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The Role of Affective Information in Context on the Judgment of Facial Expression: In What Situations Are North Americans Influenced by Contextual Information?

by

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ABSTRACT

Research in cultural psychology suggests that East Asians are more likely than North Americans to be sensitive to contextual information. By contrast, much evidence suggests that even North Americans' judgments are influenced by affective priming information, the effect of which can be seen as another type of contextual cue. However, the magnitude of such priming effect has not been tested in a cross-cultural context. Using 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 either happy or sad facial expressions in the focal area of the scene. The results indicate that the two cultural groups are similar when contextual information is salient, but only Japanese remain sensitive to context with subtle cues. (147 words)

TABLE OF CONTENTS

List of Figures

Introduction

Research on culture and psychology has demonstrated systematic cross-cultural variations in psychological processes. Notably, much evidence suggests that East Asians are more likely than their North American 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 and ethnic groups and their patterns of behavior (Adams & Markus, 2004). In this article, we will focus on the concept of context as it is used by cross-cultural researchers in their investigations of cultural variations. 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 investigate the following questions: Is the effect of affective priming stronger for East Asians than for North Americans? Or is the magnitude of the priming effect equally as strong for North Americans as for East Asians? With these ends in mind, the current paper re-examines the issue of culture and context sensitivity.

Culture and Context Sensitivity

A plethora of evidence indicates the existence of cultural differences in sensitivity to contexts. East Asians, such as Chinese, Koreans, and Japanese, are more likely than their North American counterparts to think holistically and to perceive events contextually. For example, 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), the backgrounds of visual images (Chua, Boland, & Nisbett, 2005; Masuda, Gonzalez, Kwan, & Nisbett, 2008; Miyamoto, Nisbett, & Masuda, 2006), the intonation of spoken words rather than the meaning of the words (Ishii, Reyes, & Kitayama, 2003), and the background people who surround a target person at the center of a scene (Masuda, Ellsworth, Mesquita, Leu, Tanida, & Van de Veerdonk, 2008). Some research findings suggest that East Asians' context sensitivity influences their memory (Masuda & Nisbett, 2001) and even their aesthetic preferences (Masuda, Gonzalez, et al., 2008; Wang, Masuda, & Ito, 2010). Nisbett and his colleagues maintained that the dominant patterns of visual attention developed in people's respective cultural worldviews can influence psychological processes such as aesthetic preference, memory, and judgment (Nisbett, 2003; Nisbett, Peng, Choi, & Norenzayan, 2001). East Asians dominantly share the worldview that everything is related to some degree, and that all things are embedded in context. By contrast, North Americans dominantly share the worldview that everything has unique characteristics and attributes, independent of context.

These lines of evidence motivate cross-cultural researchers to seamlessly synthesize more than one research paradigm, which in turn allows them to further examine to what extent their findings of cultural variation in attentional processes are generalizable to other psychological phenomena, and whether there are any human universals. Such efforts have borne fruit in several areas of research. For example, research indicates that although East Asians are sensitive to a situation, they and their North American counterparts embrace dispositional inference in equal amounts. Specifically, Koreans and Japanese tended to show correspondence bias—the tendency to ignore the contextual constraints of the target's behavior—when the information in the contextual constraints was not salient (Choi & Nisbett, 1998; Masuda & Kitayama, 2004; Miyamoto & Kitayama, 2002; Norenzayan, Choi, & Peng, 2007). These cross-cultural investigations have aided in the understanding of the interplay between culture and psychology.

Affective Priming and Judgment of Facial Expressions in Context

Further investigation and articulation of how judgment is influenced by culturally dominant patterns of attention will help to avoid stereotypical views toward a target cultural group and unnecessary overgeneralization of pre-existing findings (Adams & Markus, 2004). Accordingly, this article targets research on the judgment of facial expressions. Contrary to the assumption drawn by Masuda and colleagues (e.g., Masuda & Nisbett, 2001), some findings in this research paradigm have demonstrated that even North Americans and Europeans are quite sensitive to the affective valence (positive vs. negative) of contextual information

(e.g., Carroll & Russell, 1996; Russell & Fehr, 1987). Russell and his colleagues found that preceding emotional scenarios (Carroll & Russell, 1996) or faces (Russell & Fehr, 1987) influenced Canadian participants' judgment of a facial expression. Various studies have given credence to this effect of the contextual valence of judgment of facial expressions (Russell, 1991; Russell & Fehr, 1987; 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).

Fazio (2001) maintained that brief exposure to information with either positive or negative valence can automatically activate a positive or negative mindset, which in turn facilitates the reaction speed of judging information congruent to the valence of the priming stimuli and inhibit the reaction speed of judging information incongruent to the valence of the priming stimuli. An example of this research paradigm was provided by Carroll and Young (2005), who asked British participants to judge four facial emotions (i.e., happiness, sadness, fear, and anger) after a brief presentation of pictorial images that entailed clear emotional valences. Carroll and Young hypothesized that participants would quickly judge the target facial emotions when a priming stimulus and a target's facial expressions were affectively congruent with each other (e.g., an image of a wedding as prime and an image of happy faces as target). In contrast, participants would take longer to judge the targets when a priming stimulus and a target were affectively incongruent with each other (e.g., an image of a shark as prime and an

image of a happy face as target). Consistent with the hypotheses, the results indicated that, for both word and pictorial image primes, participants' reaction time for the congruous combinations was faster than that for the incongruent combinations. The affective priming effect is also observable in different modalities of priming stimuli, such as nonverbal sounds (Carroll & Young, 2005, Experiment 3) or odors (Leppänen & Heitanen, 2003)

Affective priming information produces contextual effects even when the priming stimuli are everyday landscape scenes. Hietanen, Klemettilä, Kettunen, and Korpela (2007) 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, according to Heitanen et al., 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).

In sum, the findings of these studies suggest that even Westerners' judgment of facial emotions is influenced by brief presentations of contextual information with emotional valences. However, little research has addressed or tested this point cross-culturally. The current paper tackles this issue by manipulating the degree of salience of the contextual information, and by cross-culturally examining the magnitude of affective priming effect in European Canadians and Japanese. We also attempt to fill the gap between what cross-cultural researchers have found up to now, and what affective priming paradigms have identified to date.

What is Context?

The current paper aims at extending the findings of cross-cultural investigations to research on the effects of affective contextual cues on the judgment of a target's facial expressions. To do so, however, it is necessary to identify discrepancies in the methodologies of these two camps. The differences in how to operationalize the concept of context in the experimental settings derives from differences in the definition of context between the two paradigms. From the cultural psychology perspective, the word *context* often refers to background reference with neutral valence when people judge target events (e.g., underwater scenes used by Masuda and Nisbett, 2001; the frame used by Kitayama et al., 2003). By contrast, in the research of facial expressions in contexts, *context* is a precursor event specifically related to emotions that

influence people's mindsets (e.g., Fazio, 2001; Russell, 1991). We maintain that there are at least two critical methodological differences across these two paradigms.

First, most of the cross-cultural research in context sensitivity uses contextual information that entails relatively neutral valences. For example, Masuda and Nisbett (2001) placed focal animals and fish against naturalistic background scenes. However, the standard affective priming research uses priming stimuli with identifiable affective valence (positive vs. negative). We assume that such clarity of affective valences in context universally facilitates attention to the context, and thus results in having more influence on people's judgments than when the context is presented with a neutral background. Hitherto, Masuda, Ellsworth, et al.'s (2008) study is the only cross-cultural study of context sensitivity that uses images containing contextual information with clear cognitive valences (e.g., happy background figures vs. sad background figures).

Second, unlike Masuda, Ellsworth, et al.'s (2008) study—the dependent variables of which focused on the subjective rating of the emotion on the target's face—most affective priming studies focus on reaction time while contrasting the values of congruent combinations (e.g., happiness-provoking background and happy faces) with those of incongruent combinations (e.g., sadness-provoking background and happy faces). Given the findings of existing affective priming research in Western cultures, we again assume that reaction time data would produce little cultural variation in the magnitude of the congruency effect between East Asians and North Americans.

In sum, different definitions from the two schools of research predict different outcomes of context sensitivity. That is, previous findings indicate that the affective priming paradigm facilitates attentiveness to the priming information in context among East Asians and also among North Americans; therefore, we expect that members of both groups will react faster to congruent information and more slowly to incongruent information. For this reason, we hypothesize that the cultural variations would be least observable in this research paradigm. Given the experimental setting, would we still obtain any cultural variability in magnitude of the context effect? Would the context effect on North Americans' judgment be similar to the context effect on East Asians' judgment? Would the context effect on North Americans' judgment disappear or be attenuated in situations in which the priming manipulation was weakened? To answer these questions, we conducted four cross-cultural experiments by manipulating the ways of presenting contextual information, and by using different types of contextual information.

Overview of the Studies

Participants in all studies were self-identified Japanese who were born and raised in Japan and self-identified European Canadians born and raised in Canada. 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 Masuda and Nisbett's (2001) research paradigm and presented the contextual information as a background of the target stimuli. In the sequential condition (Study 1B and Study 2B), we followed the affective priming paradigm: 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. These two ways of presenting contextual stimuli have been used separately in various studies, but have not been examined systematically using the same target stimuli. We assumed that the magnitude of influence on the later judgment would be relatively weaker when the contextual information is primed for a very short period of time and followed by a short blank period, than when the same contextual information is simultaneously presented with the target stimuli.

Second, we used two kinds of contextual stimuli: non-social contexts (i.e., natural or industrial landscape with either positive or negative valence) and social contexts (i.e., background figures expressing either positive or negative valences). For non-social contexts, 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, and Ishii (2008), in which two background individuals showed either positive or negative facial expressions.

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 contextual stimuli interacted with the manner of presentation.

We assumed that although, in general, such manipulations of contexts influence both European Canadians and Japanese, there would be differences in the strength of contextual effects, as follows:

1. We assumed that the simultaneous condition would produce a context effect, perhaps more so than the sequential condition, because the contextual cues in the simultaneous condition stay in the scene when participants make a judgment, whereas the contextual cues in the sequential condition are brief and a 50 ms gap is inserted before the stimulus onset of the target faces.
2. We assumed, on the basis of Masuda, Ellsworth, et al.'s (2008) findings, that the context effect of the background facial expressions would be weaker than that of non-social landscape images because of differences in the size of the contextual information (i.e., a landscape image covers the whole background, whereas two background individuals occupied only part of the background space). For this

reason, we expected that the combination of the brief presentation of human figure cues would be the weakest of the four conditions.

We then analyzed in which condition we could observe cultural similarities and differences regarding the magnitude of context effect. To examine this issue, we focused on within-cultural-level planned contrasts of the differences between the reaction time for congruent and incongruent combinations of contextual information and target information.

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, and Ishii'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.[1] 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, et al., 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 whether the

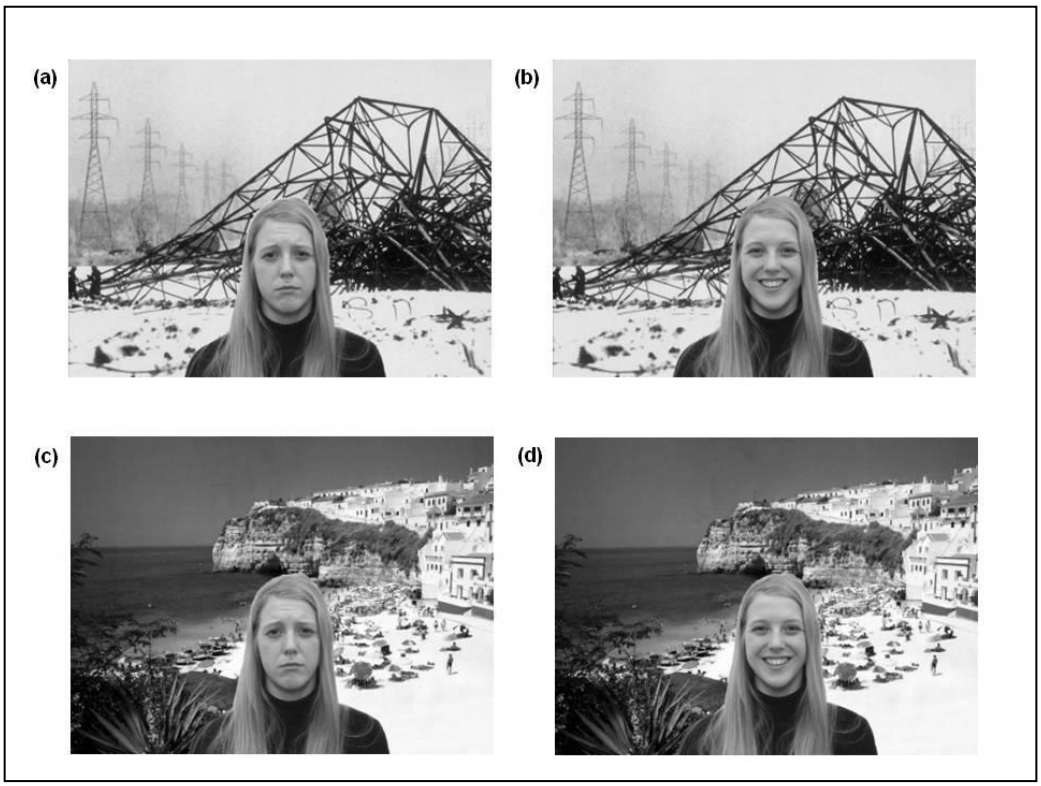

Figure 1. Examples of the stimuli used in Study 1A. Stimuli differed in terms of the valence of facial expression and of landscape. Four possible combinations were (a) negative face–negative landscape, (b) positive face–negative landscape, (c) negative face–positive landscape, and (d) positive face–positive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

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 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.

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.[2]

We found a significant main effect of congruency, $F(1, 72) = 24.53$, $p < .001$, $\eta_p^2 = .25$. A main effect of culture was not significant, $F(1, 72) = 1.87$, $p = .18$. 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 planned contrasts, results showed that, similar to Japanese participants, Canadian participants categorized the facial expression faster when the landscapes and facial expressions had congruent valences ($M_{CND} = 867.13$ and $M_{JPN} = 805.25$) than when the valences were incongruent ($M_{CND} = 910.13$ and $M_{JPN} = 852.08$; see Figure 2); $t(37) = 3.05$, $p < .01$, $t(35) = 4.17$, $p < .001$, respectively.[3, 4]

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

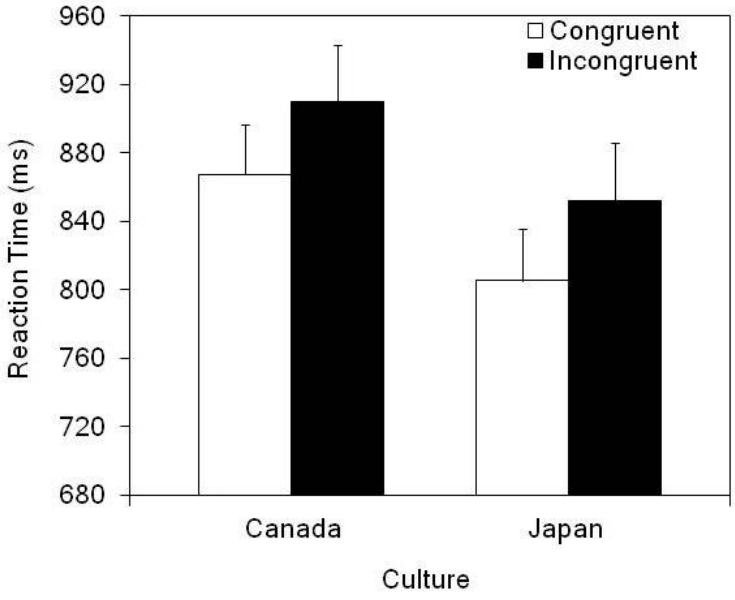

Figure 2. Mean reaction times (+SE) as a function of affective background–foreground congruence and culture (Study 1A).

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

Method

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.

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.

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.[5] Target stimuli were presented until participants responded or for 5 seconds. The intertrial interval was 2 seconds.

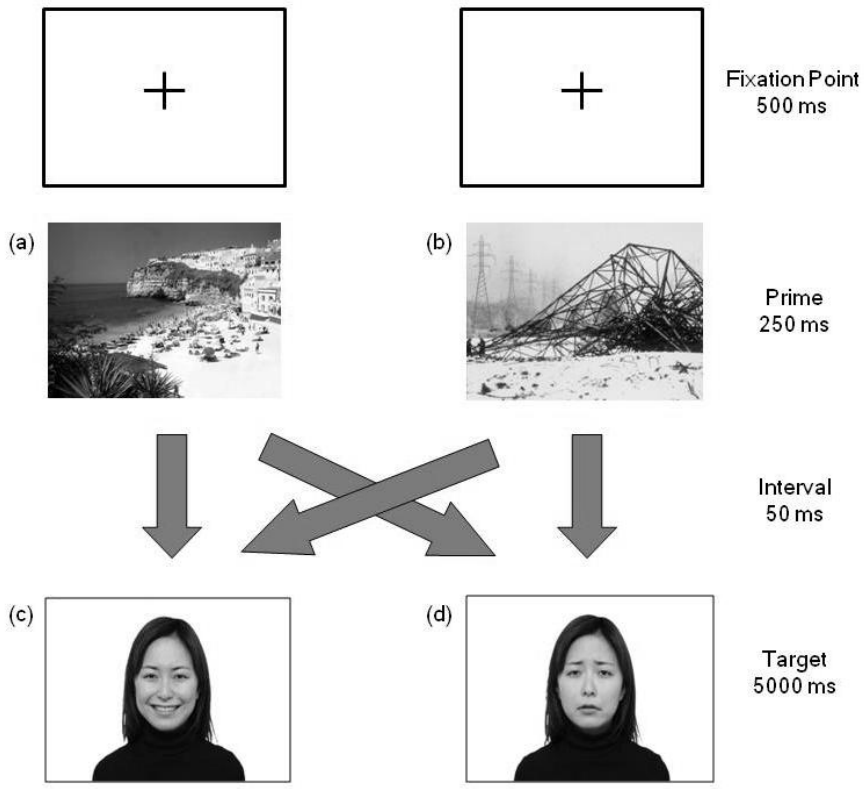

Figure 3. Illustration of the affective priming paradigm used in Study 1B. After being presented with a fixation point, participants saw (a) positive or (b) negative landscape images for 250 ms as a prime. Following the interval (50 ms), they were to categorize (c) positive or (d) negative facial expression.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

Results

We 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.[6]

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, $F(1, 70) = 1.64$, $p = .20$. 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 4); $t(36) = 2.95$, $p < .01$, $t(34) = 2.46$, $p < .05$, respectively.[7, 8]

Discussion

Study 1A and Study 1B reported cross-cultural studies investigating the effect of contextual affective priming on the judgment of facial expressions. Both studies used landscape images with validated affective valences. Participants' response time in Study 1A was, in general, shorter when positive or negative facial emotions were presented against emotionally congruent landscapes (e.g., positive landscape with target's happy face) than when the facial emotions were presented against emotionally incongruent landscapes (e.g., negative landscape with target's happy face). Participants' judgment of facial expressions in Study 1B was also influenced by a prior presentation of landscape images as contextual

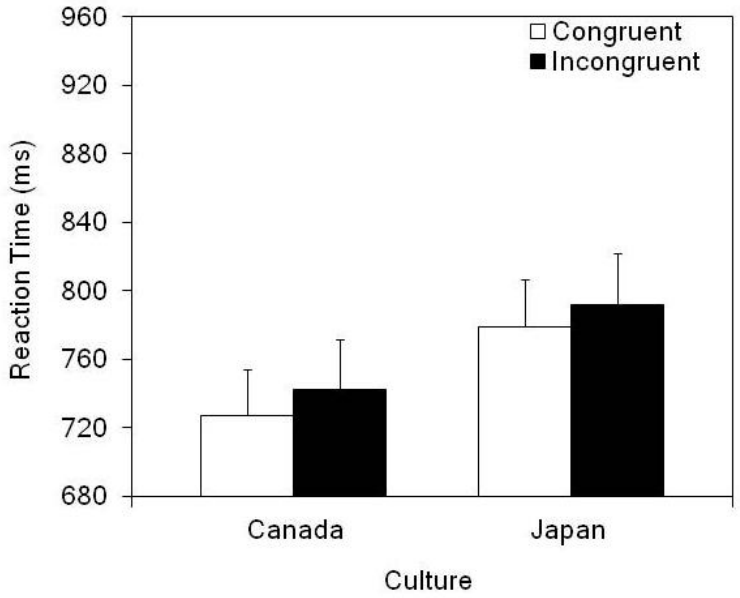

Figure 4. Mean reaction times (+SE) as a function of affective prime-target congruence and culture (Study 1B).

information. For this reason, we conclude that, beyond cultural factors of context sensitivity, both European Canadians and Japanese become sensitive to contextual information if it entails affectively clear valences. The fact that European Canadians showed a robust contextual effect was consistent with previous findings of the affective priming research (e.g. Caroll & Young, 2005; Fazio, 2001; Heitanen et al. 2007). Japanese also showed the contextual effect when they engaged in the category judgment task, and the magnitude of the effect was similar to that of their European Canadian counterparts. That is, there were no cultural differences in the pattern of the congruency effect. For this reason, it is reasonable to conclude that previous assertions, East Asians are more sensitive to context than North Americans (e.g., Masuda & Nisbett, 2001), are not generalizable to the affective priming paradigm, and that the ranges of Masuda and colleagues' explanations are limited.

However, before finalizing this conclusion, it is advisable to further test the validity of the current findings by using a different set of stimuli. Notably, using human figures in context (background figures whose facial expression is the same as or different from that of the target), Masuda, Ellsworth, et al. (2008) reported that Japanese allocated their attention to the background figures more than Americans did, and as a result, Japanese participants' judgment regarding the intensity of the target's facial expression was highly influenced by the changes in background figures' facial expressions, whereas North Americans showed little context effect. The landscape images, which cover the whole background, made the contextual information salient, and as a result, led North Americans to be

attentive to the information. If that is the case, the use of background figures, which cover only part of background area, would attenuate the magnitude of background effects because of the low salience, and the magnitude of attenuation could be larger for North Americans, whose attention generally goes to the target, than for Japanese, whose patterns of attention are more holistic. To further articulate the findings of Study 1A and Study 1B, we conducted Study 2A and Study 2B, in which we changed only the type of contextual information.

Study 2A

Following the procedure used in Study 1A, Study 2A placed the targets and the primes on the same plane to examine whether European Canadians' tendency to be influenced by the valence of background human figures was similar to that of their Japanese counterparts. We hypothesized that, if the context information is human figures, which cover only part of the background scenes, and such a change in the size of contextual information produces a weak context effect, the results would be different from those of Study 1A. However, if the type of presentation (simultaneous presentation) is more important than the type of stimuli, European Canadians would still be influenced by the human figures in the background.

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. 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, $t(17) = 17.26$, $p < .001$, ($M_{happy} = 2.35$; $M_{sad} = 7.12$), and among Japanese participants, $t(19) = 25.20$, $p < .001$, ($M_{happy} = 2.09$; $M_{sad} = 7.08$). 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. We then merged facial portraits used in Study 1A and Study 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

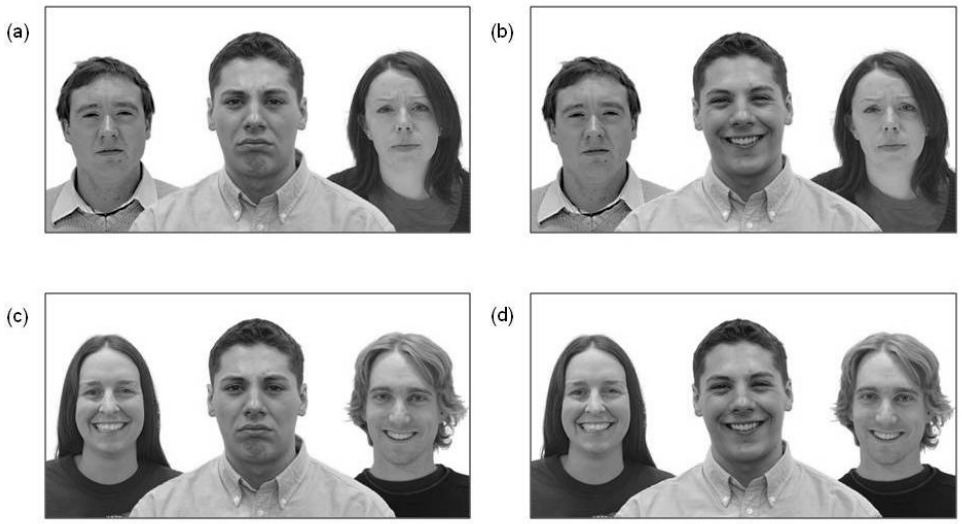

Figure 5. Examples of the stimuli used in Study 2A. Stimuli differed in terms of the valence of facial expression in the foreground and of facial expression in the background. Four possible combinations were (a) negative foreground face–negative background faces, (b) positive foreground face–negative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

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.

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.[9]

We found a significant main effect of congruency, $F(1, 68) = 10.95$, $p < .001$, $\eta_p^2 = .14$. Neither a main effect of culture nor the two-way interaction of participants' cultural backgrounds and congruency were significant, $Fs < 1$. Planned contrasts showed that similar to Japanese participants, Canadian participants categorized the targets' facial emotions faster when the target and background figures had congruent valences ($M_{CND} = 819.35$ and $M_{JPN} = 856.78$) than when they had incongruent valences, ($M_{CND} = 860.27$ and $M_{JPN} = 880.29$; see Figure 6); $t(36) = 2.60$, $p < .05$, $t(32) = 2.22$, $p < .05$, respectively.[10]

Study 2B

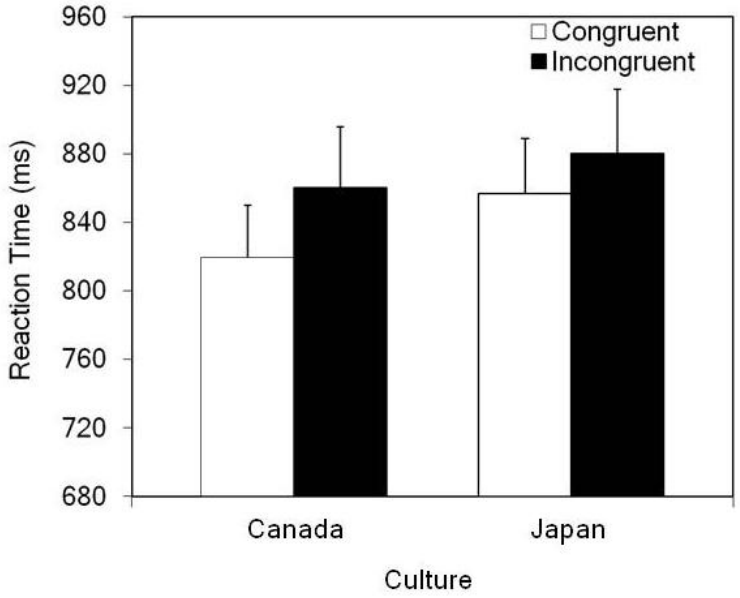

Figure 6. Mean reaction times (+SE) as a function of affective background–foreground congruence and culture (Study 2A).

Following 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. On the basis of evidence suggesting a higher sensitivity to contextual information among Japanese compared to Americans, we hypothesized that Japanese participants would still show the effect of priming even though the contextual information is less salient, whereas the contextual stimuli detached from the target stimuli would not produce a priming effect in European Canadians.

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 (see Figure 7).

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. 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. Participants' task was to categorize whether the person in the second picture depicted positive or negative emotions. Experimental stimuli were

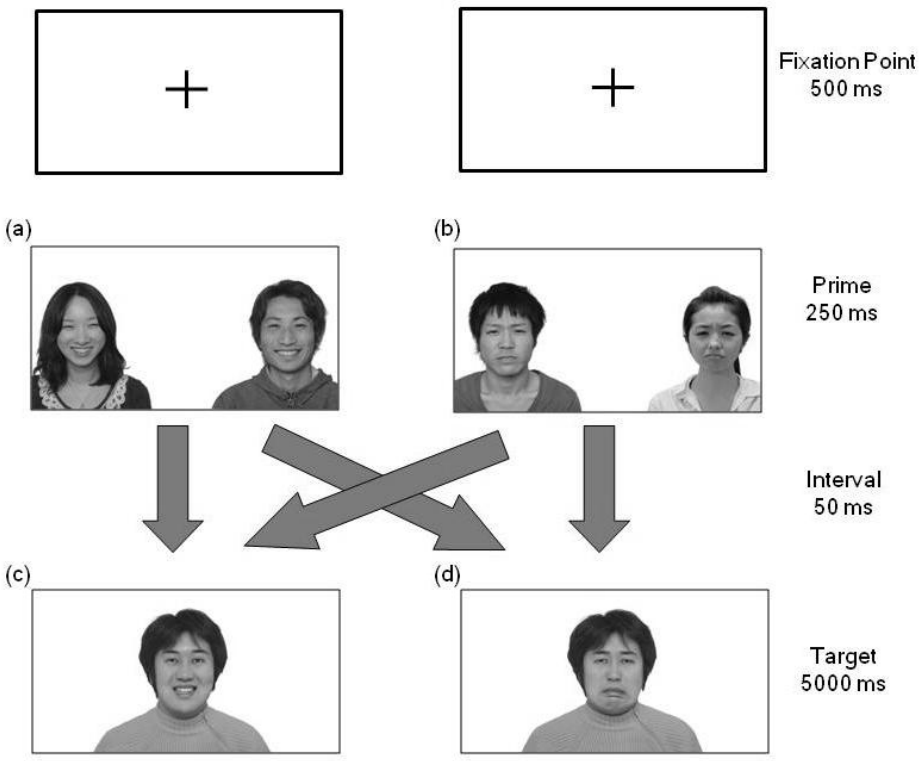

Figure 7. Illustration of the affective priming paradigm used in Study 2B. After being presented with a fixation point, participants saw (a) positive or (b) negative facial expressions for 250 ms as a prime. Following the interval (50 ms), they were to categorize (c) positive or (d) negative facial expression.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

presented on the center of the screen. Participants' reaction time and accuracy for each trial were recorded.

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.[11]

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 were significant, $Fs < 1$. However, planned contrast showed that, as hypothesized, 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), $t(35) = 3.35$, $p = .002$. 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.[12]

Discussion

Study 2A examined whether the sensitivity to background landscape images among European Canadian participants, found in Study 1A, can be

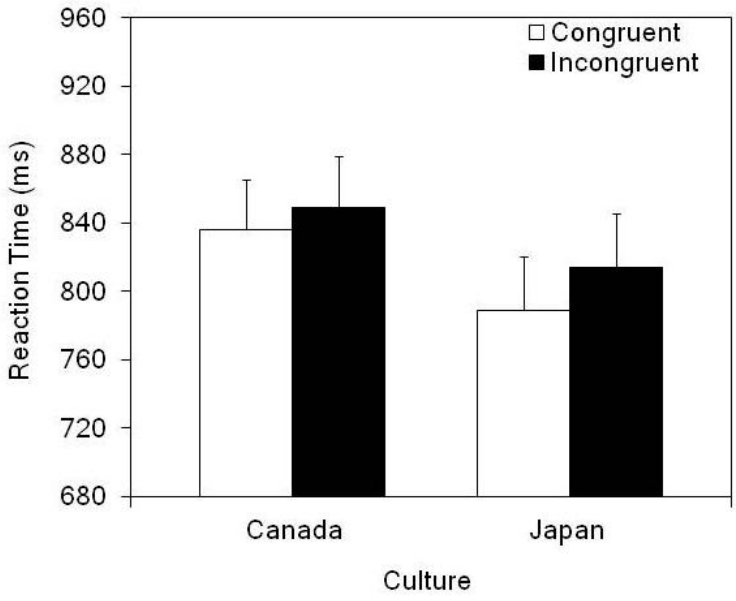

Figure 8. Mean reaction times (+SE) as a function of affective prime-target congruence and culture (Study 2B).

generalized when the contextual information was human figures which are much smaller in size than landscape images. The results indicated that the valence of background human figures influenced how both European Canadians and Japanese categorized facial emotions: They categorized facial emotions faster when surrounding faces expressed congruent emotions (e.g., happy background figures and happy target) than when surrounding faces expressed incongruent emotions (e.g., sad background figures and happy target). It seems that although European Canadians were thought to be unaffected by the less salient context, a simultaneous presentation of target with less salient context information influenced their later categorization speed of facial emotions. However, as hypothesized, the above findings did not seem to be generalizable to the findings of Study 2B. When the less salient background human figure was briefly presented, and there was a time lag between the presentation of the context information and the target information, only Japanese showed the context effect. Although we have to carefully interpret the discrepancy between the findings of Study 2B and those of the other studies (1A, 1B, and 2A), this scrutinized investigation allows us to identify the conditions that support Masuda, Ellsworth, et al.'s (2008) assertion that East Asians are more likely than North Americans to be sensitive to contextual information.

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 contextual affective information as the background of the target stimuli.

Study 1B used a classic affective priming paradigm, in which the pieces of affective information were presented 300 ms before the target stimulus appeared on the screen and there was a 50 ms blank period between these pieces of information. Study 2A and 2B used exactly the same experimental design but used human figures as the contextual information.

The results were similar across the four experiments. Overall, we replicated and extended Hietanen et al.'s (2007) findings that the magnitude of European Canadians' congruency effect using landscape images (Study 1A and 1B) and using human figures (Study 2A) was similar to that of Japanese participants. For this reason, we are able to conclude across these experimental conditions that there may be a universal tendency for people's reaction speed in categorizing the target's facial expression to be influenced by contextual cues. In other words, as long as researchers use the affective priming paradigm, Masuda, Ellsworth, et al.'s (2008) argument is limited. However, on top of these general findings, we also found that this contextual effect was stronger on Japanese than on North Americans when the context was human figures and also when there was a time lag between the presentation of the contextual priming stimuli and the target's facial expression (see the results of Study 2B). European Canadians did not show the effect of prior presentation of social information on their subsequent facial emotion judgment, while the manipulation remained effective for Japanese. We maintain that the manipulation of saliency is a critical factor in the production of differences in effect across the four experiments. But we also acknowledge some alternative explanations, which are explored in the following sections.

The Nature of Stimuli

Why was Canadians' judgment less influenced by the priming information only in Study 2B? As mentioned previously, we maintain that the size of background information was critical. However, previous cross-cultural studies suggest an alternative explanation. In the field of culture and emotion, researchers proposed that people in different cultures experience emotions according to whether their self-construal is independent or interdependent (Markus & Kitayama, 1994; Mesquita & Leu, 2007; Mesquita & Markus, 2004). That is, North Americans tend to regard an individual as a distinct agent whose emotions are socially disengaged personal experiences based on internal reactions. By contrast, East Asians consider that an individual is strongly connected to others, and thus the individual experiences emotions in a socially engaged manner. Similar discussions were offered by Oishi, Diener, Scollon, and Biswas-Diener (2004), who found that for people from interdependent cultures (i.e., Japanese), the experience of positive affect was contingent upon the presence of social others, whereas people from independent cultures (i.e., European Americans) were not influenced by the presence of social others. In other words, members of interdependent cultures judged the presence of other people as appropriate stimuli to incorporate into the evaluation of their own emotions, whereas members of independent cultures did not. The eye movement data of Masuda and his colleagues (Masuda, Ellsworth et al., 2008, Study 2; Masuda, Wang, and Ishii, 2008) further verified that Japanese participants were more likely than their

American counterparts to allocate their attention to social others by increasing their attentional duration and number of fixations.

When we apply the above arguments to the discrepancy between Study 1B and Study 2B, it is possible to attribute the weakened contextual effect on European Canadians in Study 2B to the existence of identifiable agents in the background scenes. If European Canadians applied their shared "independent" belief that all emotional expressions derive from each agent's inner factors, it might have been relatively easy for them to clearly separate the emotions of the background figures from those of the target figures. In contrast, the stimuli used in Study 1A and 1B did not contain any identifiable agents in the background scenes. Thus, because the emotional information in the backgrounds could not be attributed to any identifiable others, it may have been more difficult for the European Canadians to ignore the stimuli. As a result, European Canadians were not influenced by the contextual cues, especially when the contextual clues were presented only briefly. By contrast, such an agent-based view of human emotion was not common among Japanese; rather, they share the "interdependent" view regarding human emotions. That is, the Japanese participants' judgments of the target figure's emotion were easily affected by the emotional information in the background, regardless of whether or not the background contained identifiable agents. Although examination of this possibility, by manipulating the size of both landscape and background figures, is beyond the scope of the current paper, we believe it is a topic worth investigating in further research.

It is worth reporting that the results of the four studies suggest that the salience of the context stimuli in Study 1A and 2A is stronger than that in Study 1B and 2B. 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 50 ms 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. So this logic partially explains why European Canadians still showed contextual effects in Study 2A. We conclude that the weaker contextual effects on European Canadians' judgment in Study 2B can be understood as a combination of the salience of the contextual cues (small size of contextual information, and time lag), but there is a possibility that European Canadians' agentic view of facial expressions was also a factor in the cultural variations in judgment.

Type of Measurement: Intensity Ratings and Categorization

These findings, however, are still somewhat contradictory to those of Masuda, Ellsworth, et al. (2008). The stimuli used in Study 2A and in the Masuda, Ellsworth, et al. study are qualitatively similar, because both stimuli consist of the target's facial expressions as well as the background people's facial expressions. Again, the difference can be partially explained by the salience of the contextual information. In Masuda, Ellsworth, et al.'s stimuli, there were four background figures, whereas there were only two background figures in Study 2A. The number of background figures might critically affect the magnitude of the congruence effect.

Beyond the differences in numbers of background figures, however, we also speculate that the discrepancy in findings between these two studies 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. (2008) 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 Japanese and Westerners' 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, Westerners succeeded in discounting the contextual influence to consistently judge the target's facial expression across different background figures, whereas East Asians, because of their interdependent belief regarding facial expressions, did not make such an adjustment. Again, experimental manipulation of differences in measurement is beyond the scope of the objectives of the current paper. However, this issue is worthy of future research with well-controlled experimentation.

Examining the Role of Mood

Another limitation of the current findings is that we did not control the effect of participants' mood toward contextual information. That is, if affective information in the landscapes or backgrounds triggered participants' affective state or moods, participants may have responded more quickly to mood-congruent judgments than to mood-incongruent judgments. Given that people attend to the affective connotation of stimuli (Kitayama & Niedenthal, 1994), it is possible that stimuli with vivid affective connotations will change the participants' moods prior to the evaluation of facial emotions. That is, the information that fits with a given frame of reference is processed and responded to more quickly than the information that conflicts with the frame of reference. For example, while listening to happy music, people become faster at detecting happy words but slower at detecting sad words (Niedenthal & Setterlund, 1994). Patients diagnosed with major depression, characterized by prevalence of negative moods, require a more intensified facial expression to detect a happy face than a sad face (Joormann & Gotlib, 2006). The effect of mood has been discussed by many other researchers. For example, Zajonc (1980) discussed the *primacy of affect*, whereby an initial affective response influences the subsequent judgment of a stimulus. Bower (1981) maintained that the immersion of affect does occur, because affect and memory are intertwined in people's mental representation. Furthermore, Forgas (2003) asserted that emotional reactions, once automatically formed by a contextual stimulus, can activate related pieces of information and thus influence the subsequent judgment of a different stimulus.

Although these explanations are attractive and worth investigating, the procedures of the current studies raise some doubts about whether changes in mood occur during this kind of task. Most of the mood manipulations in previous studies had participants maintain either a positive or a negative mood for relatively long period of time. However, in the current studies, priming images were used to provoke a specific type of affective valence for very short periods, and the valence of positive versus negative information was randomly and repeatedly presented to the participants. For this reason, we question whether the participants changed their mood each time they were presented with non-social and social contextual images. The current paper obviously does not address this issue. However, some studies have attempted to measure mood by using psychophysiological devices (Ravaja, Saari, Kallinen, & Laarni, 2006; Wicker et al., 2003); their research methodology allows researchers to objectively measure the changes in mood during the experimental session. We believe that applying this methodology to the context priming task will allow us to test whether the contextual effect of the affective priming cues is purely cognitive or emotional, by examining to what extent participants' mood actually changes when they are primed with emotionally provocative contextual information.

Final Remarks

The current paper sheds light on the variability of contextual effect on people's judgment. As suggested by researchers in the field of emotion (e.g., Matsumoto, 2001), contextual cues play an important role in the accurate interpretation of facial expressions, even in the case of North American observers.

Indeed, contextual cues are informative in many cases. We urge further investigation into the contextual effect that will consider its cultural universals and variations. It is also necessary to measure the magnitude of effects on a variety of ethnic groups by using a variety of contextual cues. Researchers who study culture and psychology should carefully examine these issues in order to better understand the processes that underlie psychological phenomena.

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Footnotes

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

[2] Prior to the analysis, nonresponse cases and incorrect response cases (3.0%) were excluded. In contrast to Study 1B and 2B, we did not limit analysis to responses within 3 SD, because our interest was in examining participants' habitual patterns of categorization rather than the effect of affective priming.

[3] 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.

[4] 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 $M_{JPN} = 95.9\%$). 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.

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

[6] Prior to the analysis, we excluded nonresponse cases, incorrect responses, and responses that were 3SD away from each participant's condition means (4.6%). In contrast to Study 1A or 2A, we limited analysis to responses within 3 SD following the standard procedure used in affective priming paradigms, because our interest was in comparing the effect of affective priming between two cultural groups.

[7] 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.

[8] 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%.

[9] Prior to the analysis, nonresponse cases and incorrect response cases (2.8%) were excluded.

[10] 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 person accurately more than 96% of the time. The significant effect may have occurred by chance alone.

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

[12] 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 landscape–person 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.