

On the Relationship between Acculturation and Intercultural Understanding:
Insight from the Reading the Mind in the Eyes Test

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Abstract

Previous research has repeatedly demonstrated the importance of culture and cultural identification to interpersonal understanding. We aimed to apply the ideas from this domain to mental state reasoning, or theory of mind. We thus investigated the relationship between acculturation and inferring the mental states of other people within and across cultures by measuring Caucasian and East Asian participants' accuracy in inferring the mental states of own- and other-ethnicity targets using the Reading the Mind in the Eyes test. As expected, Caucasian participants showed a significant ingroup advantage in inferring the mental states of own- versus other-ethnicity targets but no variation according to measures of acculturation. More important, East Asian residents of Canada showed greater accuracy for own- versus other-ethnicity targets—and their accuracy for Caucasian targets increased as a function of (i) the time they had lived in Canada, (ii) their experience interacting with Caucasians, (iii) increased endorsement of mainstream Canadian values, and (iv) decreased endorsement of their heritage culture's values. These results suggest that cross-cultural understanding may be malleable to acculturation and cultural experience, highlighting the importance of further research on how people from different cultural perspectives come to understand each other and subsequently ameliorate cross-cultural misunderstanding.

Keywords: acculturation, theory of mind, person perception

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1. Introduction

Many differences exist between cultures, often making communication across cultural lines difficult. This difficulty extends beyond linguistic barriers—differences in the way we perceive and think about others also contribute to misunderstandings and miscommunications. For example, the expression and recognition of emotions is essential to effective interpersonal communication. Although the expression of some emotions is universal (see Ekman & Oster, 1979; Matsumoto, Keltner, Shiota, Frank, & O’Sullivan, 2008), emotional expression and recognition is also affected by culture: facial expressions of emotion can vary across cultures, with notable differences between Western and Eastern expressions (e.g., Jack, Garrod, Yu, Caldara, & Schyns, 2012; see also Matsumoto, 2001, for a discussion of the universality vs. cultural specificity of emotional expression). Additionally, evidence suggests an ingroup advantage in emotion recognition, such that people more accurately identify the emotions from members of their own culture than from members of other cultures (Elfenbein & Ambady, 2002; Paulmann & Uskul, 2014).

Similar to emotion recognition, inferring the mental states of others (also called “theory of mind”—for an overview, see Baron-Cohen, 1995) critically affects interpersonal interactions. Mental state reasoning overlaps with empathy and involves the inference and extrapolation of others’ intentions and feelings, which is integral for interlocutors to effectively communicate (e.g., Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001). The eyes play a particularly important role in mental state reasoning, communicating a wealth of information and automatically drawing perceivers’ attention (Baron-Cohen, Wheelwright, & Jolliffe, 1997; Janik,

Wellens, Goldberg, & Dell'Osso, 1978; Rule, Ambady, Adams, & Macrae, 2008; Vinette, Gosselin, & Schyns, 2004). In fact, perceivers can reliably infer others' complex mental states when viewing the eye region of a face just as well as when presented with an entire face (Baron-Cohen et al., 1997). One of the most widely used measures of theory of mind, the Reading the Mind in the Eyes test (RME; Baron-Cohen et al., 2001), thus asks participants to identify individuals' mental states from images of their eyes and successfully differentiates people with normally developed cognitive abilities from individuals who lack theory of mind (e.g., those with Asperger Syndrome; Baron-Cohen et al., 2001).

As mental state reasoning comprises an essential component of communication, and intercultural dialogue has grown increasingly frequent in the globalized world, understanding how culture affects the inferences that people make about others' thoughts is critical. Adams et al. (2010) conducted the first investigation of culture's influence on mental state inferences. Using a modified version of the RME that includes both Caucasian and East Asian targets, Adams et al. found that Japanese and (Caucasian) American participants more accurately identified the mental states of targets from their own culture. This demonstrated a distinct intracultural advantage in inferring others' mental states and illuminated culture's role in tuning mental state reasoning abilities. This own-culture advantage can be attributed to factors such as subtle cultural variation in nonverbal cues (see Elfenbein & Ambady, 2003). Furthermore, own-ethnicity faces tend to be processed more deeply (Levin, 1996), and perceivers attend preferentially to the eyes of ingroup members (Kawakami et al., 2014), which should advantage mental state reading. What, then, of people who find themselves between cultures? Specifically, how might a perceiver who grew up in one culture, but currently lives in another, perform when inferring the mental states of people from either culture? Here, research on acculturation points to a possible answer.

Previous work has found that acculturation affects individuals in diverse ways, including changes to their attributions, self-esteem, beliefs, and attitudes (e.g., Flaskerud & Uman, 1996; Ho, 2014; Zadeh, Geva, & Rogers, 2008). Additionally, much research demonstrates that immigrants more acculturated to their host culture change to accommodate it in a variety of ways. For example, Güngör et al. (2013) found that Japanese-Americans became more typically American and less typically Japanese in their personality (e.g., scoring lower on neuroticism) as they increasingly experienced and endorsed American culture. Similarly, Peng, Zebrowitz, and Lee (1993) reported that Koreans living in the U.S. judged characteristics of voices more like Americans than like Koreans living in Korea, demonstrating cultural adaptation in speech perception. Furthermore, Hedden, Ketay, Aron, Markus, and Gabrieli (2008) found that the difference between East Asians' and Americans' brain responses during the line judgment task (Kitayama, Duffy, Kawamura, & Larsen, 2003) decreased as East Asian participants acculturated to the U.S., suggesting that cultural differences in perception diminished with acculturation. Most relevant to the present work, Elfenbein and Ambady (2003) found that cultural differences in facial emotion recognition changed with cultural exposure such that immigrants with more exposure to their host culture came to better recognize the emotional expressions of people from the host culture. It therefore seems plausible that acculturation—or, indeed, perhaps even mere cultural experience or exposure—might also affect mental state inferences.

Expanding understanding of acculturation by examining its effects on mental state reasoning carries particular value, as inferring others' states of mind can critically impact cross-cultural communication; that is, without accurately understanding other people's mental states, effective communication simply cannot take place. In places with immigrant populations, cross-

cultural communication may therefore be important, salient, and difficult. Investigating the effect of acculturation could help to ease this difficulty, making communication more effective.

To better understand how cultural adaptation affects intercultural understanding, we expanded upon Adams et al.'s (2010) findings to explore whether acculturation moderates the own-culture advantage in mental state reasoning. Based on the research reviewed above, we anticipated that acculturation would improve people's ability to accurately infer the mental states of others across cultural lines. Specifically, we hypothesized that East Asian participants residing in Canada who report a stronger affiliation with Canadian culture and less identification with their heritage culture would more accurately infer the mental states of Caucasian targets compared to those reporting weaker affiliations with Canadian culture and stronger heritage culture identification. Thus, we expected that East Asian participants would infer the mental states of Caucasian targets better as a function of their acculturation to Canada.

2. Study 1

2.1 Method

A total of 239 (99 Caucasian, 140 East Asian) undergraduates participated in the study in exchange for partial course credit or monetary compensation. The East Asian participants' heritage cultures were 72.9 % Chinese, 6.4% Filipino, 6.4% Korean, 5.7% Vietnamese, and 8.6% "other."¹ Participants began by completing the cross-cultural version of the RME created by Adams et al. (2010), which includes East Asian targets in addition to the Caucasian targets used in Baron-Cohen et al.'s (2001) original test. Participants thus viewed the eyes of 36 Caucasian and 36 East Asian targets in random order and chose the word that best described what the target

¹ We did not record the heritage cultures of the Caucasian participants in this study.

was thinking or feeling from a set of four options (3 foils, 1 target) based on their “gut” impressions (see Figure 1).

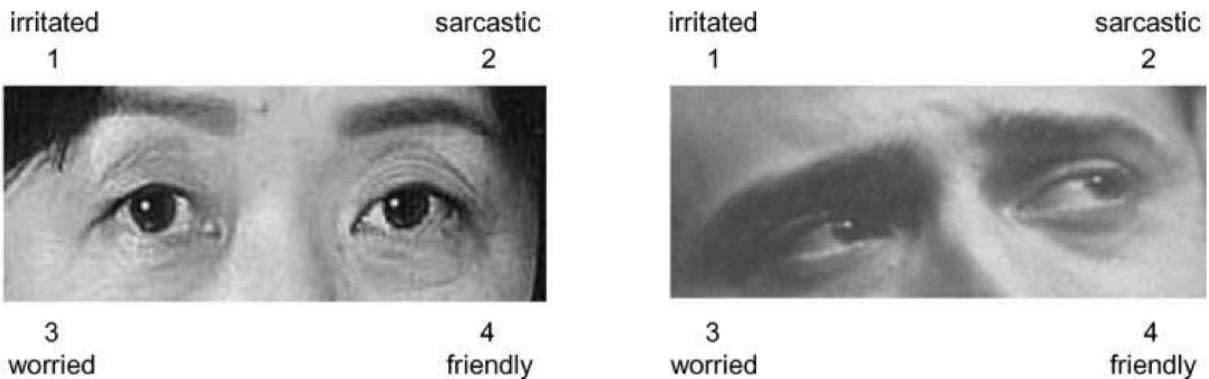


Figure 1. Example of East Asian and Caucasian stimuli. The target answer for each is “worried.”

Next, participants completed the 20-item Vancouver Index of Acculturation (VIA; Ryder, Alden, & Paulhus, 2000). The VIA presents respondents with statements regarding their identification with their heritage culture (the original culture of their family; e.g., “I believe in the values of my heritage culture”) and with mainstream Canadian culture (e.g., “I believe in mainstream Canadian values”), asking them to indicate their agreement from 1 (*strongly disagree*) to 9 (*strongly agree*) for each statement. This produces two scores: the Heritage score, which is the average of the responses to statements about the heritage culture, and the Mainstream score, the mean of the responses to statements about mainstream Canadian culture. These scores represent identification with one’s heritage culture and the host (Canadian) culture, respectively. Last, participants answered a series of demographic questions, which included reporting the number of years that they had lived in North America.

2.2 Results

We first calculated each participant's proportion of correct mental state inferences for East Asian targets and for Caucasian targets. Using these values, we computed a 2 (participant ethnicity: Caucasian, East Asian) \times 2 (target ethnicity: Caucasian, East Asian) mixed model ANOVA with repeated measures on the second factor. This analysis revealed significant main effects for both participant ethnicity and target ethnicity. Namely, Caucasian participants were overall more accurate in their responses ($M = .65$, $SD = .12$) than were East Asian participants ($M = .56$, $SD = .15$), $F(1, 237) = 36.43$, $p < .001$, $r_{\text{Effect Size}} = .37$, and the mental states of Caucasian targets ($M = .60$, $SD = .15$) were more legible than the mental states of East Asian targets ($M = .59$, $SD = .14$), $F(1, 237) = 4.38$, $p = .038$, $r_{\text{Effect Size}} = .13$.

Critically, the predicted significant interaction between participant ethnicity and target ethnicity qualified these main effects, such that participants more accurately identified the mental states of targets of their own ethnicity than of targets of the other ethnicity, $F(1, 237) = 21.57$, $p < .001$, $r_{\text{Effect Size}} = .29$. That is, Caucasian participants correctly identified the mental states of Caucasian targets ($M = .68$, $SD = .12$) better than the mental states of East Asian targets ($M = .63$, $SD = .12$), $t(98) = -5.07$, $p < .001$, $r_{\text{Effect Size}} = .46$. East Asian participants, on the other hand, identified the mental states of East Asian targets ($M = .56$, $SD = .14$) more accurately than the mental states of Caucasian targets ($M = .55$, $SD = .15$), though this difference did not reach significance, $t(139) = 1.36$, $p = .18$, $r_{\text{Effect Size}} = .11$ (see Figure 2). This pattern of results therefore replicated the previous cross-national RME research (i.e., Adams et al., 2010) in a sample from a single nation.

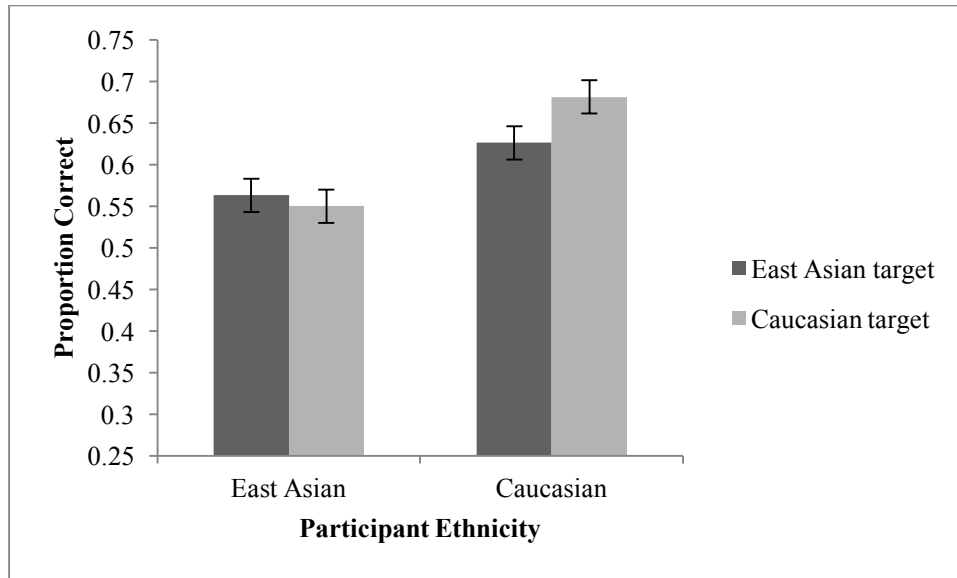


Figure 2. Means and 95% confidence intervals for the proportion of East Asian and Caucasian participants' correct mental state inferences for East Asian and Caucasian targets in Study 1. The *x*-axis crosses at chance (.25).

To better understand this intra-national effect, we next explored the relationship between participants' acculturation and the accuracy of their mental state inferences by regressing the proportion of their correct answers on the RME for each target ethnicity onto the two VIA subscores and their number of years residing in North America in simultaneous multiple linear regressions. As expected, neither of Caucasian participants' Mainstream ($M = 6.73$, $SD = 1.43$) nor Heritage culture ($M = 6.58$, $SD = 1.51$) VIA scores predicted their accuracy on the RME for either Caucasian or East Asian targets (see Table 1). Similarly, the number of years Caucasian participants had been living in North America ($M = 16.47$, $SD = 7.53$) also did not predict their RME scores.

Table 1

Unstandardized Parameter Estimates Predicting Caucasian Participants' Accuracy on the RME for Caucasian and East Asian Targets Based on their Cultural Identification and Years Lived in North America in Study 1

	<i>B</i>	<i>SE</i>	<i>t</i>
Caucasian Targets			
Heritage VIA score	-.004	.009	-0.49
Mainstream VIA score	-.004	.010	-0.39
Years in North America	.001	.002	0.65
East Asian Targets			
Heritage VIA score	-.005	.009	-0.57
Mainstream VIA score	-.014	.010	-1.41
Years in North America	.002	.002	1.22

Note. VIA = Vancouver Index of Acculturation

For East Asian participants, however, identification with their heritage culture ($M = 6.64$, $SD = 1.48$) negatively predicted their accuracy in inferring the mental states of outgroup (Caucasian) targets, whereas identification with the mainstream culture ($M = 6.03$, $SD = 1.30$) showed a positive but nonsignificant effect (see Table 2). Curiously, identification with mainstream Canadian culture also positively predicted East Asian participants' accuracy in inferring the mental states of ingroup (East Asian) targets, whereas identification with their heritage culture showed a negative nonsignificant effect. Additionally, the number of years that

East Asian participants had been living in North America ($M = 7.82$, $SD = 7.08$) positively predicted their accuracy for targets from both groups. Furthermore, years in North America correlated positively with Mainstream culture VIA scores, $r(138) = .51$, $p < .001$, and negatively with Heritage scores, $r(138) = -.27$, $p = .001$ (see Supplemental Materials for full correlation matrix).

Table 2

Unstandardized Parameter Estimates Predicting East Asian Participants' Accuracy on the RME for Caucasian and East Asian Targets Based on their Cultural Identification and Years Lived in North America in Study 1

	<i>B</i>	<i>SE</i>	<i>t</i>
Caucasian Targets			
Heritage VIA score	-.022	.008	-2.83**
Mainstream VIA score	.009	.009	0.99
Years in North America	.009	.002	5.14***
East Asian Targets			
Heritage VIA score	-.012	.008	-1.51
Mainstream VIA score	.021	.010	2.15*
Years in North America	.005	.002	2.70**

Note. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$; VIA = Vancouver Index of Acculturation

2.3 Discussion

These data suggest that the accuracy of mental state inferences may vary according to one's level of acculturation. East Asian participants who identified less strongly with their heritage culture and resided in North America longer demonstrated increased accuracy for inferring the mental states of Caucasian targets. Notably, they also showed more accuracy as they identified more with mainstream Canadian culture, although this relationship did not reach significance. This suggests that acculturation may facilitate one's ability to infer the mental states of cultural outgroup members. Rather unexpectedly, however, East Asian participants with higher Mainstream VIA scores and longer residency in North America also more accurately inferred the mental states of East Asian targets. This might be explained by English proficiency: it is likely that participants who had lived in North America longer were more fluent in English and therefore would have understood the mental state terms used in the RME test better, boosting their performance for both target types.

Moreover, duration of residence in North America positively correlated with East Asian participants' Mainstream culture VIA scores and negatively correlated with their Heritage scores. This, unsurprisingly, suggests that more time spent living in a new country leads both to increased identification with that culture and to decreased identification with one's heritage culture (Ryder et al., 2000). This increased exposure may then improve accuracy for inferring the mental states of cultural outgroup members and decrease the disparity in accuracy between judgments of own- and other-ethnicity targets.

Our results replicated Adams et al.'s (2010) findings that perceivers more accurately identify the mental states of own-ethnicity targets than other-ethnicity targets. However, this difference only reached significance for Caucasian participants in this study. Additionally, the Caucasian participants performed better than the East Asian participants overall. One possible

explanation for both of these results is that many of the East Asian participants may simply not have understood all of the complex mental state terms used in the task, reducing their performance and obscuring differences in accuracy for the targets. In Adams et al.'s study, East Asian participants completed the task with labels in their native language (Japanese), whereas all labels and instructions in our study were in English. In our sample, a quarter of participants had lived in North America for fewer than two years, and 38.6% for fewer than four years, making it plausible that their English skills may have been somewhat poor. We did not assess participants' competence in English, so this explanation is speculative but tenable for explaining the difference between the past and present work. Lastly, a main effect of target ethnicity emerged, which Adams et al. did not find in their study. This pattern of greater accuracy for Caucasian targets appeared to be mostly driven by the strong ingroup advantage among Caucasian participants, however.

3. Study 2

In Study 1, we both replicated the intracultural advantage in mental state reasoning found by Adams et al. (2010) and provided evidence for the role of acculturation in this advantage. However, a number of limitations curbed our ability to understand these effects. First, as mentioned above, Caucasian participants performed better than East Asian participants on the RME task overall, quite possibly due to differences in English proficiency. We therefore asked participants in Study 2 about their proficiency in English to verify this explanation. Furthermore, as both duration of residence in North America and acculturation predicted East Asian participants' Caucasian RME performance, it seemed possible that experience interacting with Caucasians might play an important role. Thus we added measures of intercultural interaction and the motivation to interact with members of other groups in Study 2.

3.1 Method

We recruited 290 (134 Caucasian, 156 East Asian) undergraduates to complete the cross-cultural RME, followed by the VIA. Of the East Asian participants, 89.1% identified their heritage culture as Chinese, 3.2% as Korean, and 7.7% “other.” Among the Caucasian participants, 22.4% identified their heritage cultures as consisting of southern European countries, 18.7% of northern European countries, 17.9% of eastern European countries, 14.9% as strictly North American, 5.2% as from an unspecified European origin, and the remaining 20.9% listed themselves as “mixed” or “other.”

To assess the role of cross-cultural experience and its potential distinctness from acculturation, participants also completed Islam and Hewstone’s (1993) intergroup contact scale, adapted to ask about contact with Caucasians and East Asians (see Supplemental Materials). We also included five questions asking participants about their experience and motivation interacting with both Caucasians and East Asians (see Supplemental Materials). Finally, participants answered the same demographic questions as in Study 1 and also indicated their proficiency in English on a scale from 1 (*not at all*) to 7 (*very*).

3.2 Results

We began by calculating each participant’s proportion of correct RME responses for the Caucasian and East Asian targets. We then submitted these RME scores to a 2 (participant ethnicity: Caucasian, East Asian) \times 2 (target ethnicity: Caucasian, East Asian) ANOVA with repeated measures on the second factor, revealing the hypothesized interaction between participant ethnicity and target ethnicity, $F(1, 284) = 29.71, p < .001, r_{\text{Effect Size}} = .31$ (see Figure 3). The analysis also revealed a main effect of participant ethnicity, $F(1, 284) = 52.85, p < .001, r_{\text{Effect Size}} = .40$, such that Caucasian participants ($M = .65, SD = .11$) achieved higher accuracy

than East Asian participants on the RME overall ($M = .55$, $SD = .14$). Importantly, whereas this main effect became nonsignificant upon including English proficiency as a covariate,² $F(1, 282) = 1.40$, $p = .24$, $r_{\text{Effect Size}} = .07$, the interaction effect remained significant, $F(1, 282) = 30.75$, $p < .001$, $r_{\text{Effect Size}} = .31$.

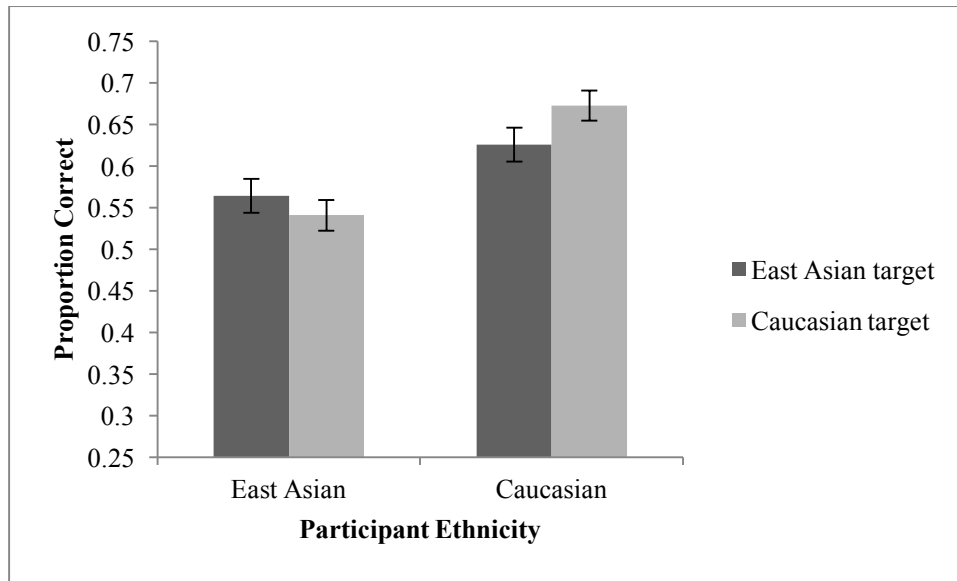


Figure 3. Means and 95% confidence intervals for the proportion of East Asian and Caucasian participants' correct mental state inferences for East Asian and Caucasian targets in Study 2. The x -axis crosses at chance (.25).

Decomposing the interaction, we found that participants showed an intracultural advantage in their RME performance, as we found in Study 1 and as reported by Adams et al. (2010). Thus, East Asian participants more accurately identified the mental states of East Asian ($M = .56$, $SD = .13$) versus Caucasian targets ($M = .54$, $SD = .14$), $t(155) = 2.70$, $p = .01$, r_{Effect}

² We excluded one participant from this analysis who did not answer the English proficiency question.

$r_{\text{Size}} = .21$, whereas Caucasian participants performed better for Caucasian ($M = .67, SD = .11$) than East Asian targets ($M = .63, SD = .11$), $t(133) = 5.08, p = < .001, r_{\text{Effect Size}} = .40$.

Next, we examined the relationships between acculturation, intercultural experience, and motivation on participants' own-culture and other-culture RME scores. Because we measured intercultural contact experience and motivation with multiple items (i.e., Islam and Hewstone's, 1993, scale and our added questions), we began by conducting two exploratory factor analyses (one for items assessing interactions with East Asians and one for Caucasian interaction items) using promax rotation. This revealed two factors for each group, which we termed Experience and Motivation, including items with factor loadings greater than or equal to 0.40 to form composites by averaging the included items' scores (see Table 3).

Table 3

Factor Loadings for Caucasian and East Asian Interaction Items

	Caucasian	Caucasian	East Asian	East Asian
	Experience	Motivation	Experience	Motivation
	factor	factor	factor	factor
IC contact quantity	0.93	-0.03	0.75	0.04
IC contact quality	0.47	0.37	0.36	0.19
IC intergroup	-0.03	0.38	0.06	0.21
IC group numbers	0.12	0.05	0.05	0.02
Experience	0.99	-0.08	0.90	-0.07
Interaction	0.91	0.04	1.00	-0.14
Motivation	0.04	0.82	0.19	0.55

Effort	-0.17	0.91	-0.20	1.02
Attention	0.18	0.31	0.02	0.50

Note. Items used in respective composite formation indicated in bold; IC = Islam and Hewstone's (1993) intercultural contact scale

We then regressed participants' RME scores onto the Experience and Motivation composite scores, VIA Mainstream and Heritage scores, and years lived in North America separately for the Caucasian and East Asian targets in simultaneous multiple linear regressions. We included years lived in North America in a second step so that we could first examine the effects of the other variables. Thus, for East Asian participants, we regressed RME accuracy for Caucasian targets onto their VIA, Caucasian Experience, and Caucasian Motivation scores in the first step (see Table 4 for descriptive statistics). The Mainstream VIA, Caucasian Experience, and Caucasian Motivation scores all significantly predicted RME accuracy (see Table 5, upper panel). Examining the VIA, East Asian Experience, and East Asian Motivation scores as predictors of RME performance for East Asian targets in a separate model showed that only VIA Mainstream scores predicted RME accuracy (see Table 5, lower panel). Years in North America emerged as the only significant predictor when added to the regression in the second step of both models and resulted in better model fit for both Caucasian targets, $F(1, 148) = 8.33, p = .004, r_{\text{Effect Size}} = .23$, and East Asian targets, $F(1, 148) = 8.24, p = .005, r_{\text{Effect Size}} = .23$.

Table 4

Means and Standard Deviations for the Predictor Variables Modeled in the Multiple Regression

Analyses in Study 2

	East Asian Participants		Caucasian Participants	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Heritage VIA score	6.81	1.36	6.52	1.58
Mainstream VIA score	5.90	1.26	7.07	1.19
East Asian Experience	6.04	1.02	4.75	1.33
East Asian Motivation	5.03	1.21	4.84	1.23
Caucasian Experience	3.90	1.34	6.06	1.01
Caucasian Motivation	4.08	1.48	5.94	1.17
Years in North America	5.61	5.93	18.53	8.72

Note. VIA = Vancouver Index of Acculturation

Table 5

Unstandardized Parameter Estimates Predicting East Asian Participants' Accuracy on the RME for Caucasian and East Asian Targets Based on Cultural Identification, Cultural Interaction, and Years Lived in North America in Study 2

	Step 1	Step 2
	<i>B (SE)</i>	<i>B (SE)</i>
Caucasian Targets		
Heritage VIA score	-.006 (.008)	.001 (.008)

Mainstream VIA score	.023 (.010)*	.006 (.011)
Caucasian Experience	.029 (.012)*	.021 (.014)
Caucasian Motivation	-.022 (.010)*	-.014 (.010)
Years in North America		.007 (.002)**
<i>Model Fit (Adjusted R²)</i>	.08	.13
East Asian Targets		
Heritage VIA score	-.003 (.008)	.004 (.008)
Mainstream VIA score	.022 (.008)*	.006 (.010)
East Asian Experience	.007 (.012)	.001 (.012)
East Asian Motivation	-.017 (.010)	-.011 (.010)
Years in North America		.006 (.002)**
<i>Model Fit (Adjusted R²)</i>	.04	.08

Note. * $p \leq .05$; ** $p \leq .01$; VIA = Vancouver Index of Acculturation

We conducted parallel analyses for the Caucasian participants. None of their VIA, Caucasian Experience, or Caucasian Motivation scores predicted RME accuracy for the Caucasian targets, nor did adding the number of years they lived in North America in Step 2 (see Table 6, upper panel). Similarly, none of the Caucasian participants' VIA, East Asian Motivation, East Asian Experience, or years lived in North America predicted RME accuracy for East Asian targets (see Table 6, lower panel).

Table 6

Unstandardized Parameter Estimates Predicting Caucasian Participants' Accuracy on the RME for Caucasian and East Asian Targets Based on Cultural Identification, Cultural Interaction, and Years Lived in North America in Study 2

	Step 1	Step 2
	<i>B (SE)</i>	<i>B (SE)</i>
Caucasian Targets		
Heritage VIA score	-.00008 (.007)	.002 (.007)
Mainstream VIA score	-.003 (.010)	-.007 (.010)
Caucasian Experience	.012 (.015)	.003 (.015)
Caucasian Motivation	.005 (.001)	.012 (.014)
Years in North America		.002 (.001)
<i>Model Fit (Adjusted R²)</i>	-.01	.01
East Asian Targets		
Heritage VIA score	.004 (.007)	.004 (.007)
Mainstream VIA score	-.004 (.009)	-.004 (.010)
East Asian Experience	.022 (.011)	.023 (.012)
East Asian Motivation	-.017 (.012)	-.017 (.013)
Years in North America		-.0001 (.001)
<i>Model Fit (Adjusted R²)</i>	.0004	-.01

Note. VIA = Vancouver Index of Acculturation

3.3 Discussion

Here, we replicated the critical ingroup advantage interaction from Study 1; thus, we again observed an intracultural advantage in mental state inferences from the eyes with a new sample. We also found that acculturation moderated East Asian participants' RME accuracy: Mainstream culture VIA scores again positively predicted RME scores for both Caucasian and East Asian targets, though (in contrast to Study 1) Heritage culture VIA scores did not. Although we expected that identification with mainstream Canadian culture might improve East Asian participants' ability to read the mental states of Caucasian targets, its relationship to the participants' accuracy for East Asian targets surprised us. Rule, Ishii, Ambady, Rosen, and Hallett (2011) found that American participants deliberated less when judging people from photos compared to members of other cultures (Spanish and Japanese participants). They reasoned that the greater emphasis on essentialist beliefs among Americans might encourage them to make faster, intuition-based judgments about others. Acculturation to Canadian culture may encourage a similarly reflexive approach to person judgments that could benefit RME accuracy, similar to the boost in performance found for American participants in Rule et al.'s study. Although this speculation would require direct tests to confirm, it may help to explain why East Asian participants who were more acculturated to North America displayed greater overall accuracy for inferring targets' mental states in the current work.

Importantly, we also introduced new variables not included in Study 1. Doing so allowed us to observe that the main effect of participant ethnicity disappeared when we controlled for English proficiency, supporting our hypothesized explanation for Caucasian participants' overall advantage on the RME. Moreover, we found that experience interacting with the outgroup significantly predicted RME scores for targets from that group independent of acculturation.

Specifically, Caucasian Experience predicted East Asian participants' RME scores for Caucasian targets. Cultural experience and acculturation may therefore tap into distinct processes, each separately and independently affecting cross-cultural mental state reasoning abilities.

Additionally, years lived in North America best predicted East Asian participants' RME performance, and including it significantly increased model fit. Duration of residence in a new culture thus appears to be the most important factor in cross-cultural mental state reading, perhaps suggesting that there are components of cultural understanding not adequately captured by the measures we included in this study. For instance, people might implicitly identify more with a culture and nonconsciously learn its patterns of interaction and nonverbal communication simply by spending time in that cultural environment.

Unexpectedly, motivation to interact cross-culturally negatively predicted East Asian participants' RME accuracy for Caucasian targets. Perhaps the individuals most motivated to interact cross-culturally do not necessarily have much experience in such interactions, thus hindering their RME performance. Another possibility may be that high motivation to interact could interfere with attention to important cues, shifting focus towards participating in the interaction rather than on actually understanding the interlocutor. These speculations require further exploration in future research, however.

4. Aggregated Results

To better understand the magnitude of the results of these two studies, we conducted a fixed-effects meta-analysis on the effect sizes for the intracultural RME advantages among both participant groups, and of the notable relationships examined across both studies for East Asian participants: the correlations between RME performance and each of the Heritage culture VIA, Mainstream culture VIA, and number of years in North America. We thus converted the effect

sizes (r -values) for the relevant results to Fisher's z scores and aggregated them across the two studies, weighting them by sample size.

These analyses revealed that the intracultural advantage in RME performance significantly exceeded zero at $\alpha = .05$ for both the Caucasian participants and, more modestly, for the East Asian participants (see Table 7). As expected, East Asian participants' Heritage VIA scores significantly negatively correlated with RME accuracy for Caucasian (but not East Asian) targets. Additionally, East Asian participants' Mainstream VIA scores and years in North America each significantly related to their RME performance for both the Caucasian and East Asian targets. However, years in North America predicted RME performance for Caucasian targets significantly more than it did for East Asian targets ($Z = 2.63, p = .004$).

Table 7

Relationship Examined and Weighted Effect Size (r) with 95% Confidence Interval and Corresponding Significance Test Value (Z) for Meta-Analytic Aggregation of Relevant Effects across Studies 1 and 2

Relationship	Mean weighted r	95% CI	Z
Caucasian Participants			
Intracultural RME advantage	.43	[.34, .57]	7.81***
East Asian Participants			
Intracultural RME advantage	.16	[.05, .28]	2.80**
RME: Caucasian targets			
Heritage VIA	-.18	[-.29, -.06]	-3.03**
Mainstream VIA	.24	[.12, .35]	4.08***

Years in North America	.44	[.36, .59]	8.02***
RME: East Asian targets			
Heritage VIA	-.09	[-.21, .02]	-1.56
Mainstream VIA	.24	[.13, .36]	4.14***
Years in North America	.33	[.23, .46]	5.82***

Note. ** $p \leq .01$, *** $p \leq .001$; RME = Reading the Mind in the Eyes test; VIA = Vancouver Index of Acculturation

5. General Discussion

Across two studies, we replicated Adams et al.'s (2010) intracultural advantage in mental state reading in a single-nation sample. Importantly, for East Asian participants, we also found that acculturation, cross-cultural interaction experience, and years of residence in North America attenuated this advantage. Those who identified more strongly with mainstream Canadian culture, identified less strongly with their heritage culture, had lived in North America longer, and had more experience interacting with Caucasians showed greater accuracy in reading the mental states of Caucasian targets. Cross-cultural experience and acculturation predicted RME performance independently, indicating that experience and acculturation are distinct and that each works discretely to affect intercultural mental state reasoning. Both exposure to a culture and identification with that culture therefore appear to be important components to reading the mental states of the people in that culture. However, years in North America predicted RME performance most strongly, perhaps because duration of residence in a culture may directly lead to implicit identification and understanding of that culture and its members—factors possibly not

captured by the VIA and our measures of cross-cultural experience (see Do-Yeong, Sarason, & Sarason, 2006, for implicit measures of cultural identification).

These are promising findings, as they indicate that, although people show an intracultural advantage in theory of mind, cross-cultural mental state reasoning ability may be malleable. Intercultural interactions therefore need not necessarily be fraught with misunderstandings. Even though the mental states of another culture might be difficult to read at first, with increased time spent in that culture, and more cultural exposure and identification, they may become more legible. These results also indicate that improving cross-cultural mental state inferences involve multiple processes. That is, both practice reading another culture's mental states and identification with that culture can lead to better understanding of the members of that culture. The predictive strength of years in North America further suggests that mere exposure to a culture may be the most important factor, perhaps due to implicit processes of learning and identification.

Some effects remain to be explained, however. Perhaps most notably, identification with mainstream Canadian culture not only predicted East Asians' RME performance for Caucasian targets, but also for East Asian targets—and to the same degree. As described above, acculturation to Canada might improve perceivers' abilities to judge others quickly and accurately because North American culture encourages essentialist thinking and snap judgments (see Rule et al., 2011). Additionally, motivation to interact with Caucasians negatively predicted cross-cultural RME performance for East Asian participants. Motivation to interact may not necessarily align with experience in doing so, however, and this motivation could possibly lead to misplaced attention in cross-cultural interactions. These explanations are speculative, however, and require examination in future research.

Our research also has several limitations. First, we included only one measure of acculturation, the VIA, which primarily measures participation and identification with a culture. Other facets of acculturation that we have not considered here may have important effects on cross-cultural mental state reasoning as well, however. Future research could therefore explore the relationship between acculturation and intercultural mental state inferences more thoroughly. Second, we did not present the acculturating participants with the RME in their first language, as our sample consisted of participants with a variety of linguistic backgrounds. As we noted in Study 2, English proficiency did affect overall RME performance. English language ability may therefore have obscured some effects. Limiting the sample to just one East Asian heritage culture and translating the RME into the language of that culture, as well as ensuring that all Caucasian participants speak English natively, would eliminate any confounds of language ability and further clarify our findings. Finally, like many cross-cultural studies, both the present and past work (e.g., Adams et al., 2010) conflate ethnicity and culture. Disentangling the relative contributions of ethnic and cultural differences can seem somewhat inextricable, as the boundaries for such distinctions often run together. Although many studies might provide examinations of intergroup ethnic differences within a culture (e.g., Young, Hugenberg, Bernstein, & Sacco, 2012), few studies have tackled the question of cultural differences within the same ethnicity. The present data might help with this by examining how ostensible cultural transitions may alter the ways in which cross-ethnic differences manifest. However, future work is certainly needed to expound upon this important topic further.

Future research could also further investigate the relationship between time spent in a country, experience interacting with that cultural group, and acculturation (including its underlying mechanisms). For example, in what instances might cultural experience lead to

identification with that culture and in what instances might it not (see Berry & Sam, 1997)? And what role might implicit learning versus conscious motivation have in this process? Furthermore, exactly why acculturation leads to improved cross-cultural mental state reading remains unknown. Of course, cross-cultural experience plays a part, but as we found that acculturation functioned as a distinct predictor from experience, this suggests that intercultural understanding comes from more than just practice interacting with a cultural group. It seems reasonable that identifying with a culture would lead to understanding the members of that culture (perhaps through increased perspective-taking ability), but the precise link between the two requires exploration in future work. Furthermore, additional research should explore why time spent in a culture appears to be the strongest predictor of cross-cultural mental state reasoning. As we noted above, it seems possible that simply spending time in a culture may lead to more implicit cultural identification not measured by the VIA and to implicit learning of nonverbal patterns that may not necessarily depend on interaction experience but, rather, merely to exposure. Although these explanations require investigation, exploring them would further knowledge of how cross-cultural understanding might be improved, and thus constitute important questions for future research.

5.1 Conclusion

Overall, these data provide further evidence for the cultural tuning of theory of mind by demonstrating that this adaptation can vary according to time spent in another cultural environment, experience interacting with members of that culture, and identification with the culture. The tuning of mental state inferences may therefore be quite malleable, provoking the question of how mental state reasoning may be moderated in other ways. Intercultural understanding may therefore not be fixed, but could change over time with exposure to and

experience with a culture. This finding has implications for issues relating to intergroup conflict, especially with regard to immigrant groups. That is, although it may be more difficult for immigrants to read the mental states of the citizens of their host culture, this difficulty may subside over time with increased experience interacting with members of the host culture and identification with the host culture. Cultural exposure may therefore facilitate intergroup understanding, demonstrating the potential to ameliorate conflicts between people with different cultural backgrounds.

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Supplemental Materials

Table S1

Bivariate Correlations for East Asian Participants' RME Accuracy and Acculturation Variables in Study 1

	1	2	3	4
1. East Asian target accuracy	—			
2. Caucasian target accuracy	.69***	—		
3. Heritage VIA score	-.17*	-.32***	—	
4. Mainstream VIA score	.27**	.23**	.10	—
5. Years in North America	.35***	.51***	-.27**	.40***

Note. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$; $df = 138$; VIA = Vancouver Index of Acculturation

Table S2

Bivariate Correlations for East Asian Participants' RME Accuracy and Acculturation Variables in Study 2

	1	2	3	4	5	6	7	8	9
1. East Asian target accuracy	—								
2. Caucasian target accuracy	.69***	—							
3. Heritage VIA score	-.02	-.04	—						
4. Mainstream VIA score	.21**	.24**	.21**	—					
5. East Asian Experience	.003	.01	.32***	.22**	—				
6. East Asian Motivation	-.14	-.10	.30***	.02	.55***	—			
7. Caucasian Experience	.22**	.22**	-.002	.50***	.07	-.03	—		
8. Caucasian Motivation	.03	.02	.12	.37***	.26***	.13	.66***	—	
9. Years in North America	.31***	.37***	-.14	.49***	.04	-.17*	.35***	.03	—
10. English proficiency	.44***	.57***	.01	.51***	.09	-.07	.43***	.13	.60***

Note. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$; $df = 154$; VIA = Vancouver Index of Acculturation

Appendix S1

Islam and Hewstone's (1993) intercultural contact scale modified for Caucasian and East Asian contact. Response options range from 1 to 7 unless otherwise indicated. Scores are calculated by averaging responses in each subsection.

Contact quantity:

1. How much contact have you had with Caucasians [East Asians] at university? (*none at all to a great deal*)
2. How much contact have you had with Caucasians [East Asians] as neighbors? (*none at all to a great deal*)
3. How much contact have you had with Caucasians [East Asians] as close friends? (*none at all to a great deal*)
4. How frequently do you have informal talks with Caucasians [East Asians]? (*not at all to very often*)
5. How frequently do you visit Caucasians' [East Asians'] homes? (*never to very often*)

Contact quality:

1. Has your contact with Caucasians [East Asians] been perceived as equal? (*definitely not to definitely yes*)
2. Has your contact with Caucasians [East Asians] been involuntary or voluntary? (*definitely involuntary to definitely voluntary*)
3. Has your contact with Caucasians [East Asians] been superficial or intimate? (*very superficial to very intimate*)
4. Has your contact with Caucasians [East Asians] been experienced as pleasant? (*not at all to very*)

5. Has your contact with Caucasians [East Asians] been competitive or cooperative? (*very competitive to very cooperative*)

Intergroup aspects of contact:

1. When you come into contact with Caucasians [East Asians], do you feel you meet as individuals or as members representing your respective groups? (*as individuals to as group members*)
2. Do you usually see Caucasians [East Asians] with whom you have had contact as typical Caucasians [East Asians]? (*not at all typical to very typical*)

Relative numbers of ingroup and outgroup members: (choice of one)

1. When I have contact with Caucasians [East Asians], it is usually: (*a single Caucasian [East Asian] and me, several Caucasians [East Asians] and me, a single Caucasian [East Asian] and several people of other ethnicities, several Caucasians [East Asians] and several people of other ethnicities*)

Appendix S2

Questions assessing Caucasian and East Asian contact experience and motivation. Response options range from 1 to 7.

1. How much experience do you have interacting with Caucasian [East Asian] people?
(none to very much)
2. How often do you interact with Caucasian [East Asian] people? *(never to very often)*
3. How motivated are you to interact with Caucasian [East Asian] people? *(not at all to very much)*
4. How much of an effort do you make to interact with Caucasian [East Asian] people?
(none at all to a great deal)
5. In a group of people, how much do you pay attention to Caucasians [East Asians], compared to others? *(much less to much more)*