important cross-cultural differences emerged. Effects attributable to decoder group membership can essentially be attributed to the fact that French Canadians were more efficient at decoding sadness and shame expressions. Several pertinent explanations for these differences in decoding could be posited. Thus, it is plausible to argue that the sadness and shame expressions used in our study mostly represent expressions typical of a North American expressive repertoire and thus afforded North American decoders with an advantage. Nonetheless, the general decoding rule proscribing the perception of negative emotions in collectivist cultures (Matsumoto, 1989, 1992) also provides a highly plausible explanation for these differences. In particular, expressions of sadness and shame signal loss of control or face and may pose a particular challenge for group harmony in Asian and African cultures. Hence, through socialization, members of these cultures may develop decoding strategies that attenuate or discount the evidence for such expressions. Such differences in decoding rules also appear to be the best explanation for the observation that sub-Saharan Africans consistently used the concept of serenity to categorize negative emotional expressions of anger, sadness, fear, and shame.

Furthermore, an encoder effect was found for the decoding of fear expressions such that they were more accurately recognized when expressed by African encoders compared to Caucasian or Chinese encoders. Given that the stimuli of the MSFDE (Beaupré et al., 2000)

used in this study were carefully balanced in terms of the presence and intensity of facial muscular components across encoder groups, encoder group differences with respect to the recognition of fear expressions are mostly attributable to differences in facial morphology. In fact, the contrast between the white of the sclera (i.e., which is revealed by the raising of the eye cover fold in fear expressions) and the darker skin color in sub-Saharan Africans may increase the perceived salience of fear in encoders of this group. In contrast, Chinese encoders, for whom accuracy was lowest, can not usually lift the upper lid sufficiently to expose the sclera.

In conclusion, this study suggests that when members of different cultural groups decode equivalent prototypical expressions from members of their own or other cultural groups, highly similar judgments will be made, as predicted by the universality position. However, simple morphological features that vary the salience of facial expressive cues also help and hinder the recognition of emotions in predictable ways. At the same time, cultural norms influence decoding in various subtle ways that may be highly pertinent in everyday interactions, where subtle differences in meaning are often very relevant.

NOTES

1. The facial expressions were coded by two certified coders using the Facial Action Coding System (FACS; Ekman & Friesen, 1978). Only expressions for which both coders agreed on both the Action Units (AUs) and their intensity were retained. For the final set of expressions, all actors showed the same AU combination for the same expressions.

2. Participants were also asked to indicate their level of confidence in their judgment. However, the data pertaining to this variable will not be presented in this context.

3. Accuracy probability at the chance level is 1/9 (.11) because the shame and the embarrassment scales have been merged as one single scale. Therefore, accuracy on shame expressions is considered if the emotional scale receiving the strongest intensity is the shame or the embarrassment scale.

4. Given the lack of sphericity of the data, the Greenhouse-Geisser correction was used.

5. Given the merging of the shame and embarrassment scales, there were eight remaining possible types of misattributions, respectively, for happiness, anger, sadness, fear, and disgust expressions, whereas only seven types of misattributions were possible for the shame expressions.

6. In addition, we conducted a series of regression analyses separately for each level of these factors. Out of the 18 analyses (6 types of emotion expressions × 3 ethnic groups), only one significant regression emerged (perceived frequency of occurrence predicted recognition accuracy of sadness expressions by French Canadian decoders; ß = .35, $p = .029$).

7. Given the lack of sphericity of the data, the Greenhouse-Geisser correction was used.

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