Running head: FACIAL EMOTIONS

Affective Information in Context and Judgment of Facial Expression: Cultural Similarities and Variations in Context Effects Between North Americans and East Asians

Kenichi Ito and Takahiko Masuda

University of Alberta

Koichi Hioki

University of Kobe

Correspondence concerning this article should be addressed Kenichi Ito, Department of Psychology, University of Alberta, P-357, Biological Sciences Building, Edmonton, Alberta, T6G 2E9, Canada. E-mail: kenichi@ualberta.ca. The project is supported by the standard grant of the Social Science and Humanities Research Council of Canada (G124130642). We thank Keiko Ishii for her feedback in the early part of the research project. We also thank research assistants at the Culture and Cognition Lab at the University of Alberta.

Words in text: 7338

Abstract

Previous research in cultural psychology suggests that North Americans are less likely than their East Asian counterparts to be sensitive to contextual information. By contrast, much evidence suggests that even North Americans' judgments are highly influenced by affective priming information, the effect of which can be seen as another type of contextual cue. However, the magnitude of such a priming effect has not been comprehensively tested in a cross-cultural context. Taking advantage of the methodology of the affective priming paradigm, we conducted two studies, in which we manipulated (a) the timing of priming information (simultaneous vs. sequential) and (b) the type of affective information (background landscape vs. background human figures), in which European Canadians and Japanese judged target faces that showed either happy or sad facial expressions in the focal area of the scene. The results in general indicate that a similar degree of contextual effect occurs in members of both cultures. The issue of generalization of cross-cultural findings and the necessity of overarching more than one research paradigm are discussed. (171 words)

Keywords: cross-cultural comparison, facial expressions, contextual influence, cultural similarity, European Canadian, Japanese

Affective Information in Context and Judgment of Facial Expression: Cultural Similarities and Variations in Context Effects Between North Americans and East Asians

Research on culture and psychology has demonstrated systematic cross-cultural variations in psychological processes. Notably, much evidence suggests that North Americans are less likely than their East Asian counterparts to be sensitive to contextual information (e.g., Masuda & Nisbett, 2001, 2006; Nisbett & Masuda, 2003). However, how much these findings can be applicable and generalizable to the other domains of psychological phenomena has not been fully discussed. Furthermore, such findings are sometimes used to form stereotypes about specific cultural or ethnic groups and their patterns of behavior (Adams & Markus, 2004) More detailed analyses of underlying processes which produce cultural differences and similarities in psychological processes are highly expected in the field of cross-cultural research (Matsumoto & Yoo, 2006). Given the evidence in cultural research that has accumulated over several decades, we maintain that a close examination of the magnitude of context effect across other domains of behavioral research will be of value. For this investigation, we targeted the affective priming effect on the judgment of emotional facial expressions (e.g., Fazio, 2001, for review). Using this research paradigm, we conducted two cross-cultural studies to re-examines the issue of culture and context sensitivity.

Judgment of Facial Expressions in Context

There are several lines of research that has examined context effect, some of which show that even North Americans are affected by context, some of which do not show that.

Past research suggests that North Americans and Europeans are sensitive to the affective valence (positive vs. negative) of contextual information. For example, Canadian participants' judgment of a facial expression was influenced by preceding emotional scenarios or faces

(Carroll & Russell, 1996; Russell & Fehr, 1987). Various studies have given credence to this effect of the contextual valence on the judgment of facial expressions (Russell, 1991; Tanaka-Matsumi, Attivissimo, Nelson, & D'Urso, 1995). Of particular interest to the current study, North Americans' judgments are also said to be highly influenced by even a brief presentation of affective priming information, which is also a type of contextual cue (Fazio, 2001, for review).

Hietanen, Klemettilä, Kettunen, and Korpela (2007), for example, had Finnish participants judge a happy face or a disgusted face after briefly presenting them with landscape images. The images differed in terms of the proportion of natural materials and artificial materials. The images in one category showed scenes consisting mainly of artificial materials (e.g., an urban apartment complex), which activated negative attitudes. In the other category, the images showed mainly natural materials (e.g., a suburban park), which activated positive attitudes. In a stepwise manner, Heitanen et al. manipulated the ratio of natural materials to artificial materials in the scenes and created five degrees of combinations from mostly artificial materials to mostly natural materials. The results showed that as the proportion of natural materials in the primes increased, participants categorized happy faces faster and disgusted faces more slowly. That is, participants judged a target's facial emotion more quickly when the valence of the elicited mindset was congruent with that of the target's facial emotion (e.g., a suburban park with a happy face) than when the valence of the elicited mindset was incongruent with the target's facial emotion (e.g., an urban apartment complex with a happy face).

Such sensitivity to contextual information among North Americans and Europeans, however, appears incompatible with the theory and evidence of past cross-cultural research (Nisbett, 2003; 2007; Nisbett, Peng, Choi, & Norenzayan, 2001). Past research demonstrated that East Asians have a greater tendency to pay attention to contextual cues such as the frames of

abstract figures (Ji, Peng, & Nisbett, 2000; Kitayama, Duffy, Kawamura, & Larsen, 2003; Masuda, Akase, Radford, & Wang, 2008), or the backgrounds of visual images (Chua, Boland, & Nisbett, 2005; Masuda, Gonzalez, Kwan, & Nisbett, 2008; Masuda & Nisbett, 2006; Miyamoto, Nisbett & Masuda, 2006).

A series of studies conducted by Masuda and his colleagues (Masuda, Ellsworth, et al., 2008; Masuda, Wang, & Ishii, 2008) are particularly relevant to the current study. Masuda and his colleagues presented American and Japanese participants with lineups of five cartoon figures (or facial pictures), in which one main character who showed a specific facial expression stood against a background of four figures who showed their own facial expressions. Participants were then asked to rate the intensity of sadness, happiness, and anger shown by the central figures. The combination of the facial expressions of the target figure and the background figures was manipulated so that the figures differed in terms of the match or the mismatch of facial emotions between the central figure and the four background figures. The results showed that the discrepancy of intensity ratings between the match and the mismatch lineups were greater for Japanese participants than for American participants. The implication was that the Japanese incorporated the background figures' facial emotions into the evaluation of the target's facial emotions, but this effect was not observed in Americans.

It is difficult to make sense of the literature because of different methodologies. Although both paradigms investigate sensitivity to contextual information, the methodologies of the affective priming study (e.g., Hietanen et al., 2007) and the lineup study (e.g., Masuda, Ellsworth, et al., 2008) are distinct from one another. First, in the priming study, participants were shown contextual information and the target information sequentially, whereas participants in the lineup study were shown the contextual information and the target simultaneously. Second, the priming

study was conducted using a variety of priming stimuli, whereas the lineup study was conducted using only background figures' facial expressions as contextual information. Third, the priming study focused only on a single culture, whereas the lineup study compared the effect across cultures. These inconsistencies in methodology obscure the magnitude of the research findings.

Therefore, modification of experimental designs from the two paradigms is necessary to place these two research paradigms on the same plane. However, little research has been conducted to seamlessly blend these two paradigms. The current article addresses this issue by (a) manipulating the presentation (timing) of the contextual information, (b) manipulating the type of stimuli, (c) and cross-culturally examining the magnitude of contextual effect between two cultural groups: European Canadians and Japanese.

Overview of the Studies

We designed our experiments so that, first, the contextual stimuli were presented in two different ways: simultaneous condition vs. sequential condition. In the simultaneous condition (Study 1A and Study 2A), we followed the lineup study (e.g., Masuda, Ellsworth, et al., 2008) that the contextual information was presented as a background of the target stimuli. In the sequential condition (Study 1B and Study 2B), we followed the affective priming study: Participants were presented with a fixation point at the center of the screen for 500 ms, followed by contextual priming stimuli for 250 ms, followed by a blank for 50 ms.

Second, we used two kinds of contextual stimuli: background landscape (i.e., natural or industrial landscape with either positive or negative valence) and background human figures (i.e., background figures expressing either positive or negative valences). For background landscape, we selected landscape images as the contextual information (Study 1A and 1B), following Hietanen et al.'s (2007) studies. However, unlike Hietanen et al., who assumed that landscapes

containing nature images entail positive valence and that city landscapes entail negative valence, we manipulated the valence of landscape images more clearly by using stimuli from International Affective Picture System resources (Lang, Bradley, & Cuthbert, 2005), and by pretesting whether European Canadians and Japanese evaluate the valence of the images in a similar manner. For the background human figures (Study 2A and 2B), we used revised stimuli originally created by Masuda, Wang, et al. (2008), in which two background individuals showed either happy or sad facial expressions.[1]

By synthesizing these two factors, we crossed the two kinds of contextual stimuli with the two ways to present them. Study 1A (simultaneous condition) and Study 1B (sequential condition) used landscape images with clear valences (landscape cues); Study 2A (simultaneous condition) and Study 2B (sequential condition) used background figures' facial emotions as contextual stimuli (human figure cues). Crossing the two presentation styles with the two kinds of contextual stimuli allowed us to examine whether the nature of the contextual stimuli interacted with the manner of presentation. Using these experimental manipulations, we tested whether we could observe cultural similarities or any differences in any specific experimental condition. If the context effect was observed across all experimental conditions and across cultures, the result would confirm the robustness of the context effect during category judgment of facial expressions. By contrast, if any cultural variation in the context effect was observed, the assertion of cultural variation in context sensitivity would be generalizable beyond the original research paradigm.

Study 1A

Following previous works in cultural psychology (e.g., Masuda & Nisbett, 2001, 2006), Study 1A examined whether European Canadians' tendency to be influenced by context

information was similar to that of their Japanese counterparts. To answer this question, we created a set of stimuli by placing the contextual information on the same plane as the target information that the participants were asked to judge.

Method

Participants. Thirty-eight European Canadians (20 females and 18 males) at the University of Alberta and 36 Japanese (18 females and 18 males) at Kobe University participated in the experiment. In exchange for their participation, European Canadian participants received a course credit, and Japanese participants received a gift card worth about $5.

Stimuli. To select culturally equivalent facial expressions for the categorization task of the current study, we conducted a pilot study in which European Canadian and Japanese participants evaluated the valence of facial expressions from Masuda, Wang, et al.'s (2008) stimuli. The pictures showed 24 European (12 happy and 12 sad) and 24 Asian (12 happy and 12 sad) facial expressions. Each model showed both happy and sad facial emotions in accordance with criteria suggested by Ekman and Friesen (1975). One group of participants (41 Canadians and 21 Japanese) evaluated European faces, and the other group (41 Canadians and 21 Japanese) evaluated Asian faces. All participants in this pilot study were asked to rate the intensity of happiness and sadness on a 10-point scale ranging from 0 (*not at all intense*) to 9 (*extremely intense*). On the basis of the results we selected 12 happy faces (6 Europeans) and 12 sad faces (6 Europeans), which both Canadian and Japanese participants rated as clearly distinguishable from one another.[2] For the selected 12 European faces (6 female), a paired-samples t-test confirmed that the mean happiness intensity and the mean sadness intensity of 6 happy faces as well as those of 6 sad faces were significantly different from each other among European Canadian participants, $t_{happy\ face}(40) = 30.85$, $p < .001$ ($M_{happiness} = 6.81$; $M_{sadness} = .98$), $t_{sad\ face}(40) = 13.00$,

$p < .001$ ($M_{happiness} = .70$; $M_{sadness} = 4.20$) and among Japanese participants, $t_{happy\ face}(20) = 26.38$, $p < .001$ ($M_{happiness} = 6.72$; $M_{sadness} = .72$), $t_{sad\ face}(20) = 10.28$, $p < .001$ ($M_{happiness} = .88$; $M_{sadness} = 4.99$). Similarly for 12 Asian faces (6 female), a paired-samples t-test showed that the mean happiness intensity and the mean sadness intensity of 6 happy faces as well as those of 6 sad faces were significantly different from each other among European Canadian participants, $t_{happy\ face}(40) = 30.52$, $p < .001$ ($M_{happiness} = 6.55$; $M_{sadness} = .48$), $t_{sad\ face}(40) = 25.53$, $p < .001$ ($M_{happiness} = .55$; $M_{sadness} = 6.24$) and among Japanese participants, $t_{happy\ face}(20) = 25.92$, $p < .001$ ($M_{happiness} = 6.52$; $M_{sadness} = .34$), $t_{sad\ face}(20) = 14.18$, $p < .001$ ($M_{happiness} = .59$; $M_{sadness} = 6.01$). We conducted another pilot study in which 28 European Canadians (15 females) and 20 Japanese (9 females) who had not participated in the first pilot study were asked to evaluate the intensity of the valence of landscape images from International Affective Picture System resources (Lang, Bradley, & Cuthbert, 2005). Following Lang et al., we used Self-Assessment Manikin (SAM) as the scale, in which a schematic image depicted values ranging from 1 (*extremely positive*) to 9 (*extremely negative*). From 40 landscape images, we selected 10 images (5 positive) that were either clearly positive or clearly negative. A paired-samples t-test confirmed that the mean of 5 positive landscapes was significantly different from the mean of 5 negative landscapes among European Canadian participants, $t(27) = 22.10$, $p < .001$, ($M_{positive} = 2.41$; $M_{negative} = 7.71$), and among Japanese participants, $t(19) = 9.86$, $p < .001$, ($M_{positive} = 3.49$; $M_{negative} = 7.00$).

We then merged images of facial emotions with images of landscapes to make single pictures, so that faces were presented with landscape backgrounds (see Figure 1). In total, we created 240 experimental stimuli by merging each of 24 facial images with five positive and five negative landscapes, using Adobe Photoshop CS2 version 9.0.2. The size of the target's facial

images was 566 × 453 pixels (11.4° × 14.2°). The size of the landscape images was 1024 ×768 pixels (25.3° × 18.9°) and covered the entire screen of the 15-inch monitor.

Procedure. Upon arrival, participants were asked to read instructions on a computer screen. The instructions stated that the task was to judge as fast and accurate as possible whether the person at the center of the picture expressed positive or negative emotions. Half of the participants were instructed to left-click for positive emotions and right-click for negative emotions; the order was reversed for the other half of the participants. All participants used their right hand to click. The instructions were presented in the participants' native language. The first author translated the English version of the instructions into Japanese, and a bilingual research assistant back-translated the instructions.

Experimental stimuli were presented randomly using E-prime version 1.2 (Schneider, Eschman, & Zuccolotto, 2002) on a 15-inch laptop computer at a resolution of 1024 × 768 pixels. Participants sat in front of the computer at a viewing distance of approximately 60 cm. They were given four practice trials and subsequently completed 240 experimental trials. Participants' reaction time and accuracy for each trial were recorded. After answering a demographic information questionnaire at the end of the experiment, participants were fully debriefed.

--- [Insert Figure 1] ---

Results

The focus of the current studies was to compare the effect of contextual primes on Canadian participants with that on Japanese participants. Thus we combined the happy face–positive landscape condition with the sad face–negative landscape condition to create the congruent scores, and the happy face–negative landscape condition with the sad face–positive landscape condition to create the incongruent scores. In this way, discrepancies between

congruent scores and incongruent scores indicate the effect of contextual information on the categorization of target. We then conducted 2 (culture: European Canadian vs. Japanese) × 2 (congruency: congruent vs. incongruent) ANOVA, with participants' reaction time being the dependent variable. Culture was the between-subjects variable, and congruency was the within-subject variable.[3]

We found a significant main effect of congruency, $F(1, 72) = 33.66$, $p < .001$, $\eta_p^2 = .32$. A main effect of culture was not significant, $F(1, 72) = 2.34$, p = ns. The two-way interaction of participants' cultural backgrounds and congruency was not significant, $F < 1$, suggesting that the effect of contextual landscape was similar across the two cultural groups. Within cultural-level, the results also showed that, similar to Japanese participants, Canadian participants categorized the facial expression faster when the landscapes and facial expressions had congruent valences ($M_{CND} = 830.69$ and $M_{JPN} = 773.29$) than when the valences were incongruent ($M_{CND} = 866.25$ and $M_{JPN} = 813.86$; see Figure 2); $t(37) = 3.89$, $p < .001$, $t(35) = 4.31$, $p < .001$, respectively.[4, 5]

--- [Insert Figure 2] ---

Study 1B

In Study 1B, we isolated the affective component of contextual information from the target's facial expressions by using the affective priming paradigm. European Canadian and Japanese participants were briefly presented with pictorial images of positive or negative landscapes before the judgment of happy or sad facial expression. We examined whether the brief presentation of salient affective contextual information influenced the judgment of the two groups of participants in a similar manner; that is, we tested whether both groups would categorize targets' facial emotions that were congruent with the valence of contextual

information more quickly than facial emotions that were incongruent with the valence of contextual information.

Method

Stimuli. In this experiment, we used the same facial expressions and landscape images as in Study 1A. Instead of merging them as a single image, we used landscape images as primes and facial expressions as targets. The sizes of the facial images and landscape images were identical to those used in Study 1A.

Participants. Thirty-eight European Canadians (18 females and 20 males) at the University of Alberta and 35 Japanese (18 females and 17 males) at Kobe University participated in the experiment. These participants had not participated in the two pilot studies or Study 1A. In exchange for their participation, European Canadian participants received a course credit, and Japanese participants received a gift card worth about $5.

Procedure. The experimental procedure was similar to the procedure used in Study 1A, except that participants were presented with sets of two consecutive images. The task was to categorize (by clicking mouse buttons) whether the second image, a facial portrait, appeared to depict a positive or a negative emotion. Experimental trials followed the affective priming paradigm (see Figure 3). Participants were presented with a fixation point at the center of the screen for 500 ms, followed by primes for 250 ms, and a blank for 50 ms. Thus, the Stimulus Onset Asynchrony (SOA) was set at 300 ms to separate affective priming effect from semantic priming effect.[6] Target stimuli were presented until participants responded or for 5 seconds. The intertrial interval was 2 seconds.

--- [Insert Figure 3] ---

Results

We conducted 2 (culture: European Canadian vs. Japanese) × 2 (congruency: congruent vs. incongruent) ANOVA, with participants' reaction time being the dependent variable. Culture was the between-subjects variable, and congruency was the within-subject variable.[7]

We found a significant main effect of congruency, $F(1, 70) = 14.59$, $p < .001$, $\eta_p^2 = .17$. A main effect of culture was not significant, $F(1, 70) = 1.64$, p = ns. The two-way interaction of participants' cultural backgrounds and congruency was not significant, $F < 1$. Planned contrast revealed that, similar to Japanese participants, Canadian participants categorized the target faster when the pairs of prime and target had congruent valences ($M_{CND} = 727.33$ and $M_{JPN} = 779.17$) than when the pairs had incongruent valences ($M_{CND} = 742.72$ and $M_{JPN} = 792.10$; see Figure 2); $t(36) = 2.95$, $p < .01$, $t(34) = 2.46$, $p < .05$, respectively.[8, 9]

--- [Insert Figure 4] ---

Study 2A

Following the procedure used in Study 1A, we placed the targets and the primes on the same plane in Study 2A to examine whether European Canadians' tendency to be influenced by the valence of human figures was similar to that of their Japanese counterparts.

Method

Participants. Thirty-seven European Canadians (17 females and 20 males) at the University of Alberta and 33 Japanese (16 females and 17 males) at Kobe University participated in the experiment. These participants had not participated in any of previous studies. In exchange for their participation, European Canadian participants received a course credit, and Japanese participants received a gift card worth about $5.

Stimuli. We conducted another pilot study to select happy or sad facial portraits to be used as contexts. We prepared 48 new facial portraits according to criteria used in the first pilot

study. 18 Canadian participants (8 females) and 20 Japanese participants (6 females) who had not participated in any of previous studies evaluated the intensity of valence. Participants evaluated each portrait using the SAM, in which a schematic image depicted values ranging from 1 (*extremely positive*) to 9 (*extremely negative*).

On the basis of the result, we selected 16 facial portraits (8 happy and 8 sad) that varied equally in terms of models' gender and ethnicity. Models showed either a happy face or a sad face. A paired-samples *t*-test confirmed that the mean of 8 happy facial portraits were significantly different from the mean of 8 sad facial portraits among European Canadian participants, $t(17) = 17.26$, $p < .001$, ($M_{positive} = 2.35$; $M_{negative} = 7.12$), and among Japanese participants, $t(19) = 25.20$, $p < .001$, ($M_{positive} = 2.09$; $M_{negative} = 7.08$). The selected facial portraits were then paired with portraits of the opposite gender within the same ethnic group to form context images. As a result, we created 8 prime pictures (4 pairs of happy faces and 4 pairs of sad faces). A pair of portraits was placed side by side, 3cm apart (2.9°). The size of the facial portrait was the same as the target stimuli used in Study 1A and 1B. We then merged facial portraits used in Study 1A and 1B with the contextual facial images to make single images, so that target faces were presented with backgrounds of two other faces (see Figure 5). The merged images were presented at the center part of the screen (870 × 459 pixels) on a 15-inch monitor (1024 × 768 pixels). The size of the targets' facial images was 566 × 453 pixels (11.4° × 14.2°), which was identical to that in Study 1A and 1B. In total, we created 192 experimental stimuli by merging each of 24 target facial images with 4 happy and 4 sad pairs of facial images.

Procedure. The experimental procedure was similar to that used in Study 1A, except that target facial emotions were presented with background human figures. Participants' task was to

judge whether the person at the center of the picture expressed positive or negative emotions as fast and accurate as possible.

--- [Insert Figure 5] ---

Results

We conducted 2 (culture: European Canadian vs. Japanese) × 2 (congruency: congruent vs. incongruent) ANOVA, with participants' reaction time being the dependent variable. Culture was the between-subjects variable, and congruency was the within-subject variable.[10]

We found a significant main effect of congruency, $F(1, 68) = 14.69$, $p < .001$, $\eta_p^2 = .18$. Neither a main effect of culture nor the two-way interaction of participants' cultural backgrounds and congruency were significant, $Fs < 1$. Planned contrasts revealed that, similar to Japanese participants, Canadian participants categorized the targets' facial emotions faster when the target and background figures had congruent valences ($M_{CND} = 791.91$ and $M_{JPN} = 821.08$) than when they had incongruent valences, ($M_{CND} = 818.18$ and $M_{JPN} = 839.62$; see Figure 6); $t(36) = 2.99$, $p < .01$, $t(32) = 2.48$, $p < .05$, respectively.[11]

--- [Insert Figure 6] ---

Study 2B

Following the methodology of Study 1B, we used an affective priming paradigm in which European Canadian and Japanese participants were briefly presented with pictorial images of happy or sad facial expressions before viewing and categorizing happy or sad facial emotions in the target images.

Method

Stimuli. In this experiment, we used the same facial portraits as in Study 2A. Background faces used as contexts were used as primes, and target faces were the same as in the previous

three studies. The size of background faces and target faces was identical to those used in Study 2A.

Participants. Forty-one European Canadians (21 females and 20 males) at the University of Alberta and 36 Japanese (17 females and 19 males) at Kobe University participated in the experiment. These participants had not participated in any of previous studies. In exchange for their participation, European Canadian participants received a course credit, and Japanese participants received a gift card worth about $5.

Procedure. Experimental procedure was the same as in Study 1B, except that there were 192 trials in total, and primes were facial emotions rather than landscape images (See Figure 7). Participants' task was to categorize as fast and accurate as possible whether the person in the second picture depicted positive or negative emotions.

--- [Insert Figure 7] ---

Results

We then conducted 2 (culture: European Canadian vs. Japanese) × 2 (congruency: congruent vs. incongruent) ANOVA, with participants' reaction time as the dependent variable. Culture was the between-subjects variable, and congruency was the within-subject variable.[12]

We found a significant main effect of congruency, $F(1, 75) = 11.16$, $p < .001$, $\eta_p^2 = .13$. Neither a main effect of culture nor the two-way interaction of participants' cultural backgrounds and congruency was not significant, $Fs < 1$. However, planned contrast showed that Canadian participants' response latency in the congruent condition ($M_{CND} = 836.09$) was not significantly faster than their response latency in the incongruent condition ($M_{CND} = 848.86$), $t(40) = 1.54$, $p = .13$; whereas Japanese participants categorized targets significantly faster in the congruent

condition (M_{JPN} = 788.91) than in the incongruent condition (M_{JPN} = 813.56; see Figure 8), $t(35) = 3.35$, $p = .002$.[13, 14]

--- [Insert Figure 8] ---

General Discussion

We reported two cross-cultural studies that investigated the effect of contextual affective priming on the judgment of facial expressions. Study 1A placed the positive or negative landscape images in the background of the target stimuli. Study 1B used a classic affective priming paradigm, in which the positive or negative landscape images were briefly presented before the target stimulus appeared on the screen. Study 2 used exactly the same experimental design as Study 1 except that, instead of landscape images, facial expressions were used as the contextual information.

Is there any cultural similarity in findings across all experimental conditions? To verify the tendency of presentation methods and types of stimuli, we combined data from two studies and conducted 2 (Presentation: Sequential vs. Simultaneous) × 2 (Stimuli: Landscape vs. Face) × 2 (Culture: European Canadian vs. Japanese) between-subject ANOVA with the effect of context (the response latency of the congruent condition subtracted from the incongruent condition) being the dependent variable. We found a significant main effect of Presentation, $F(1, 285) = 6.18$, $p < .02$, $\eta_p^2 = .02$. The salience of the context stimuli in Study 1A and Study 2A was stronger than that in Study 1B and Study 2B: The simultaneous condition produced a stronger context effect than the sequential condition. When the context appears simultaneously with the target's facial information, it is much easier to infer the connection between these two pieces of information. By contrast, if the context priming cue is presented before the target facial expression, such a time lag attenuates the contextual effect on the reaction speeds of the

judgment of the target's facial expression. We also found a marginally significant Stimuli × Presentation interaction, $F(1, 285) = 3.32$, $p < .07$, $\eta_p^2 = .01$. Simple effect analysis revealed a significant effect of Presentation controlling for the type of stimuli. That is, the simultaneously presented landscape images influenced participants' judgment of facial expression more than sequentially presented landscape images, $F(1, 144) = 9.96$, $p < .01$, $\eta_p^2 = .07$. In general, the magnitude of the context effect was similar for European Canadians and Japanese participants that neither Culture × Presentation nor Culture × Stimuli were significant, $Fs < 1$. The results successfully replicated Hietanen et al.'s (2007) who tested only the sequential condition. Furthermore, we extended findings of their study by identifying a stronger context effect in simultaneous condition compared with the sequential condition.

These cultural similarities across all experimental conditions lead us to conclude that when people categorize a target's facial expression, there might be a universal tendency for reaction speed to be influenced by contextual cues. Just as emotional expressions do not occur in a vacuum in real life, judgment of facial expressions always occurs in context. So it is reasonable to assume that people generally take into account the face-context linkage and that they are influenced by the congruency and incongruency of this linkage (Matsumoto & Hwang, 2010; Mastumoto, Hwang, & Yamada, in press). Our findings regarding reaction times provide proof that the face-congruent contexts influence judgment speed of the emotion on the target's face equally for both European Canadians and Japanese, and that there are culturally similar patterns in terms of the magnitude of contextual effect. The results of the current study therefore suggest that Masuda, Ellsworth, et al.'s (2008) findings cannot be generalized to this experimental paradigm.

What were the differences in the Masuda, Ellsworth, et al.'s (2008) study and the current study, which could have demarcated cultural universals from cultural variation? Because the stimuli used in Study 2A or 2B and in Masuda, Ellsworth, et al.'s study are qualitatively similar to the extent that both stimuli consist of the target's facial expressions as well as the background people's facial expressions, we speculate that the discrepancy in findings can be attributable to the differences in measurement. The objective of the current studies was to investigate whether or not the previously found cultural differences in context sensitivity were observable in the information processing speed of affectively congruent or incongruent information. To achieve this objective, we used categorization tasks, in which we measured the reaction speed of categorizing the target's facial emotions. By contrast, Masuda, Ellsworth, et al. asked participants to rate the intensity of target facial emotions, targeting the interpretation of the facial emotions surrounded by congruent or incongruent facial emotions. Therefore, it is possible that even in Masuda, Ellsworth, et al.'s intensity judgment task, both East Asians' and North Americans' reaction speed in identifying the *category* of the target's emotion is equally influenced by the contextual information. But, in the *intensity* judgment, which is believed to take longer than the category judgment, North Americans succeeded in discounting the contextual influence to consistently judge the target's facial expression across different background figures, whereas East Asians, because of their cultural belief regarding facial expressions, did not make such an adjustment. Although experimental manipulation of differences in measurement is beyond the scope of the current paper, this issue is worthy of future research with well-controlled experimentation.

Final Remark

The comparison of different paradigms reveals the interconnectedness of constructs in a theory and provides new insights (Aronson, 1997). By focusing on competing research findings from two research paradigms, the current studies investigated the magnitude of context effects in a variety of experimental conditions, and the findings confirmed the robustness of the context effect during the category judgment of facial expressions. Furthermore, conducting a series of systematic cross-cultural studies allowed us to examine the cultural similarity and differences in the context effect between European Canadians and Japanese. Consistent with findings of researchers in the field of emotion, the findings of our two studies suggest that contextual cues indeed play an important role in the accurate interpretation of facial expressions, even in the case of North American observers.Taken together, our two studies provide evidence that systematic cross-cultural comparison is an insightful methodology not only for solving conflicts between two competing findings, but also to articulate the magnitude of effects while avoiding any overgeneralization due to use of a single paradigm. To date, little research has comprehensively attempted to synthesize competing paradigms by using a cross-cultural comparison methodology. We maintain that the current article provides a good model for further advances in the field of cross-cultural psychology.

Footnotes

[1] Methodologically, emotionally neutral contextual stimuli are very difficult to obtain, because, if stimuli are not emotionally salient, people's impression for the stimuli is likely to depend on various meanings associated with the stimuli. Controlling for the meaning of the stimuli between two cultural groups or even within one cultural group is difficult. Therefore, we decided to focus on emotionally positive or negative stimuli.

[2] We intentionally varied the ethnicity and the gender of faces to control for possible biases in interpreting facial emotions (Elfenbein & Ambady, 2003; Merten, 2005).

[3] Prior to the analysis, we excluded nonresponse cases, incorrect responses, and responses that were 3SD away from each participant's condition means (5.0%).

[4] The condition means indicated that Canadian participants seemed to be slower at evaluating facial emotions than Japanese participants. Thus, we conducted an independent sample *t*-test to compare reaction times for the congruent condition and the incongruent condition between cultures. Neither the congruent condition, $t(72) = 1.46$, $p = .15$, nor the incongruent condition, $t(72) = 1.23$, $p = .22$, were significantly different across cultures.

[5] We also conducted 2 (culture: European Canadian vs. Japanese) × 2 (congruency: congruent vs. incongruent) ANOVA, with participants' accuracy rate as the dependent variable. We found a significant main effect of congruency, $F(1, 72) = 17.15$, $p < .001$, $\eta_p^2 = .19$. Both Canadian and Japanese participants categorized the facial emotions more accurately when the landscapes and facial expressions had congruent valences ($M_{CND} = 98.6\%$ and $M_{JPN} = 98.3\%$) than when they had incongruent valences ($M_{CND} = 95.9\%$ for Canadian and $M_{JPN} = 95.9\%$ for Japanese). However, the result should be evaluated with caution, because even in the incongruent condition,

participants categorized the facial emotions accurately more than 95% of the time. The significant effect might have occurred by chance alone.

[6] Affective priming research (Hermans, Spruyt, & Eelen, 2003) and neurological evidence (Adolphs, 2002) suggest that affective priming occurs within 300 ms SOA.

[7] Prior to the analysis, we excluded nonresponse cases, incorrect responses, and responses that were 3SD away from each participant's condition means (4.6%).

[8] The condition means indicated that Canadian participants seemed to be faster at categorizing facial emotions than Japanese participants. Thus, we conducted an independent sample *t*-test to compare reaction times for the congruent condition and the incongruent condition between cultures. Neither the congruent condition, $t(70) = 1.36$, $p = .19$, nor the incongruent condition, $t(70) = 1.20$, $p = .23$, were significantly different between cultures.

[9] We also conducted 2 (culture: European Canadian vs. Japanese) × 2 (congruency: congruent vs. incongruent) ANOVA, with participants' accuracy rate as the dependent variable. There was neither significant main effect nor interaction effect of participants' culture and congruency, $F < 1$. The lack of significant effect of congruency, which was significant with reaction time as the dependent variable, may be due to the ceiling effect, because all condition means were above 97%.

[10] Prior to the analysis, we excluded nonresponse cases, incorrect responses, and responses that were 3SD away from each participant's condition means (4.8%).

[11] We also conducted 2 (culture: European Canadian vs. Japanese) × 2 (congruency: congruent vs. incongruent) ANOVA, with participants' accuracy rate as the dependent variable. We found a significant main effect of the congruency, $F(1, 68) = 8.16$, $p = .006$ $\eta_p^2 = .11$. Both Canadian and Japanese participants categorized the facial emotions more accurately when the target and

background figures had congruent valences (M_{CND} = 97.2% and M_{JPN} = 98.7%) than when they had incongruent valences (M_{CND} = 96.5% and M_{JPN} = 96.6%). However, the result should be evaluated with caution, because even in the incongruent condition, participants categorized the emotion accurately more than 96% of the time. The significant effect may have occurred by chance alone.

[12] Prior to the analysis, we excluded nonresponse cases, incorrect responses, and responses that were 3SD away from each participant's condition means (4.4%).

[13] We also conducted 2 (culture: European Canadian vs. Japanese) × 2 (congruency: congruent vs. incongruent) ANOVA, with participants' accuracy rate as the dependent variable. We found a marginally significant main effect of the congruency, $F(1, 75) = 3.91$, $p = .52$ $\eta_p^2 = .05$. Both Canadian and Japanese participants categorized the person more accurately when the background–target pair had congruent valences (M_{CND} = 97.4% and M_{JPN} = 98.4%) than when the pair had incongruent valences (M_{CND} = 97.1% and M_{JPN} = 97.5%). However, the result should be evaluated with caution, because even in the incongruent condition, participants categorized the person accurately more than 97% of the time. The significant effect may have occurred by chance alone.

[14] The results support previous cross-cultural findings (e.g., Masuda, Ellsworth, et al., 2008); that is, although Japanese participants remained sensitive to context information, Canadian participants did not show evidence of sensitivity to contextual information when the valence of context was modest. However, the results must be interpreted with caution, because they may be due to the lack of power given that the pattern of results is similar to the rest of the study.

References

Adolphs, R. (2002). Recognizing emotion from facial expressions: Psychological and neurological mechanisms. *Behavioral and Cognitive Neuroscience Reviews, 1*, 21–62. doi:10.1177/1534582302001001003.

Adams, G., & Markus, H. R. (2004). Toward a conception of culture suitable for a social psychology of culture. In M. Schaller & C. S. Crandall (Eds.), *The psychological foundations of culture* (pp. 335–360). Mahwah, NJ: Lawrence Erlbaum.

Aronson, E. (1997). The theory of cognitive dissonance: The evolution and vicissitudes of an idea. In C. McGarty & S. A. Haslam (Eds.), *The message of social psychology* (pp. 20–35). Cambridge, MA: Blackwell Publishers Inc.

Bower, G. H. (1981). Mood and memory. *American Psychologist*, *36*, 129–148. doi:10.1037/0003-066X.36.2.129.

Carroll, J. M., & Russell, J. A. (1996). Do facial expressions signal specific emotions? Judging emotion from the face in context. *Journal of Personality and Social Psychology, 70*, 205–218. doi:10.1037/0022-3514.70.2.205.

Carroll, N. C., & Young, A. W. (2005). Priming of emotion recognition. *Quarterly Journal of Experimental Psychology A: Human Experimental Psychology, 58A*, 1173–1197. doi:10.1080/02724980443000539.

Chua, H. F., Boland, J. E., & Nisbett, R. E. (2005). Cultural variation in eye movements during scene perception. *Proceedings of the National Academy of Sciences of the United States of America, 102,* 12629–12633. doi:10.1073/pnas.0506162102.

Ekman, P., & Friesen, W. V. (1975). *Unmasking the face: A guide to recognizing emotions from facial clues*. Englewood Cliffs, NJ: Prentice-Hall.

Elfenbein, H. A., & Ambady, N. (2003). When familiarity breeds accuracy: Cultural exposure and facial emotion recognition. *Journal of Personality and Social Psychology, 85*, 276–290. doi:10.1037/0033-2909.128.2.203.

Fazio, R. H. (2001). On the automatic activation of associated evaluations: An overview. *Cognition & Emotion, 15*, 115–141. doi:10.1080/02699930125908.

Forgas, J. (2003). Affective influences on attitudes and judgments. In R. J. Davidson, K. R. Scherer, & H. Goldsmith (Eds.), *Handbook of affective sciences* (pp. 596–618). London: Oxford University Press.

Hermans, D., Spruyt, A., & Eelen, P. (2003). Automatic affective priming of recently acquired stimulus valence: Priming at SOA 300 but not at SOA 1000. *Cognition & Emotion, 17*, 83–99. doi:10.1080/02699930302276.

Hietanen, J. K., Klemettilä, T., Kettunen, J. E., & Korpela, K. M. (2007). What is a nice smile like that doing in a place like this? Automatic affective responses to environments influence the recognition of facial expressions. *Psychological Research, 71*, 539–552. doi:10.1007/s00426-006-0064-4.

Ji, L., Peng, K., & Nisbett, R. E. (2000). Culture, control, and perception of relationships in the environment. *Journal of Personality and Social Psychology, 78*, 943–955. doi:10.1037/0022-3514.78.5.943.

Joormann, J., & Gotlib, I. H. (2006). Is this happiness I see? Biases in the identification of emotional facial expressions in depression and social phobia. *Journal of Abnormal Psychology, 115*, 705–714. doi:10.1037/0021-843X.115.4.705.

Kitayama, S., Duffy, S., Kawamura, T., & Larsen, J. T. (2003). Perceiving an object and its context in different cultures: A cultural look at New Look. *Psychological Science, 14*, 201–206. doi:10.1111/1467-9280.02432.

Kitayama, S., & Niedenthal, P. M. (1994). Introduction. In P. M. Niedenthal & S. Kitayama (Eds.), *The heart's eye: Emotional influences in perception and attention* (pp. 41–65). San Diego, CA: Academic Press.

Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (2005). *International affective picture system (IAPS): Affective ratings of pictures and instruction manual* (Tech. Rep. No. A-6). Gainesville, FL: University of Florida, Center for Research in Psychophysiology.

Leppänen, J. M., & Hietanen, J. K. (2003). Affect and face perception: Odors modulate the recognition advantage of happy faces. *Emotion, 3*, 315–326. doi:10.1037/1528-3542.3.4.315.

Masuda, T., Akase, M., Radford, M. H. B., & Wang, H. (2008). Jokyo yoin ga gankyu undo pattern ni oyobosu eikyo: Nihonjin to Seiyojin no syuken jyoho heno bunkasa no kikaku kenkyu [Cross-cultural research on the pattern of eye-movement: Comparing the level of concentration between Japanese and Western participants]. *Japanese Journal of Psychology, 79*, 35–43.

Masuda, T., Ellsworth, P. C., Mesquita, B., Leu, J., Tanida, S., & Van de Veerdonk, E. (2008). Placing the face in context: Cultural differences in the perception of facial emotion. *Journal of Personality and Social Psychology, 94*, 365–381. doi:10.1037/0022-3514.94.3.365.

Masuda, T., Gonzalez, R., Kwan, L., & Nisbett, R. E. (2008). Culture and aesthetic preference: Comparing the attention to context of East Asians and Americans. *Personality and Social Psychology Bulletin, 34,* 1260–1275. doi:10.1016/j.jesp.2003.08.004.

Masuda, T., & Nisbett, R. E. (2001). Attending holistically versus analytically: Comparing the context sensitivity of Japanese and Americans. *Journal of Personality and Social Psychology, 81,* 922–934. doi:10.1037/0022-3514.81.5.922.

Masuda, T., & Nisbett, R. E. (2006). Culture and change blindness. *Cognitive Science: A Multidisciplinary Journal, 30,* 381–399. doi:10.1207/s15516709cog0000_63.

Masuda, T., Wang, H., & Ishii, K. (2008, February). *Comparing patterns of attention between Canadian and East Asian international students.* Poster session presented at the annual meeting of the Society of Personality and Social Psychology, Albuquerque, NM.

Matsumoto, D., & Hwang, S.H. (2010). Judging Faces in Context. *Social and Personality Psychology Compass, 3,*1-10.

Matsumoto, D., Hwang, S.H., & Yamada, H. (in press). *Journal of Cross-Cultural Psychology.*

Matsumoto, D. & Yoo, S. H. (2006). Toward a new generation of cross-cultural research. Perspectives on Psychological Science, 1, 234-250. doi:10.1111/j.1745-6916.2006.00014.x.

Merten, J. (2005). Culture, gender and the recognition of the basic emotions. *Psychologia: An International Journal of Psychology in the Orient, 48,* 306–316. doi:10.2117/psysoc.2005.306.

Miyamoto, Y., Nisbett, R. E., & Masuda, T. (2006). Culture and the physical environment: Holistic versus analytic perceptual affordances. *Psychological Science, 17,* 113–119. doi:10.1111/j.1467-9280.2006.01673.x.

Niedenthal, P. M., & Setterlund, M. B. (1994). Emotion congruence in perception. *Personality and Social Psychology Bulletin, 20,* 401–411. doi:10.1177/0146167294204007.

Nisbett, R. E. (2003). *The geography of thought: How Asians and Westerners think differently . . . and why.* New York: Free Press,

Nisbett, R. E. (2007). Eastern and western ways of perceiving the world. In Y. Shoda, D. Cervone, & G. Downey (Eds.), *Persons in context: Building a science of the individual* (pp. 62-83). New York: Guilford Press.

Nisbett, R. E., & Masuda, T. (2003). Culture and point of view. *Proceedings of the National Academy of Sciences of the United States of America, 100,* 11163–11175. doi:10.1073/pnas.1934527100.

Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of thought: Holistic versus analytic cognition. *Psychological Review, 108,* 291–310. doi:10.1037/0033-295X.108.2.291.

Ravaja, N., Saari, T., Kallinen, K., & Laarni, J. (2006). The role of mood in the processing of media messages from a small screen: Effects on subjective and physiological responses. *Media Psychology, 8,* 239–265. doi:10.1207/s1532785xmep0803_3.

Russell, J. A. (1991). The contempt expression and the relativity thesis. *Motivation and Emotion, 15,* 149–168. doi:10.1007/BF00995675.

Russell, J. A., & Fehr, B. (1987). Relativity in the perception of emotion in facial expressions. *Journal of Experimental Psychology: General, 116,* 223–237. doi:10.1037/0096-3445.116.3.223.

Schneider, W., Eschman, A., & Zuccolotto, A. (2002). *E-Prime user's guide.* Pittsburgh, PA: Psychology Software Tools.

Tanaka-Matsumi, J., Attivissimo, D., Nelson, S., & D'Urso, T. (1995). Context effects on the judgment of basic emotions in the face. *Motivation & Emotion, 19,* 139–155. doi:10.1007/BF02250567.

Wicker, B., Keysers, C., Plailly, C., Royet, J. P., Gallese, V., & Rizzolatti, G. (2003). Both of us disgusted in my insula: The common neural basis of seeing and feeling disgust. *Neuron, 40,* 655–664. doi:10.1016/S0896-6273(03)00679-2.

Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist, 35,* 151–175. doi:10.1037/0003-066X.35.2.151.

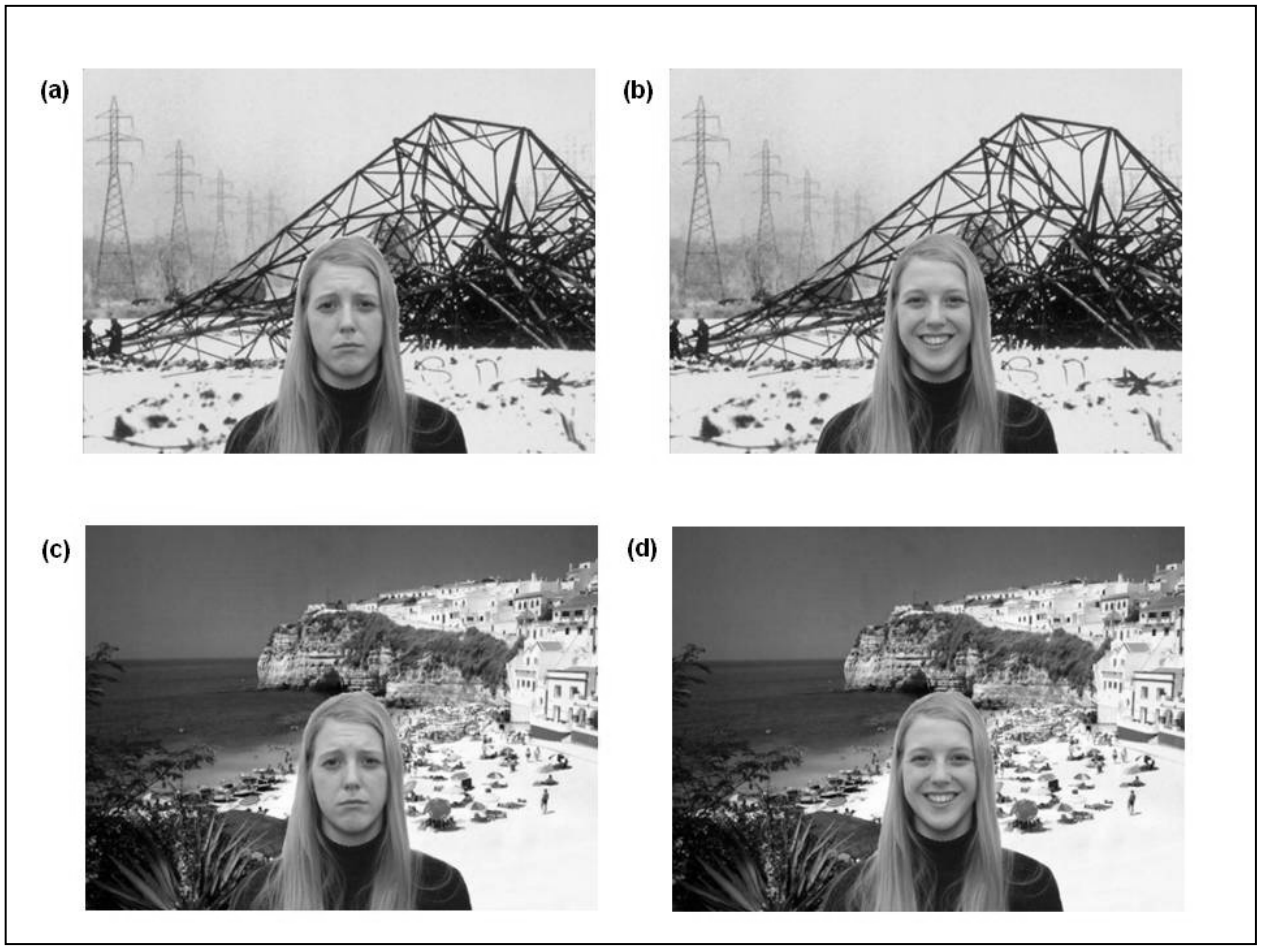

Figure 1. Examples of the stimuli used in Study 1A. Stimuli differed in terms of the valence of facial expression and of landscape. Four possible combinations were (a) negative face–negative landscape, (b) positive face–negative landscape, (c) negative face–positive landscape, and (d) positive face–positive landscape.

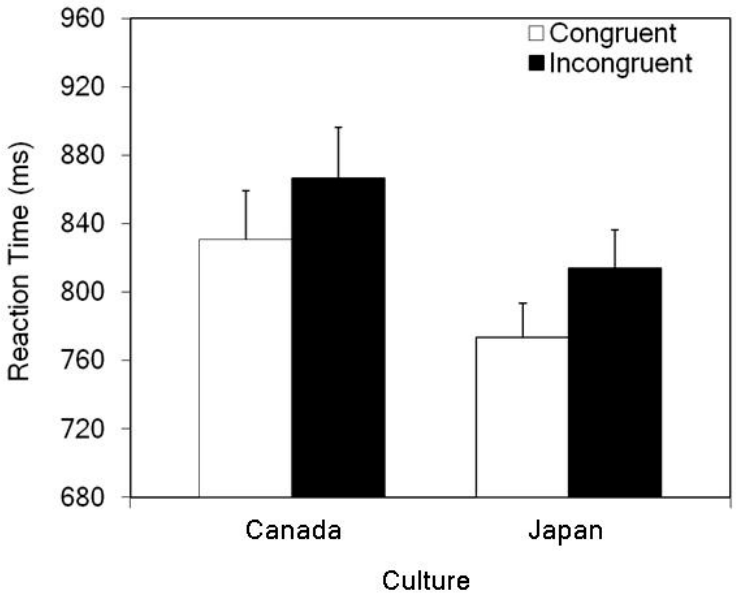

Figure 2. Mean reaction times (+SE) as a function of affective background–foreground congruence and culture (Study 1A).

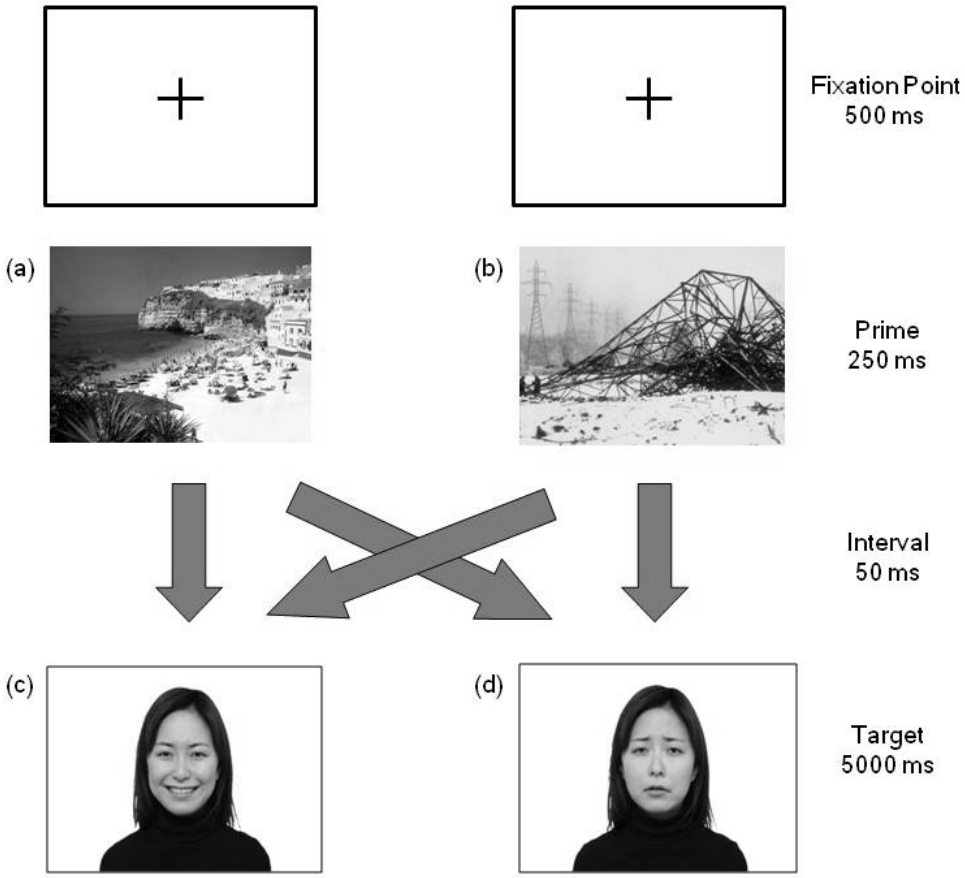

Figure 3. Illustration of the affective priming paradigm used in Study 1B. After being presented with a fixation point, participants saw (a) positive or (b) negative landscape images for 250 ms as a prime. Following the interval (50 ms), they were to categorize (c) positive or (d) negative facial expression. Emotionally congruent prime–target pairs refer to the combination of (a) and (c) or (b) and (d), whereas emotionally incongruent prime–target pairs refer to the combination of (a) and (d) or (b) and (c).

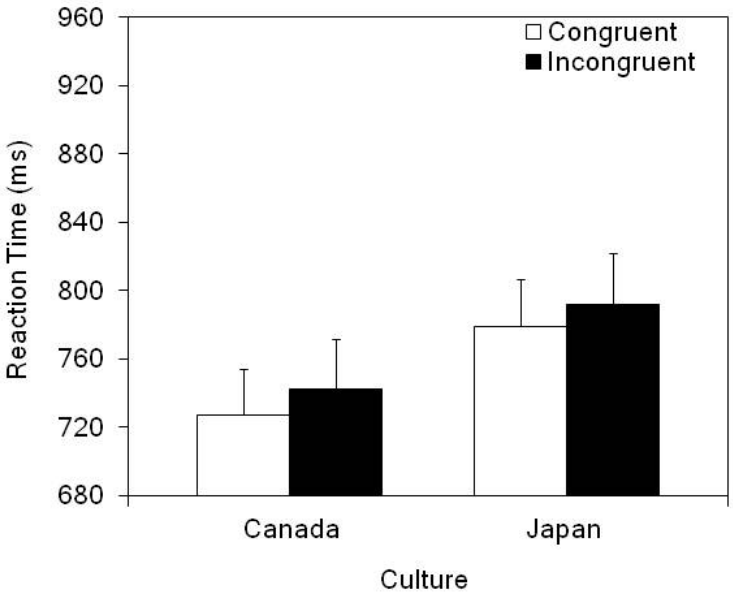

Figure 4. Mean reaction times (+SE) as a function of affective prime-target congruence and culture (Study 1B).

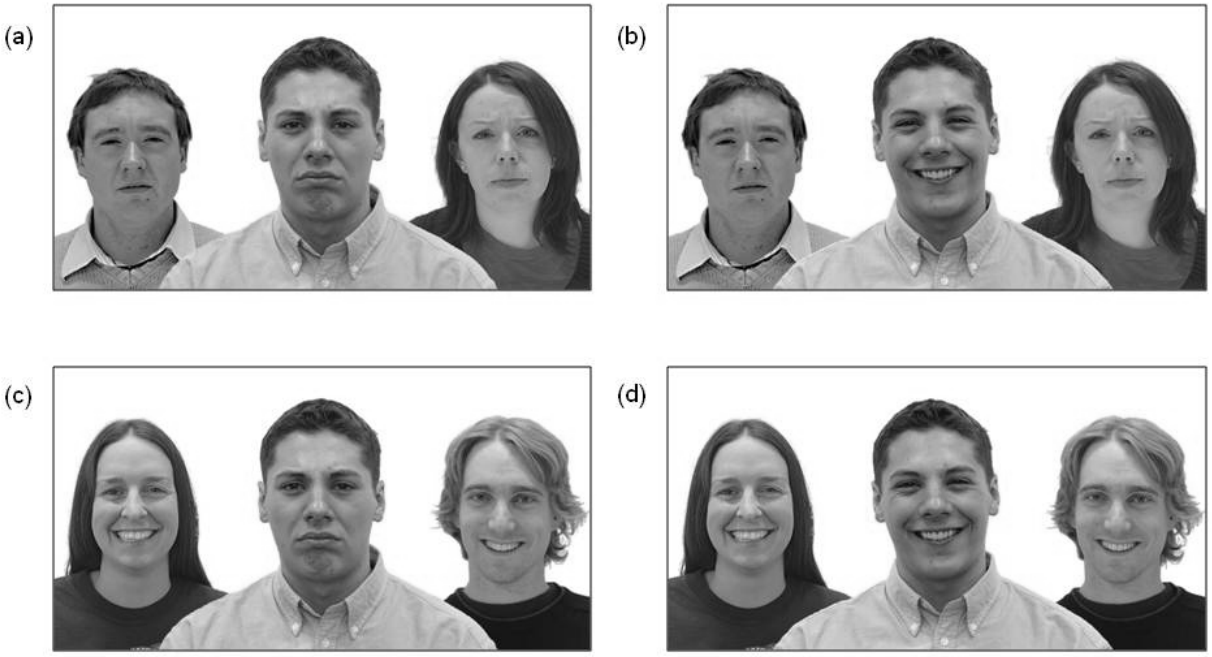

Figure 5. Examples of the stimuli used in Study 2A. Stimuli differed in terms of the valence of facial expression in the foreground and of facial expression in the background. Four possible combinations were (a) negative foreground face–negative background faces, (b) positive foreground face–negative background faces, (c) negative foreground face–positive background faces, and (d) positive foreground face–positive background faces.

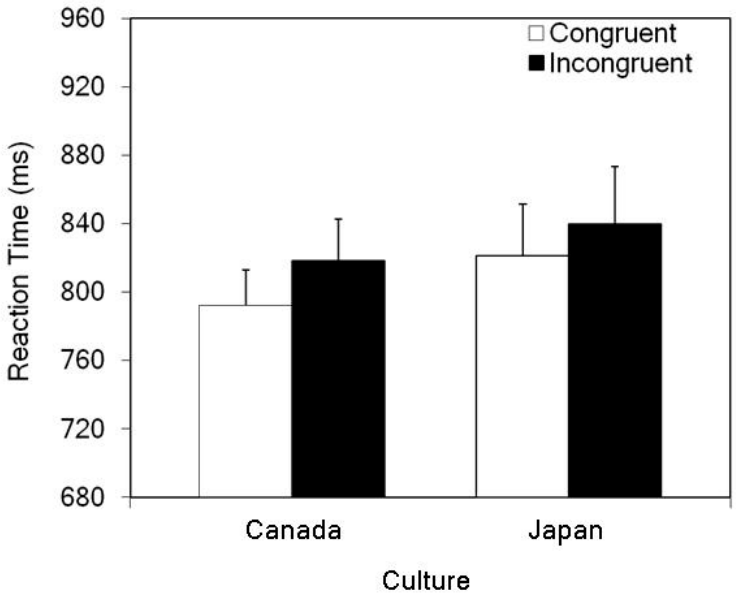

Figure 6. Mean reaction times (+SE) as a function of affective background–foreground congruence and culture (Study 2A).

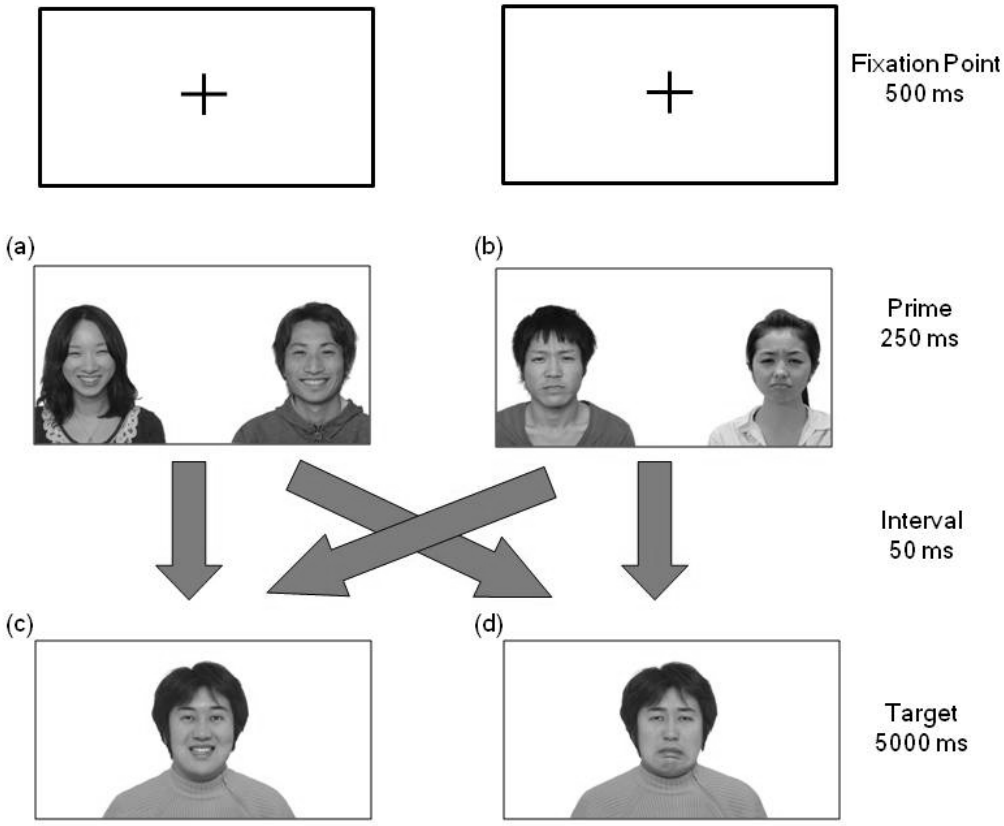

Figure 7. Illustration of the affective priming paradigm used in Study 2B. After being presented with a fixation point, participants saw (a) positive or (b) negative facial expressions for 250 ms as a prime. Following the interval (50 ms), they were to categorize (c) positive or (d) negative facial expression. Emotionally congruent prime–target pairs refer to the combination of (a) and (c) or (b) and (d), whereas emotionally incongruent prime–target pairs refer to the combination of (a) and (d) or (b) and (c).

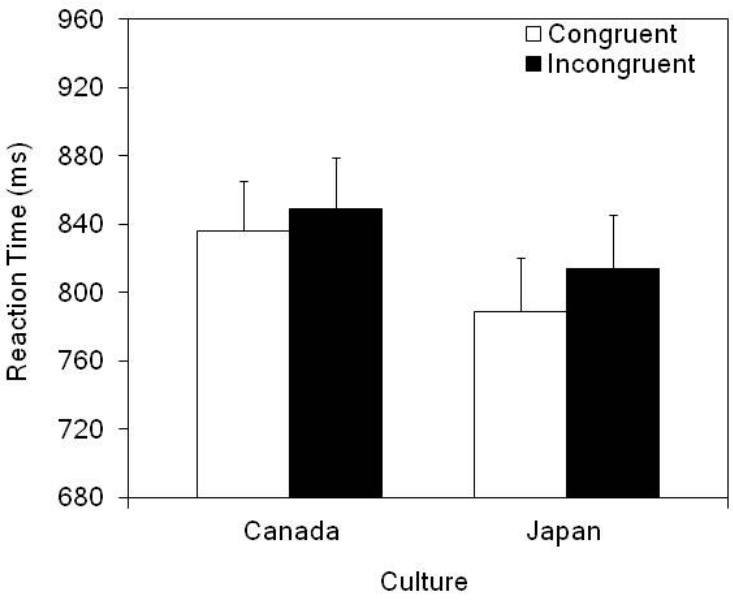

Figure 8. Mean reaction times (+SE) as a function of affective prime-target congruence and culture (Study 2B).