Perceiving Acculturation from Neutral and Emotional Faces

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Abstract

Facial expressions of emotion convey more than just emotional experience. Indeed, they can signal a person's social group memberships. For instance, extant research shows that "nonverbal accents" in emotion expression can reveal one's cultural affiliation (Marsh, Elfenbein, & Ambady, 2003). That work only tested distinctions between people belonging to one of two cultural categories, however (Japanese vs. Japanese Americans). What of people who identify with more than one culture? Here, we tested whether nonverbal accents might signal not only cultural identification, but the *degree* of cultural identification (i.e., acculturation). Using neutral, happy, and angry photos of East Asian individuals varying in acculturation to Canada, we found that both Canadian and East Asian perceivers could accurately detect the targets' level of acculturation. Although perceivers used hairstyle cues when available, once we removed hair, accuracy was greatest for happy expressions—supporting the idea that nonverbal accents convey cultural identification. Finally, the intensity of targets' happiness related to both their self-reported and perceived acculturation, helping to explain perceivers' accuracy and aligning with research on cultural display rules and ideal affect. Thus, nonverbal accents appear to communicate cultural identification not only categorically, as previous work has shown, but also continuously.

Key words: acculturation, face perception, emotion, nonverbal accents

Perceiving Acculturation from Neutral and Emotional Faces

Facial expressions of emotion play an invaluable role in everyday communication. Beyond communicating what a person feels, emotional expressions provide a wealth of information that ranges from signalling behavioral intentions (e.g., Fridlund, 1994; Scarantino, 2017) to even cueing social group membership (e.g., Bjornsdottir & Rule, 2017b; Tskhay & Rule, 2015; see Bjornsdottir & Rule, 2017a, for review). Although scholars have only recently begun to explore the link between emotional expressions and social group membership, existing work highlights its importance in perceiving others' group memberships and in facilitating (or hindering) cross-group communication.

Perhaps the most notable research in this area explored the role of emotional expressions in signalling cultural affiliation. Marsh, Elfenbein, and Ambady (2003) tested whether perceivers could distinguish the faces of Japanese and Japanese American individuals, both when posing neutral faces and when displaying various emotional expressions. Their results showed that the two groups were distinguishable from their faces, particularly when expressing emotions. The authors theorized that "nonverbal accents" (defined as cultural variations in emotional expressions) heightened accuracy for determining cultural group membership (see also Elfenbein, 2013). Indeed, contrary to previous theories suggesting total universality (e.g., Ekman & Friesen, 1971), more recent work has found that facial expressions of emotion show clear cultural variations on culturally common patterns of expression (sometimes termed "dialects;" Elfenbein, Beaupré, Lévesque, & Hess, 2007; Jack, Caldara, & Schyns, 2012; Jack, Garrod, Yu, Caldara, & Schyns, 2012; Jack, Sun, Delis, Garrod, & Schyns, 2016), further supporting the conclusion that nonverbal accents can reveal people's cultural affiliations.

Thus far, research on nonverbal cues to cultural affiliation has focused on individuals belonging to only one culture, yet many individuals may affiliate with more than one cultural group. For instance, individuals undergoing acculturation (the process by which individuals' identities change following experience with a new culture) may feel blended between cultures or see themselves as belonging to more than one culture (Ryder, Alden, & Paulhus, 2000). Indeed, acculturation exerts a profound impact on individuals' perceptions, personality, and even neural responses, engaging in thoughts and behaviors intermediate between those typical of people from their heritage and host cultures (e.g., Güngör et al., 2013; Hedden, Ketay, Aron, Markus, *&* Gabrieli, 2008; Peng, Zebrowitz, & Lee, 1993). Elfenbein and Ambady (2003a) additionally found that cultural differences in recognizing facial expressions of emotion changed with cultural exposure: Compared to those with less cultural exposure, immigrants who experienced greater exposure to their host culture better recognized emotions expressed by people from that host culture (see also Bjornsdottir & Rule, 2016, for similar findings with regard to mental state reading). Moreover, immigrants' self-reported emotional experience similarly changes with cultural exposure and engagement (De Leersnyder, Mesquita, & Kim, 2011).

This led us to wonder whether cultural exposure and acculturation may change individuals' *enacted* emotional expressions as well. That is, if cultural affiliation manifests in one's face and acculturation shifts individuals between their two cultures, might individuals' degree of acculturation appear in their faces? If so, might nonverbal accents reveal acculturation as they do cultural affiliation; for example, through expressions that vary in their degree of resemblance to (or blending between) expressions typical in the heritage versus host culture? Although there are cultural differences in emotion expressions (which help people detect someone's cultural affiliation; Marsh et al., 2003), these differences have always been examined

categorically (i.e., one culture vs. another). Here, we expanded upon this work by treating cultural affiliation as a continuum and testing whether emotional expressions also vary in a continuous manner that reveals people's degree of acculturation.

To address this gap, we built upon Marsh et al.'s (2003) findings by testing whether nonverbal accents reflect cultural identification in a sample of East Asian targets who varied in their acculturation to Canada. Specifically, we examined whether impressions of how Canadian a person looks correlate with that target's acculturation, and whether this association is stronger for posed emotional, rather than neutral, expressions. We hypothesized that individuals more acculturated to Canada would appear more Canadian, whereas individuals identifying more with their heritage cultures would appear less Canadian. That is, we anticipated that ratings of how Canadian targets look would correlate positively with those targets' scores on the mainstream (host) culture subscale of the Vancouver Index of Acculturation (VIA; Ryder et al., 2000) and negatively with their scores on the VIA heritage culture subscale. Consistent with Marsh et al.'s (2003) work on nonverbal accents, we furthermore expected to observe a stronger association when targets displayed emotional versus neutral expressions.

We also examined the specific cues that might communicate acculturation in targets' emotion expressions. Clear cultural differences exist in the display rules for expressing emotion, such that East Asian cultures endorse lower expressivity than North American cultures, which then parallel differences in the intensity of emotions experienced (Matsumoto, Kudoh, Scherer, & Wallbott, 1988; Matsumoto et al., 2008). Along these lines, ideal affect in North American culture consists of more excited happiness, compared to the calm happiness valued in East Asian cultures (Tsai, 2007; Tsai, Knutson, & Fung, 2006). Stereotypes likewise associate Canadians with positive emotion (Brambilla, Ravenna, & Hewstone, 2012), which could affect impressions

of how Canadian someone looks. Altogether, this suggests that acculturation could affect the intensity of expressed emotions.

Given that previous research shows ingroup advantages in emotion reading (Elfenbein et al., 2007; Elfenbein & Ambady, 2002; Wickline, Bailey, & Nowicki, 2009; see Elfenbein & Ambady, 2003b, for review), this might also apply to detecting other information conveyed by emotion expressions, such as cultural affiliation. We therefore tested whether perceivers' degree of acculturation and their ethnicity might affect their accuracy in detecting others' cultural affiliation. We chose to examine ethnicity, due to its well-documented impact on face processing (i.e., the own-race effect; e.g., Meissner & Brigham, 2001), including emotion perception (e.g., Elfenbein & Ambady, 2002). We also tested the role of perceiver acculturation, as we reasoned that the ability to detect identification with a particular culture (here, Canadian) might relate to the perceiver's identification with that culture (a form of ingroup advantage).

We began in Study 1 by testing whether Canadian perceivers could correctly detect East Asians' degree of acculturation from their neutral and emotional faces. We then refined our examination in Study 2 by focusing on only the internal features of the face, testing for accuracy without the presence of salient hairstyle cues. Next, we investigated a potential cue to accuracy in Study 3 by testing the role of emotional intensity in communicating acculturation. Finally, we explored the role of perceivers' own ethnicity and acculturation in accurately detecting others' acculturation in Study 4. This research was approved by the Research Ethics Board at the University of Toronto and data from all studies are available on the Open Science Framework (OSF; https://osf.io/93e4d/?view_only=73ba99060e73407cb22926cdfd2b87dc).

Study 1

To test the visibility of acculturation, we collected photographs of East Asian individuals who varied in their acculturation to Canada and to their heritage cultures. We then asked Canadian perceivers to rate the targets on how Canadian they appeared. We preregistered this study on the OSF (https://osf.io/7ubc6).

Method

Stimuli. We collected photos of 189 East Asian undergraduates in Canada (144 female, 45 male; 159 Chinese, 9 South Korean, 5 Filipino, 5 Taiwanese, 3 Vietnamese, 1 Japanese, 1 Kazakh, 1 Malaysian, 1 Mauritian, and 4 unspecified heritage culture) who had completed the VIA (adapted from the original such that Canadian culture, rather than North American culture, was the mainstream culture) as part of a separate earlier study. The VIA asks participants to rate their agreement with 20 statements such as "I often participate in my heritage cultural traditions" and "I often behave in ways that are typically Canadian," providing a measure of participants' degree of identification with both their heritage culture and mainstream (Canadian) culture (Ryder et al., 2000), and shows robust reliability (see Huynh, Howell, & Benet-Martinez, 2009). We photographed targets in the lab, cropped their photos around the top of head, bottom of chin, and around the ears; and then standardized the photos to 350 pixel width and converted them to greyscale. Each target had a photo posing a neutral expression, a happy expression, and an angry expression (Figure 1).

We chose these emotions in light of documented cultural differences in the expression of both happiness and anger (e.g., Elfenbein et al., 2007; Jack et al., 2012, 2016). Expressions of happiness could provide the clearest variation by acculturation due to cultural differences in ideal affect (i.e., North American culture values more excited expressions of happiness, whereas East Asian culture values calmer happiness; Tsai, 2007). Expressions of anger also vary according to

cultural display rules (Matsumoto et al., 2008; Matsumoto, Yoo, & Chung, 2010), providing a

helpful contrast of both a positively valenced (happiness) and negatively valanced (anger)

expression against neutral. We based the number of targets on a power analysis anticipating the

average effect size in social psychology ($r = .21$; Richard, Bond, & Stokes-Zoota, 2003),

indicating that we would need at least 173 targets for 80% power at $\alpha = .05$ in target-level

correlations. We collected 189 targets for 84% power and for a target sample that evenly divided

between the three expressions.

Procedure. We recruited 102 Canadian undergraduates to rate how Canadian all 189

targets appeared from 1 (*not at all*) to 7 (*very*), excluding two participants who rated all of the

targets identically and 10 who reported that they were not Canadian citizens or permanent

residents (remaining $N = 90$; 73 female, 17 male; $M_{age} = 18.67$ years, $SD = 2.07$; 32 East Asian,

17 South Asian, 13 Caucasian, 11 Middle Eastern, 7 mixed race, 3 African, 2 Southeast Asian, 1

Hispanic, 1 Pacific Islander, 3 unspecified ethnicity). We instructed participants to rate the faces

based on their first impressions. Targets appeared in random order, with one third of targets

displaying each expression (neutral, happy, angry) and the expression posed by each individual

target counterbalanced across three conditions, to which we randomly assigned participants.

Thus, roughly 30 participants rated each version of each target, a sample size resulting in good

interrater reliability (Cronbach's αs = .81-.87). Participants provided demographic information

after rating all of the targets.[1]

[1] In addition to reporting age, gender, ethnicity, and Canadian citizenship, participants also

reported the number of years lived in Canada, the culture with which they most identified,

subjective social class standing, and family income. Across Studies 1, 2, and 4, exploratory

Results

We first correlated targets' VIA Heritage ($M = 6.66$, $SD = 1.39$) and Mainstream ($M = 5.92$, $SD = 1.29$) scores with their mean Canadianness ratings (averaged across participants) for each of the three expressions. Mainstream scores significantly positively correlated with the Canadianness ratings for all of the angry, $r(187) = .19$, 95% CI [.05, .32], $p = .008$, happy, $r(187) = .28$, 95% CI [.14, .41], $p < .001$, and neutral expressions, $r(187) = .25$, 95% CI [.11, .38], $p < .001$, such that targets who identified more with Canadian culture looked more Canadian. Heritage scores negatively related to the Canadianness ratings significantly for the angry expressions ($M = 3.62$, $SD = 0.42$), $r(187) = -.16$, 95% CI [-.30, -.02], $p = .03$, marginally for the happy expressions ($M = 4.24$, $SD = 0.50$), $r(187) = -.12$, 95% CI [-.26, .02], $p = .09$, but not for the neutral expressions ($M = 3.67$, $SD = 0.47$), $r(187) = -.10$, 95% CI [-.24, .04], $p = .17$, though all correlations were in the hypothesized direction (i.e., targets looked more Canadian if they identified less with their heritage culture).

To provide a more conservative test, we also ran multiple linear regressions with the two VIA subscores simultaneously predicting Canadianness ratings for each expression; results mirrored those from the correlations (Table 1).[2]

Table 1

analyses suggested that none of these variables consistently related to participants' performance on the task (see Supplementary Material).

[2] Consistent with previous research (Ryder et al., 2000), targets' VIA Heritage and Mainstream scores related orthogonally, $r(187) = .04$, $p = .57$.

Unstandardized Regression Coefficients, Standard Errors, and Significance Tests for VIA

Subscores Predicting Canadianness Ratings in Study 1

	B	SE	t	p	$r_{effect\ size}$	95% CI
Neutral expression						
VIA Heritage	-.03	.02	-1.45	.15	-.11	[-.25, .04]
VIA Mainstream	.10	.02	3.95	< .001	.28	[.14, .41]
Happy expression						
VIA Heritage	-.04	.02	-1.71	.09	-.12	[-.26, .02]
VIA Mainstream	.11	.03	4.07	< .001	.29	[.15, .41]
Angry expression						
VIA Heritage	-.05	.02	-2.57	.01	-.19	[-.32, -.04]
VIA Mainstream	.06	.02	2.85	.005	.20	[.06, .34]

Note. *df* = 186

Finally, we tested whether acculturation detection significantly differed by target expression by meta-analytically comparing the effect sizes of the three emotions separately within each VIA subscore (Meng, Rosenthal, & Rubin, 1992). The absence of significant differences suggested that the neutral, happy, and angry expressions similarly revealed targets' level of acculturation as measured by both their Heritage and Mainstream VIA scores, all Zs ≤ 0.61, *p*s ≥ .54.

Discussion

Supporting our hypothesis, people perceived East Asian individuals who identified more with Canadian culture as looking more Canadian. Not only did the targets' Mainstream VIA

scores positively predict ratings of how Canadian they looked, their Heritage VIA scores also negatively predicted how Canadian they looked, though to a lesser extent. Thus, targets appeared more Canadian if they identified more with Canada and looked (somewhat) more Canadian if they identified less with their culture of origin.

In contrast to previous work on nonverbal accents (Marsh et al., 2003), however, this association between target acculturation and perceived Canadianness was not stronger when targets displayed emotional versus neutral expressions. This suggests that emotional expressions did not provide additional information about the targets' cultural identification. Perhaps this difference emerged because a feature consistent across the three expressions provided a more salient cue to acculturation that masked any nonverbal accent cues (e.g., targets' hairstyles; Matsumoto & Hwang, 2018). We tested this in Study 2.

Study 2

To isolate the role of nonverbal accents in communicating acculturation, we cropped all extrafacial cues from the faces and repeated the task from Study 1. Correlations between targets' VIA scores and ratings of how Canadian they look would indicate that the face communicates cultural identification, whereas a lack of such accuracy would suggest that external cues largely contributed to the results we observed in Study 1. We expected that targets more acculturated to Canada (as indicated by higher Mainstream VIA scores) would be rated as more Canadian.[3] We hypothesized that this association would be stronger when targets displayed emotional (happiness, anger) versus neutral expressions (consistent with past findings on nonverbal

[3] Given the weaker relationship between Heritage VIA scores and Canadian ratings in Study 1, we did not specifically hypothesize an association between them in this study.

accents; Marsh et al., 2003), but also anticipated that VIA scores would not relate as strongly to

perceived Canadianness as in Study 1 because targets' hair may have served as a cue to their

acculturation (Matsumoto & Hwang, 2008). We preregistered this study on the OSF

(https://osf.io/hzmup).

Method

      We removed all extrafacial information from each target's photo (e.g., hair, traces of

clothing at the base of the neck), thereby displaying only their internal facial features (Figure 2).

After excluding six participants who gave identical ratings for each target and 14 who reported

not having Canadian citizenship or permanent residency, 72 undergraduates (50 female, 22 male;

M_{age} = 18.72 years, SD = 1.77; 30 East Asian, 18 Caucasian, 8 South Asian, 6 mixed race, 3

Southeast Asian, 2 African, 2 Pacific Islander, 1 Hispanic, 1 Middle Eastern, 1 unspecified

ethnicity) rated the targets on how Canadian they looked following the exact procedure used in

Study 1. As there, roughly 30 participants rated each version of each target, providing good

interrater reliability (Cronbach's αs = .74-.88). Participants provided demographic information

after rating all of the targets.

Results

      As above, we correlated targets' VIA subscores with their Canadianness ratings

(averaged across perceivers) for each of the three expressions. Targets' Mainstream VIA scores

did not correlate with ratings of their angry, $r(187)$ = .08, 95% CI [-.06, .22], p = .30, or neutral

expressions, $r(187)$ = .08, 95% CI [-.06, .22], p = .26, but significantly positively correlated with

ratings of their happy expressions: $r(187)$ = .26, 95% CI [.12, .39], p < .001. Likewise, targets'

Heritage VIA scores correlated neither with ratings of their angry (M = 3.58, SD = 0.44), $r(187)$

= -.12, 95% CI [-.26, .02], p = .11, nor neutral expressions (M = 3.61 , SD = 0.47), $r(187)$ = -.08,

95% CI [-.22, .06], $p = .28$, but marginally negatively correlated with ratings of their happy

expressions ($M = 4.26$, $SD = 0.58$), $r(187) = -.14$, 95% CI [-.28, .003], $p = .053$.

    We again simultaneously entered both VIA subscores into multiple linear regressions

predicting Canadianness ratings for each of the three expressions, which echoed the correlations

(Table 2).

    Finally, we again meta-analytically compared the effect sizes between the three

expressions for each of the two VIA subscores. This revealed no significant differences between

the emotions for the Heritage VIA scores, $Zs \leq 0.59$, $ps \geq .56$, but marginally stronger

associations for ratings based on the happy versus angry and neutral expressions for the

Mainstream VIA scores, both $Zs = 1.79$, $ps = .07$.

Table 2

Unstandardized Regression Coefficients, Standard Errors, and Significance Tests for VIA

Subscores Predicting Canadianness Ratings in Study 2

	B	SE	t	p	$r_{effect\ size}$	95% CI
Neutral expression						
VIA Heritage	-.03	.02	-1.13	.26	-.08	[-.22, .06]
VIA Mainstream	.03	.03	1.17	.24	.09	[-.06, .23]
Happy expression						
VIA Heritage	-.06	.03	-2.17	.03	-.16	[-.30, -.01]
VIA Mainstream	.12	.03	3.83	< .001	.27	[.13, .40]
Angry expression						
VIA Heritage	-.04	.02	-1.67	.10	-.12	[-.26, .02]

VIA Mainstream	.03	.02	1.29	.20	.09	[-.05, .23]

Note. *df* = 186

Discussion

Targets' Mainstream and Heritage VIA scores again respectively correlated significantly positively and marginally negatively with how Canadian they looked, but only when they displayed happy expressions. This suggests that perceivers in Study 1 *did* primarily use hair cues in their judgments (Matsumoto & Hwang, 2018), but that nonverbal accents *also* cue targets' acculturation in their happy expressions, paralleling Marsh et al.'s (2003) findings. We tested one such possible cue—emotion intensity—in Study 3.

Study 3

Whereas Studies 1 and 2 suggest that hairstyle helps to drive perceptions of targets' acculturation, we nonetheless observed acculturation detection in the absence of hair cues when targets displayed happy expressions. Here, we explored emotional intensity as a possible cue. Well-documented cultural differences in display rules for emotion indicate that East Asian cultures endorse lower expressivity than North American cultures do (Matsumoto et al., 2008). Similarly, North American culture promotes high-arousal happiness, whereas East Asian culture values low-arousal happiness (Tsai et al., 2006). Cultural stereotypes parallel this: for example, people associate Canadians with positive emotion (Brambilla et al., 2012). We therefore obtained emotion intensity ratings for the targets' happy and angry expressions, and valence ratings of their ostensibly neutral expressions (given research suggesting that neutral faces contain subtle emotional signals; e.g., Adams, Nelson, Soto, Hess, & Kleck, 2012). We then related these

ratings to targets' self-reported VIA scores and ratings of how Canadian they look using the data collected in Studies 1 and 2.

Method

We randomly assigned 86 North American participants from Amazon's Mechanical Turk (38 female, 48 male; M_{age} = 34.52 years, SD = 9.28; 58 Caucasian, 16 African, 4 East Asian, 4 Hispanic, 1 mixed race, 1 Native American, 1 Pacific Islander, 1 South Asian) to rate either the angry, happy, or neutral faces from Study 1, as we did not anticipate external features to influence judgments of emotion. We excluded four additional participants who reported trouble viewing the stimuli. Thus, roughly 30 participants rated either the angry faces on how angry they looked, the happy faces on how happy they looked (both from 1 [*not at all*] to 7 [*very*]), or the valence of the neutral faces (in response to the question "How does this person feel right now?" from -3 [*negatively*] to 3 [*positively*]); overall, the participants showed excellent interrater reliability (Cronbach's αs = .92-.96).[4] After rating all 189 targets in random order, participants provided demographic information and reported whether they had trouble viewing any of the stimuli.

[4] We also showed the neutral faces to 37 additional undergraduate participants (22 female, 15 male; M_{age} = 19.59 years, SD = 3.55; 20 East Asian, 8 Caucasian, 3 Middle Eastern, 2 mixed race, 2 Southeast Asian, 1 African, 1 South Asian) for only 500 ms per face to obtain their first impressions of the targets' affect before they noticed their neutral expressions (as perceivers may overwrite initial impressions when given more time to process them; e.g., Rule, Tskhay, Freeman, & Ambady, 2014). Using these speeded ratings rather than the self-paced ratings yielded the same pattern of results.

Results

To assess the validity of emotional valence and intensity as cues, we correlated each target's VIA subscores with the ratings for each of the three expressions. Valence ratings of the neutral faces ($M = -0.01$, $SD = 0.75$) did not relate to targets' Heritage, $r(187) = .03$, 95% CI [-.11, .17], $p = .67$, or Mainstream subscores, $r(187) = .07$, 95% CI [-.07, .21], $p = .37$. Similarly, ratings of the angry faces' intensity ($M = 3.90$, $SD = 0.76$) correlated with neither the Heritage, $r(187) = .04$, 95% CI [-.10, .18], $p = .61$, nor Mainstream subscores, $r(187) = -.04$, 95% CI [-.18, .10], $p = .55$. Ratings of the happy faces' intensity ($M = 4.43$, $SD = 0.86$), however, significantly related to both the Heritage, $r(187) = -.17$, 95% CI [-.31, -.03], $p = .02$, and Mainstream subscores, $r(187) = .19$, 95% CI [.05, .33], $p = .009$; thus, targets who identified more with Canadian culture and less with their heritage culture looked happier.

We next tested the degree to which participants in Studies 1 and 2 might have used emotional valence and intensity as cues in their judgments by correlating their Canadianness ratings for the three expressions with the valence and intensity scores collected here. More positive affect (i.e., less intense anger, more intense happiness, and more positive-looking neutral faces) related to higher Canadianness ratings among the neutral faces, happy faces, and angry faces in both studies (Table 3).

Table 3

Correlation Coefficients and 95% Confidence Intervals for Correlations Between Canadianness Ratings and Emotional Valence and Intensity for Targets Posing Neutral, Happy, and Angry Expressions

	Neutral Face Valence	Happy Face Intensity	Angry Face Intensity

| Study 1 | .37*** [.24, .49] | .59*** [.49, .68] | -.13† [-.27, .01] |
| Study 2 | .44*** [.32, .55] | .60*** [.50, .68] | -.15* [-.29, -.01] |

Note. $df = 187$. † $p < .10$, * $p < .05$, *** $p < .001$

Discussion

Here, we found that the intensity of expressed happiness significantly related to targets'

acculturation to Canada, aligning with previous work on display rules indicating that people in

individualistic Western cultures are more emotionally expressive (e.g., Matsumoto et al., 2008)

and with work demonstrating that North American cultures favor high-arousal (excited)

happiness over the low-arousal (calm) happiness valued in East Asian cultures (Tsai, 2007; Tsai

et al., 2006). We also found that perceivers associated looking more Canadian with more positive

valence across all three expressions, perhaps because of the strong stereotypes associating

Canadians with positivity (Brambilla et al., 2012). That stereotype and the lack of association

between targets' acculturation and both the valence of their neutral faces and the intensity of

their angry faces, helps to explain why perceivers in Study 2 only accurately detected targets'

acculturation from targets' happy faces.

Study 4

Adding to the findings in Studies 1-3 that extrafacial and internal facial cues reveal East

Asians' acculturation, we next aimed to test whether perceiver differences might moderate that

detection. Specifically, we tested whether perceivers' own acculturation to Canada might affect

how well they can detect others' acculturation. We anticipated either (a) that East Asian

perceivers with higher Mainstream VIA scores would achieve higher accuracy (i.e., greater

acculturation to Canada might lead to increased ability to detect such acculturation in others,

given that Canadian participants in Studies 1 and 2 were able to detect targets' acculturation), or (b) that East Asian perceivers would perform better overall due to an ingroup advantage (e.g., Elfenbein & Ambady, 2002), irrespective of their own acculturation. We preregistered this study on the OSF (https://osf.io/gvybk).

Method

We aimed to recruit at least 284 participants to achieve 95% power in perceiver-level correlations and regressions (anticipating the average effect size in social psychology, $r = .21$, and $\alpha = .05$; Richard et al., 2003). After excluding 27 participants who reported an ethnicity other than East Asian,[5] four who did not list an East Asian heritage culture, and 18 who rated all of the targets identically, 258 undergraduates (180 female, 77 male, 1 other; $M_{age} = 19.27$ years, $SD = 2.02$; 106 Canadian citizens, 152 non-Canadian citizens) rated the stimuli from Study 2 (the faces without hair cues) for how Canadian they appeared, following the same procedure except that we inserted the VIA just before the demographic questions. The participants achieved excellent interrater reliability (Cronbach's αs = .90-.94), allowing us to average their scores for the targets to test for replication of the results above.

Results

Targets. We first tested whether the target-level results here replicated those above by performing the same analyses as in Studies 1 and 2. Targets' Mainstream VIA scores positively correlated with their mean Canadian ratings when neutral ($M = 3.19$, $SD = 0.37$), $r(187) = .20$, 95% CI [.06, .33], $p = .006$, happy ($M = 3.69$, $SD = 0.48$), $r(187) = .25$, 95% CI [.11, .38], $p <$

[5] Including the data of 15 participants who reported Southeast Asian or mixed East Asian ethnicity did not change our pattern of results.

.001, and angry (M = 3.17, SD = 0.36), r(187) = .17, 95% CI [.03, .31], p = .02. Their Heritage

VIA scores, however, did not significantly correlate with the mean Canadianness ratings when

neutral, r(187) = -.11, 95% CI [-.25, .03], p = .14, or angry, r(187) = -.10, 95% CI [-.24, .04], p =

.19, but did significantly negatively correlate with the mean Canadianness ratings when happy,

r(187) = -.19, 95% CI [-.32, -.05], p = .01.

Simultaneously regressing the mean Canadianness ratings onto both VIA subscores in

linear regressions for each expression revealed the same pattern of results (Table 4). Meta-

analytically comparing the effect sizes between the three expressions for each VIA subscore

revealed no significant differences, all Zs ≤ 0.88, ps ≥ .38, nor did comparing these effect sizes

with those from Study 2, Zs ≤ 1.18, ps ≥ .24, although the correlations differed in statistical

significance between the two studies.

We additionally correlated the mean Canadianness ratings with the valence and intensity

ratings obtained in Study 3. This again showed that targets looked more Canadian if they

displayed more positive affect in their neutral expressions, r(187) = .45, 95% CI [.33, .56], p <

.001, more intense happiness, r(187) = .64, 95% CI [.55, .72], p < .001, and less intense anger,

r(187) = -.17, 95% CI [-.31, -.03], p = .02.

Table 4

Unstandardized Regression Coefficients, Standard Errors, and Significance Tests for VIA

Subscores Predicting Canadianness Ratings in Study 4

	B	SE	t	p	$r$effect size	95% CI
Neutral expression						
VIA Heritage	-.03	.02	-1.64	.10	-.12	[-.25, .03]

VIA Mainstream	.06	.02	2.86	.005	.21	[.06, .34]
Happy expression						
VIA Heritage	-.07	.02	-2.81	.007	-.20	[-.34, -.06]
VIA Mainstream	.10	.03	3.71	< .001	.26	[.12, .39]
Angry expression						
VIA Heritage	-.03	.02	-1.45	.15	-.11	[-.25, .04]
VIA Mainstream	.05	.02	2.45	.02	.18	[.03, .31]

Note. $df = 186$

Perceivers. To test whether individual differences in perceivers' acculturation related to the accuracy of their judgments, we calculated the participants' Heritage ($M = 6.80$, $SD = 1.44$) and Mainstream VIA subscores ($M = 5.91$, $SD = 1.37$). We then used each individual participant's Canadianness ratings to compute sensitivity correlations measuring their accuracy (e.g., Judd, Ryan, & Park, 1991). Specifically, we correlated their Canadianness ratings of the targets with each of the targets' Heritage and Mainstream VIA scores for each emotional expression, yielding six sensitivity correlations per participant. After converting these correlations to Fisher's z scores, we then correlated these sensitivity scores with the participants' own VIA scores to measure how their accuracy related to their acculturation.

Results revealed one small significant association: Perceivers with higher Mainstream VIA scores detected neutral targets' Heritage VIA scores less accurately (Table 5). Entering perceivers' two VIA subscores as simultaneous predictors of their sensitivity scores in separate models for each of the six scores (i.e., the three target emotions crossed with the two target sensitivity scores) showed the same pattern of results: Perceivers' Mainstream VIA scores

positively predicted stronger associations between how Canadian they thought the neutral targets looked and how strongly those targets identified with their heritage culture, $B = .01$, $SE = .006$, $t(255) = 2.17$, $p = .03$, $r_{\text{effect size}} = .13$, 95% CI [.01, .25]. Thus, participants more acculturated to Canada demonstrated somewhat lower accuracy (all other Bs $\leq .009$, ts ≤ 1.26, ps $\geq .21$, $r_{\text{Seffect size}} \leq .08$).

As an exploratory test, we also correlated perceivers' years in Canada with their accuracy scores. This revealed a similar pattern as with acculturation: Perceivers who had spent more years in Canada less accurately detected neutral targets' Heritage VIA scores, $r(255) = .14$, $p = .03$, and less accurately detected angry targets' Mainstream VIA scores, $r(255) = -.18$, $p = .003$. All other rs $\leq .09$, ps $\geq .13$.

We also explored whether Canadian citizens' accuracy differed from non-Canadian citizens' accuracy by splitting the participants according to their citizenship status and conducting independent samples t tests of the two groups' Fisher's z scores for the six combinations of emotions and VIA subscores. We reasoned that citizenship status might encompass more aspects of acculturation than those captured by VIA scores or years in Canada alone.6 This revealed two differences: Non-Canadian citizens ($n = 152$; $M_z = .14$, $SD = .14$) detected angry targets' Mainstream VIA scores significantly better than Canadian citizens did ($n = 106$; $M_z = .02$, $SD = .13$), $t(228.56) = 2.70$, $p = .007$, $r_{\text{effect size}} = .18$, 95% CI [.05, .30], and non-

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6 Canadian citizens, as one might expect, had spent more time in Canada, $t(121.96) = 13.23$, $p < .001$, $r_{\text{effect size}} = .64$, 95% CI [.56, .71], had higher Mainstream VIA scores, $t(219.83) = 6.41$, $p < .001$, $r_{\text{effect size}} = .37$, 95% CI [.26, .47], and had lower Heritage VIA scores, $t(216.46) = -2.68$, $p = .008$, $r_{\text{effect size}} = -.17$, 95% CI [-.28, -.04], than non-Canadian citizens.

Canadian citizens (M_z = -.08, SD = .14) detected happy targets' Heritage VIA scores marginally

more accurately than Canadian citizens did (M_z = -.05, SD = .14), $t(228.04)$ = 1.85, p = .07, $r_{\text{effect size}}$ = .12, 95% CI [-.01, .25].[7] All other comparisons, $ts \leq 0.77$, $ps \geq .44$, $r_{\text{seffect size}} \leq .05$.

Table 5

Correlation Coefficients and 95% Confidence Intervals for Associations Between Perceivers'

VIA Subscores and Their Accuracy for Detecting Targets' Acculturation Across Neutral, Happy,

and Angry Expressions

	Fisher's $z_{\text{VIA Scores:Canadianness Ratings}}$					
	Neutral		Happy		Angry	
Perceiver VIA Scores	Heritage	Mainstream	Heritage	Mainstream	Heritage	Mainstream
Heritage	-.08	.007	.01	.07	-.007	-.05
	[-.20, .04]	[-.12, .13]	[-.11, .13]	[-.05, .19]	[-.13, .12]	[-.17, .07]
Mainstream	.12*	-.05	.002	.09	.01	.02
	[.003, .24]	[-.17, .07]	[-.12, .12]	[-.03, .21]	[-.11, .13]	[-.10, .14]

Note. df = 256. * *p* < .05

Discussion

The results of Study 4 replicated the overall pattern in Studies 1 and 2, demonstrating the

robustness of acculturation's visibility from the face. The ethnically homogeneous East Asian

participants here, however, detected targets' acculturation descriptively better than the ethnically

[7] Degrees of freedom corrected for heteroscedasticity.

heterogeneous Canadian participants in Study 2 did (though conservative meta-analytic tests of

the effect sizes between the two studies did not indicate significant differences). East Asian

individuals may therefore have an ingroup advantage in detecting acculturation from other East

Asian individuals' faces. Their own acculturation to Canada did not relate much to their accuracy

in detecting others' acculturation, whether measured by VIA scores, years in Canada, or

Canadian citizenship, suggesting that one's own acculturation level does not confer an advantage

in detecting others' acculturation levels from their faces. In contrast, individuals less acculturated

to Canada might detect acculturation somewhat more accurately (though this pattern was not

consistent across targets' emotional expressions or VIA subscores, and the differences were

small).

Meta-Analysis

Participants in Studies 1, 2, and 4 judged targets' levels of acculturation from photos of

their faces expressing three different emotional states. To capture an overall sense of the

magnitude of accuracy in making these judgments, we meta-analytically combined the data for

the association between targets' self-reported acculturation (as operationalized through their VIA

scores) and perceivers' consensus judgments of how Canadian targets appeared.

Results of a fixed-effects meta-analysis across the three studies showed that targets'

perceived Canadianness significantly positively related to their Mainstream VIA scores and

significantly negatively related to their Heritage VIA scores across all three expressions, though

strongest for happy expressions (Z values indicate that mean r values significantly differ from 0;

Table 6). Mainstream VIA scores related to perceivers' impressions of their Canadianness more

strongly than their Heritage VIA scores did, however. Considering that such ratings inquire

specifically about identification with Canadian culture (and given the VIA subscores'

orthogonality; Ryder et al., 2000), this difference makes sense. Although it may seem intuitive to

think that identification with one's host and heritage cultures might relate inversely, some

individuals may identify strongly with both simultaneously. Alternatively, asking how Chinese

the targets look, for example, could potentially assess the visibility of targets' heritage culture

identification but might conflate impressions of ethnicity and culture. The meta-analysis also

revealed that our effect sizes did not significantly differ between our three studies (as indicated

by the Q statistic), echoing our earlier effect size comparisons.

Table 6

Meta-Analytic Results Summarizing the Association Between Perceptions of how Canadian

Targets Looked and Their Acculturation by Emotional Expression

Association	k	Weighted M_r	95% CI	Z	Q
Heritage VIA					
All expressions	9	-.12	[-.17, -.08]	-5.12***	1.78
Neutral	3	-.10	[-.18, -.01]	-2.29*	0.09
Happy	3	-.15	[-.23, -.06]	-3.57***	0.51
Angry	3	-.13	[-.21, -.04]	-3.01**	0.36
Mainstream VIA					
All expressions	9	.20	[.15, .25]	8.15***	8.89
Neutral	3	.18	[.10, .26]	4.24***	3.01
Happy	3	.26	[.19, .35]	6.37***	0.10
Angry	3	.15	[.07, .23]	3.50***	1.33

Note. k = number of contributing effects, *Q* = heterogeneity statistic, VIA = Vancouver Index of

Acculturation. * *p* < .05, ** *p* < .01, *** *p* < .001

General Discussion

These studies provide the first evidence that a person's level of acculturation is visible in

his or her face. Both features external to the face (hairstyle) and internal facial cues enabled

accurate judgments of targets' acculturation. Among happy expressions, the intensity of

expressed happiness communicated targets' degree of acculturation such that more intensely

smiling targets identified more with Canadian culture. This aligns with research on cultural

differences in ideal affect (Tsai, 2007; Tsai et al., 2006) and provides the first evidence of how

(expressions of) ideal affect may change through acculturation. The facial cues contributing to

accuracy require further exploration, however, as the valence and intensity of neutral and angry

expressions did not respectively relate to targets' acculturation and thus cannot explain

perceivers' ability to detect acculturation from these expressions. Nonverbal accents indeed

manifest in the face in other, more nuanced ways (Elfenbein et al., 2007). Further interrogation

of those possibilities thus seems warranted (e.g., the particular Action Units involved; Jack et al.,

2016), particularly as the cultural display rules for anger vary by context (Matsumoto et al.,

2010; Park et al., 2013). Moreover, differences in self-presentation through makeup, for

example, could influence perceptions of neutral faces.

Apart from extending previous research on the role of nonverbal accents in

communicating cultural group membership (Marsh et al., 2003) and on the cultural specificity of

emotion expression (e.g., Elfenbein et al., 2007; Jack et al., 2016), our work also suggests an

ethnic ingroup advantage in detecting acculturation in others' faces. Though preliminary, this

aligns with ethnic ingroup advantages in emotion recognition and mental state reading (Adams et al., 2010; Elfenbein & Ambady, 2002; cf. Elfenbein et al., 2007), as well as the deeper processing of own-ethnicity faces (Levin, 1996). Perceivers in Study 4 (all East Asian) discerned targets' acculturation across all three facial expressions, whereas those in Study 2 (all Canadian citizens, varying in ethnicity) only showed accuracy for happy targets. The composition of our samples did not allow for the cleanest comparison across the studies, however. The sample in Study 2 included a large proportion of East Asian participants, and many of the East Asian participants in Study 4 also held Canadian citizenship. Moreover, our exploratory comparison of the accuracy of Canadian and non-Canadian citizens in Study 4 suggests that non-Canadian citizens (and those with less experience and identification with Canadian culture) may be able to detect others' acculturation more accurately, though this was not consistent across all emotional expression and VIA score combinations, limiting our ability to draw strong conclusions from this finding. We unfortunately lacked the statistical power to reciprocally compare accuracy by perceiver ethnicity in Study 2, however, leaving open the question of ethnicity's role in moderating perceivers' acculturation judgments. For example, future research could compare samples of Caucasian Canadians, East Asian Canadians, and East Asian non-Canadians to gain a fuller understanding of how accuracy varies by ethnicity while accounting for perceiver citizenship (and acculturation).

Overall, this research provides a critical first step in demonstrating the visibility of acculturation in the face, providing an important extension to previous work (Marsh et al., 2003). Nonverbal accents or dialects appear to convey cultural identification not only categorically, but also continuously—particularly when expressing happiness. Hairstyles also contribute to accurate impressions of acculturation (Matsumoto & Hwang, 2018), but do not fully explain the

accuracy of acculturation judgments. Nonverbal accents thus play a crucial role in revealing acculturation, adding to the growing literature on what emotional expressions convey beyond emotion.

The relation between acculturation and emotional expressions indicates that experience and identification with a culture can change how people express their emotions. This has implications for how an individual's emotional expressions may be perceived by cultural majority and minority group members; for instance, more acculturated individuals may be perceived more accurately by members of the majority (host) culture. Acculturation thus not only affects how acculturated individuals perceive others' emotions (Elfenbein & Ambady, 2003a) but also how others may perceive acculturated individuals' emotions. Similarly, though a shift in emotional expressions due to acculturation might increase host culture perceivers' ability to read an acculturated targets' emotions, this might also *decrease* the ability of members of the heritage culture to accurately perceive those emotional expressions. This injury to understanding could strain relations with other less-acculturated individuals and potentially lead acculturating individuals to further increase their identification with the host culture. Yet, such individuals may also feel caught between two cultures, leading to some of the frustration and isolation characteristics of the middle stages of the acculturation process (e.g., Demes & Geeraert, 2015). Future work should examine these possibilities, for example through longitudinal investigation of individuals' emotional expressions as they undergo the process of acculturation and by testing the legibility of their expressions among members of the heritage and host cultures.

Understanding how people perceive each other according to their place of origin and acculturation to a new environment may play an increasingly important role as the world becomes more globalized and internationally connected. Our findings provide a glimpse into

how people accurately perceive others' cultural identification, opening avenues for better

grasping how the impressions that people form in their increasingly diverse interactions may

improve or hinder such exchanges.

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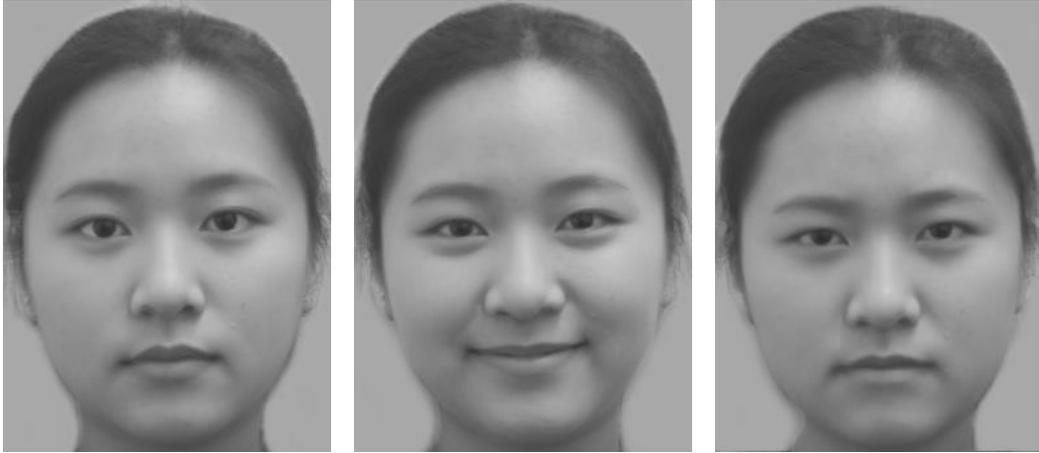
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Figure 1. Example neutral, happy, and angry stimuli used in Study 1. Images are composites of

photographs taken by the authors and do not picture any individual.

Figure 2. Example neutral, happy, and angry stimuli showing only the internal facial features

(used in Studies 2 and 4). Images are composites of photographs taken by the authors and do not

portray any specific individual.