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Human face is of fundamental importance for social interactions. People become aware of race,

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than to White faces in explicit sorting or identi-

express ingroup bias—a tendency to evaluate ingroup members more positively than outgroup members (Tajfel, 1982). The mere act of categorizing oneself as a group member is sufficient to

followed by a 2s interval during which participants had to judge whether the trait adjective presented described in general own-race members. Each word prompted a "yes" or "no" response by pressing a button on a standard keyboard with the left or right index finger. Fifteen negative and 15 positive trait adjectives were selected from another set of 30 negative and 30 positive trait adjectives and were presented in a random order in the control priming procedure, during which participants were asked to judge the valence of each adjective by pressing the button. Each priming procedure lasted for 3 minutes. The order of the NAP and control priming was counterbalanced across participants. All the adjectives and instructions were in English for American participants.

Face-orientation identification task Face images were taken from four Chinese (two men) and four American (two men) college-aged individuals who were equally unfamiliar to all participants. Ten face images of each model with a neutral facial expression were taken using a digital camera. The faces were oriented to the left in five images and to the right in the other five images with different orientations from 30 to 90 degrees. The scrambled faces were made by cutting the images of the faces into 10 x 10 arrays, which were then organized randomly into images with the same size of the face stimuli. All images were calibrated in luminance and contrast and converted into JPG format.

and accuracy. Participants were given 10 trials as a practice in order to get familiar with the task.

As our prior research observed that the negative association priming procedure influences general respond speed even to a non-face stimuli (i.e., scrambled faces) (Ma & Han, 2010), participants were also asked to respond to scrambled faces so as to normalize response speeds to facial stimuli. Normalized RTs were calculated by dividing RTs to own-race / other-race faces with RTs to scrambled faces.

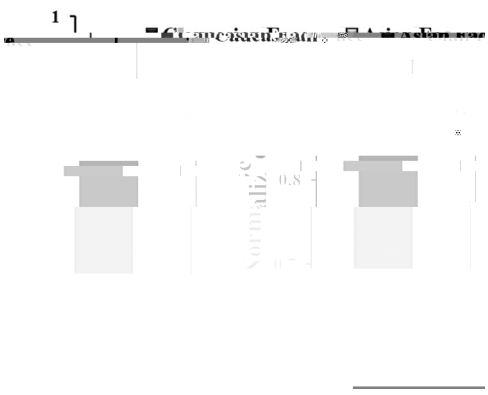

Figure 2. The results of normalized RTs to the identification of face orientations in Study 1.
Note: The Y-axis represents the ratio of Asian faces / scrambled faces and Caucasian faces / scrambled-faces.

Results and discussion

During the NAP procedure, American participants identified 9.89 (*SD* = 3.32) negative adjectives that were believed to appropriately describe general own-race members. Participants were 98.6% correct in identification of word valence in the control priming task. The response accuracy in the face-orientation judgment task was high (95.9%).

Since there was no difference in normalized RTs between left and right hands (.93 vs. .94, $F(1, 17) = 0.936$, $p = .347$) and the left- and right-hand responses were highly correlated ($r = .950$, $p < .001$), we combined left- and right-hand RTs in the following analyses.

To examine the effect of NAP on RT advantage associated with own-race faces, normalized RTs were subjected to ANOVAs with Face (own-race vs. other-race faces) and Priming (NAP vs. control priming) as within-subjects independent variables. Neither the main effect of Face ($F(1, 17) = 1.322$, $p = .266$) nor the main effect of Priming ($F(1, 17) = 2.602$, $p = .125$) was significant. Interestingly, we found a significant interaction between Face and Priming ($F(1, 17) = 26.947$, $p < .001$, Figure 2). Post-hoc analysis confirmed that participants responded faster to own-race than to other-race faces in the control priming condition ($t(17) = -2.843$, $p = .011$) whereas a reverse pattern was observed in the NAP condition ($t(17) = 5.224$, $p < .001$). Paired-sampled *t*-tests were further performed and revealed that the NAP slowed responses to own-race faces ($t(17) = -3.138$, $p = .006$) but did not affect responses to other-race faces ($t(17) = -0.047$, $p = .963$).

The RT results of Study 1 confirmed implicit racial categorization in European American in a perceptual, race-irrelevant task that required judgments of face orientations, as participants responded faster to own-race than to other-race faces in the control priming condition. More importantly, we showed that the own-race advantage in RTs was eliminated by the NAP which induced negative association with own-race members, suggesting that positive association with own-race members contributes to the own-race advantage. The results of Study 1 provided evidence that positive attitudes toward own-race faces influenced implicit racial face categorization.

Study 2

In Study 1, European American participants were recruited in China where they are treated as a minority group. Being perceived as a member of a minority group may increase salience of racial identity and thus lead to faster responses to own-race faces. To test if the results of Study 1 can be simply explained by this "minority group" account, Study 2 recruited Han Chinese

participants who live in Xinjiang Uigur Autonomous Region of China where the population of Han and Uigur Chinese was comparable and people routinely categorize others into two racial groups (i.e., Han and Uigur Chinese). Han Chinese constitute about 40% and Uigur Chinese constitute about 46% of the population of Xinjiang Uigur Autonomous Region of China, according to *China Population Statistics Yearbook 2006* (National Bureau of Statistics of China, 2006). Moreover, Study 2 employed the IAT to examine the relation between own-race advantage in RTs and the implicit positive attitudes toward own-race members. To ask the same participant group to conduct both the IAT and face orientation judgment tasks also allowed us to assess if own-race advantage in RTs was mediated by the implicit positive attitudes toward own-race members. Finally, comparing the results in Studies 1 and 2 allowed us to assess if the effect of positive attitudes on the processing of own-race faces can be generalized in individuals from Western and East Asian cultures.

Method

Participants Healthy Han Chinese college students from Xinjiang Normal University (n = 18, 10 men, M = 20.63 years, SD = 1.54) participated in Study 2. All participants were born and grew up in the Xinjiang Uigur Autonomous Region of China. All were right-handed and had normal or corrected-to-normal vision. Informed consent was obtained prior to the study. This study was approved by a local ethics committee.

Stimuli and procedure

IAT Stimuli of the racial IAT task consisted of face images of 10 Han (five women) and 10 Uigur (five women) models and 10 positive and 10 negative trait adjectives. A front-view face with a neutral facial expression was taken from each model. During the IAT, participants were instructed to categorize a variety of items that appeared on a computer screen. There were seven blocks of categorization trials, with 20 trials for the practice blocks and 40 trials for the data-collection blocks. Each block was preceded by a set of instructions presented on the screen to inform participants of the type of items that they had to categorize as well as the meaning of the keys (key labels remained on the screen throughout each block). Each stimulus was presented for 300 ms at the center of the screen and was followed by the presentation of a fixation with a duration of 2000 ms. Participants responded to each stimulus item by pressing a key on a standard keyboard using the left or the right index finger. The IAT effect was measured as the difference in RTs between (own-race + negative) block and (own-race + positive) block, similar to the previous work (Greenwald et al., 1998; Greenwald & Farnham, 2000). The orders of (own-race + negative) blocks and (own-race + positive) blocks and the assignment of "Category labels 1" and "Category labels 2" responses to the left and right hands were counterbalanced across participants. Instructions emphasized both response speed and accuracy.

NAP and face-orientation judgment task All aspects were the same as those in Study 1 except that face stimuli were taken from four Han models (two men) and four Uigur models (two men, Figures 3a and 3b), who were equally unfamiliar to all participants. The trait words in the NAP priming and the instructions were in Chinese. The order of the IAT and face-orientation judgment task was counterbalanced across participants, and there was a one-hour break between these two tasks.

Results and discussion

Results of the IAT We calculated the IAT effect (mean latency for (own-race + negative) block minus mean latency for (own-race + positive) block) in the same way as Greenwald et al.'s (1998) work. The IAT effect was significant (RTs for (own-race + negative): M = 727 ms, SD = 92; RTs for (own-race + positive): M = 660 ms, SD = 86, IAT effect: M = 66 ms, SD = 85, $t(17) = 3.349$, $p = .003$). The results indicate that Han Chinese participants hold stronger implicit positive attitudes toward own-race than other-race faces.

that the own-race advantage in RTs to face orientations was mediated by the implicit prejudice shown in the IAT. Taken together, our findings lend support to our hypothesis that the positive attitude toward own-race faces influences implicit categorization of own-race and other-race faces.

A critical aspect of the design of the current research is the NAP procedure that was designed to weaken the positive attitudes toward own-race members. The control priming required valence judgments of positive versus negative adjectives. The NAP procedure was modified from the self-concept threat priming that asked participants to judge if a number of negative trait words can describe the self in our previous work (Ma & Han, 2010). We showed that the implicit positive attitude toward the self indexed by the results of the IAT was eliminated by self-concept threat priming. This result provides evidence that such negative association priming indeed weakened the positive attitude toward the target face. Several results of the current research also supported the theory that the NAP procedure in the current research reduced the positive attitude toward own-race members. First, the NAP priming effect was positively correlated with the number of negative trait words assigned to own-race faces, suggesting a greater decrease of own-race for those who assigned more negative traits to own-race faces. If the NAP only facilitated racial categorization rather than reduced positive attitude toward own-race faces, one would not expect such a positive correlation. Second, the post-hoc paired-sampled *t*-tests showed that the NAP effect was significant for responses to own-race faces but not for responses to other-race faces, indicating that the NAP reduced response speed to own-race faces but had little effect on responses to other-race faces. If the priming only made racial identity more salient, one would expect faster responses to own-race faces after the NAP procedure. This alternative interpretation is not consistent with our findings. Finally, the mediation analysis indicated the NAP effect on own-race advantage was indeed mediated by the implicit positive attitude toward own-race members.

As both experiments recruited participants from one racial group (i.e., European American participants in Study 1 and Han Chinese participants in Study 2), it may be argued that the observed NAP effects on categorization of racial faces stem from specific perceptual features of own-race faces or participants' perceptual expertise or ingroup/outgroup relations with target faces. However, neither perceptual features of own-race faces nor participants' perceptual expertise/group relations with target faces changed after the NAP in comparison with the control priming condition. Therefore, the NAP effect observed in our study cannot be attributed to these perceptual or social mechanisms. The relatively positive attitudes toward own-race faces concur with faster responses to own-race than to

as indicated by variations in the IAT effect (range from −102 to 246 ms, M = 66 ms, SD = 85).

- Both the NAP and control priming procedures informed our participants that they would be shown faces that differed in racial background in order to make sure that, after both the NAP and control priming, participants were aware that they would judge own-race and other-race faces. Otherwise, only the NAP rather than the control priming made the racial identity salient. Such instruction might make racial identity salient in both priming conditions and thus induce top-down influence on categorization of own-race and other-race faces.

An important issue of social cognition is

that positive attitudes toward a racial group contribute to faster responses to faces of that race. Our findings are in agreement with the argument that the most obvious feature of racial thinking is to infer about and to form attitudes toward a person's traits, moral dispositions, affiliations (Kurzban et al., 2001; Cosmides et al., 2003). These findings indicate that attitude bias toward a certain social group can influence implicit person categorization during perception of faces. Future research may investigate whether the current findings can be applied to other category domains of faces such as sex and age, and whether the attitude priming procedure used in current work can change one's stereotype or prejudice. Research along these lines may help to understand how social information and perceptual information interact with each other and how the processing of social information in different domains (e.g., race, sex, age, or emotional state) is similarly influenced by attitudes toward a target person.

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