Group Processes & Intergroup Relations

14(6) 887–899
© The Author(s) 2011
Reprints and permission: sagepub.co.uk/journalsPermissions.nav
DOI: 10.1177/1368430211409962
gpir.sagepub.com

Perceptual mechanisms have been proposed for the categorization of racial faces. Social cognitive mechanisms involved in the categorization of racial faces, however, remain unclear. The present study investigated whether and how attitudes influence racial face categorization by measuring reaction times to judge orientations of own-race or other-race faces. Study 1 showed that, in a task of judging orientations of Caucasian and Asian faces, European Americans responded faster to own-race (Caucasian) faces than to other-race (Asian) faces. Study 2 showed that Han Chinese responded faster to own-race (Han Chinese) faces than to other-race (Uigur Chinese) faces. In addition, we found that, in both experiments, own-race advantage in reaction times was eliminated by inducing negative attitudes toward own-race faces using a negative association priming procedure. Moreover, the mediation analysis in Study 2 showed that the priming effect was mediated by attitude bias toward own-race faces. Our findings provide evidence for categorization of racial faces in a perceptual, race-irrelevant task, which, however, is strongly modulated by attitudes toward target faces.

attitude, face, priming, race

Paper received 20 June 2010; revised version accepted 06 April 2011.

Human face is of fundamental importance for social interactions. People become aware of race, gender, age of others easily by perceiving their faces. Distinctions between individuals of different races, ages, and genders are so apparent that categories of humans on the basis of these dimensions are often considered to be special classes (Brewer, 1988). Given the important role of race in forming social group and determining appropriate social behaviors, there has been increasing number of studies that examine cognitive and neural mechanisms underlying racial face processing. For example, Whites respond faster to Black faces

[1]Peking University, China
[2]Central University of Nationalities, China

Shihui Han, Department of Psychology, Peking University, 5 Yiheyuan Road, Beijing 100871, China.
Email: shan@pku.edu.cn

than to White faces in explicit sorting or identification tasks (Levin, 1996; 2000; Valentine & Endo, 1992), reflecting increased attention or alert to Black faces in Whites (Correll, Park, Judd, & Wittenbrink, 2002). Whites also had more difficulty recognizing Black rather than White faces (Meissner & Brigham, 2001; Shriver, Young, Hugenberg, Bernstein, & Lanter, 2008), suggesting different mechanisms of memory encoding of racial faces.

Recent neuroscience studies also revealed multiple-level neural mechanisms involved in racial face processing. For instance, the neural activity in a brain area that is specifically engaged in face processing (i.e., the fusiform gyrus) is greater for own-race faces than for other-race faces (Golby, Gabrieli, Chiao, & Eberhardt, 2001) whereas activity in a subcortical structure (i.e., the amygdala) showed a reverse pattern (Cunningham et al., 2004; Hart et al., 2000). Event-related brain potential (ERP) studies showed evidence that the differentiation of own-race versus other-race faces may occur quite early in the visual processing stream. It has been shown that amplitudes of a short-latency frontal negativity peaking at 100 ms after stimulus onset and a long-latency component peaking between 300–500 ms differentiate between own-race and other-race faces (Ito & Urland, 2003; 2005). The brain imaging findings support the idea that multiple-level mechanisms are involved in the categorization of faces based on race.

However, the categorization of faces by race reflects social cognition associated with social group membership, and high-level social cognitive mechanism may be also involved in racial face processing (e.g., Sporer, 2001). Indeed, it has been proposed that race encoding is a byproduct of cognitive processes that evolve for tracking coalitional alliance (Kurzban, Tooby, & Cosmides, 2001; Cosmides, Tooby, & Kurzban, 2003), suggesting that social attitude may play an important role in the processing of racial faces. However, little is known about whether and how attitudes toward target faces influence categorization of faces into own-race and other-race. The current research was conducted for two purposes. First, we examined whether subjects implicitly categorized faces into own-race and other-race in a perceptual, race-irrelevant task. Second, we investigated whether and how positive attitudes toward own-race faces influenced the implicit processes of racial faces in the perceptual task.

To uncover if the differentiation of racial faces takes place in a race-irrelevant task, we adopted a paradigm used in our recent work (Ma et al., 2009; Ma & Han, 2009, 2010; Sui & Han, 2007; Sui, Liu, & Han, 2009), in which subjects were presented with faces that oriented to the left or right and had to judge the orientation of each face. High-level facial information such as identity, gender, and race is irrelevant to this task that requires identification of a perceptual feature of the face stimuli. Using the similar paradigm, the current research investigated whether reaction times (RTs) associated with judgments of face orientations differ between own-race and other-race faces. Findings of differential RTs to own-race and other-race faces in such a perceptual task would support the idea of implicit social categorization of racial faces since the task does not require explicit identification of race.

More importantly, the current work examined whether the differential processing of own-race and other-race faces is subjected to top-down influence such as attitudes toward the target faces. Our recent work showed that attitudes strongly modulated categorization of the self and others during face processing (Ma & Han, 2010). Specifically, we found that, while subjects responded faster to self-face than to familiar faces, such self-face advantage in RTs was eliminated by self-concept threat priming that required subjects to judge if a number of negative trait words were appropriate to describe the self. We also showed evidence that self-concept threat priming eliminated the implicit association test (IAT) effect (Greenwald, McGhee, & Schwartz, 1998) that reflected implicit positive attitudes toward the self. The effect of self-concept threat priming on RTs to self-face suggests that positive attitudes toward the self contribute to implicit categorization of faces in terms of the self and familiar others. Social identity theory proposed that an individual defined the self in terms of group memberships and individuals commonly

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 lead one to display ingroup bias (Tajfel & Turner, 1986). Similar to the mechanism underlying self-face advantage, we hypothesized that the positive attitude toward one's own race would result in faster responses to own-race faces compared to other-race faces.

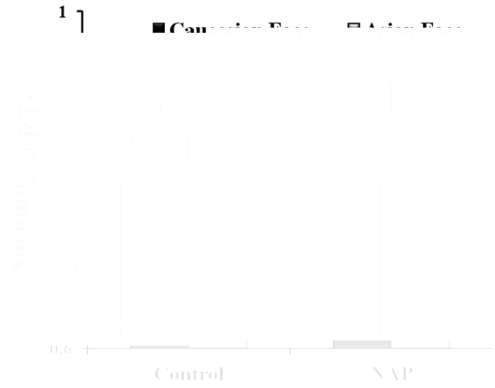
To test our hypothesis, Study 1 asked European American subjects to judge orientations of American and Asian faces in order to examine whether subjects responded faster to own-race faces relative to other-race faces. If so, we further assessed the role of positive attitudes toward own-race face in own-race advantage using a negative association priming (NAP) procedure to induce negative association with own-race members. The NAP is similar to the self-concept threat priming in our previous work (Ma & Han, 2010) except that negative trait words were applied to own-race members instead of the self. In the NAP procedure, subjects were asked to judge whether a number of negative trait words were appropriate to describe a general own-race member. Our previous work has demonstrated that similar priming reduces positive attitude toward the target person (Ma & Han, 2010). If positive attitudes contribute to the own-race advantage in RTs, one would expect a reduction of own-race advantage in RTs after the NAP procedure. As American subjects in Study 1 were recruited in China where Americans are treated as a minority group and attitudes correlated with contact/expertise (Meissner & Brigham, 2001; Pettigrew & Tropp, 2000), we conducted Study 2 to further investigate the influence of positive attitudes on racial face processing in Han Chinese subjects who live in Xinjiang Uigur Autonomous Region of China where the population of Han and Uigur Chinese (the Uigur are descendants of Turkic people) was comparable. In addition, Study 2 asked the sam0 0 0 ompa3TJEa3ing 2xutn addiuudes correlaifnher invest3tI0wID 23I0wIas

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 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

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.



The results of normalized RTs to the identification of face orientations in Study 1.
: The Y-axis represents the ratio of Asian faces / scrambled faces and Caucasian faces / scrambled-faces. Error bars represent standard errors. NAP = negative association priming.

During the NAP procedure, American participants identified 9.89 (= 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, (1, 17) = 0.936, = .347) and the left- and right-hand responses were highly correlated (= .950, < .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 ((1, 17) = 1.322, = .266) nor the main effect of Priming ((1, 17) = 2.602, = .125) was significant. Interestingly, we found a significant interaction between Face and Priming ((1, 17) = 26.947, < .001, Figure 2). Post-hoc analysis confirmed that participants responded faster to own-race than to other-race faces in the control priming condition (= .011) whereas a reverse pattern was observed in the NAP condition ((17) = 5.224, < .001). Paired-sampled -tests were further performed and revealed that the NAP slowed responses to own-race faces (= .006) but did not affect responses to other-race faces ((17) = = .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.

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

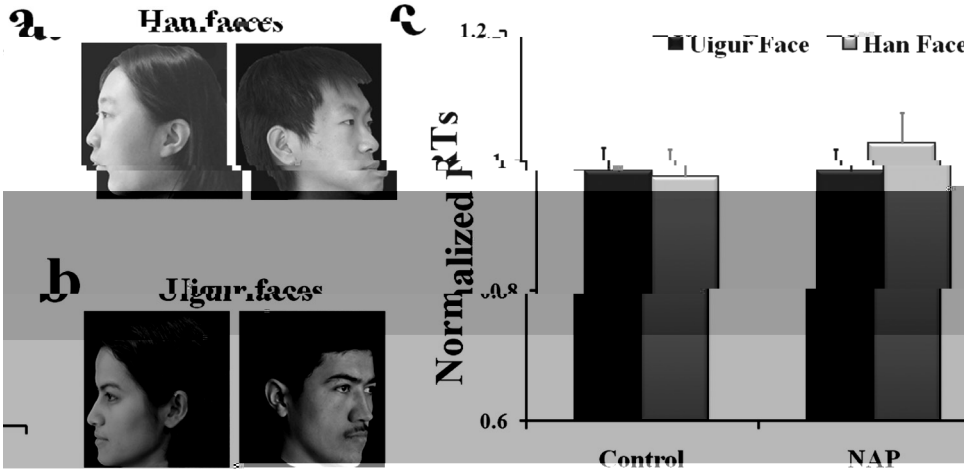
(National Bureau of Statistics of China, 2006). Moreover, Study 2 employed the IAT to examine the relation between own-race advantage in RTs and the implicit positive attitudes toward own-race members. To ask the same participant group to conduct both the IAT and face orientation judgment tasks also 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.

Healthy Han Chinese college students from Xinjiang Normal University (= 18, 10 men, = 20.63 years, = 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 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.

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.

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): = 727 ms, = 92; RTs for (own-race + positive): = 660 ms, = 86, IAT effect: = 66 ms, = 85, (17) = 3.349, = .003). The results indicate that Han Chinese participants hold stronger implicit positive attitudes toward own-race than other-race faces.



(a) and (b) Illustrations of Han and Uigur faces used in Study 2; (c) normalized RTs to the identification of face orientations in Study 2.

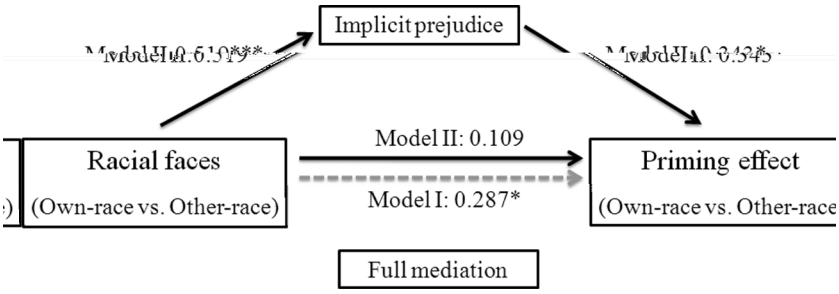
: The Y-axis represents the ratio of Han faces/scrambled faces and Uigur faces/scrambled faces. Error bars represent standard errors. NAP = negative association priming.

During the NAP procedure, participants identified 10.83 (= 6.17) negative trait adjectives that were believed to appropriately describe own-race members. Participants were 97.3% correct in identification of word valence in the control priming task. The response accuracy to the identification of face orientation was high (95.0%).

To examine the effect of NAP on RTs to the identification of orientations of own-race and other-race faces, normalized RTs were subjected to ANOVA 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 ((1, 17) = 1.496, = .238) nor of Priming ((1, 17) = 1.935, = .182) was significant. However, there was a significant interaction of Face x Priming ((1,17) = 7.505, = .014, Figure 3c). Participants showed a trend of faster responses to own-race than to other-race faces in the control priming condition ((17) = 0.667, = .514) whereas a reverse pattern was observed in the NAP condition (= .055). Post-hoc analysis further confirmed that the NAP slowed responses to own-race faces (= .02) but did not affect responses to other-race faces (= .995).

To quantify the relation between participants' attitudes toward Han Chinese and the variation of RTs to Han faces between the NAP and control priming conditions, we calculated the correlation between the number of negative traits assigned to Han Chinese during the NAP procedure and the RT difference to Han faces between the control and the NAP conditions (mean RTs to Han faces in the control priming minus those in the NAP). We found a reliable negative correlation between the two effects (= –.543, = .02), the more negative traits assigned to Han Chinese, the longer the delay of response speeds to Han faces in the NAP relative to the control priming conditions.

To further investigate the relationship between the racial attitude and the priming effect on RTs, a mediation analysis was performed on the independent variable (IV; race: own-race vs. other-race), the mediator (implicit prejudice: differential (negative minus positive) association with own-race vs. other-race) and the dependent variable (DV, RT



The mediator effect in Study 2.

: The model that regressed IV (race: own-race vs. other-race), mediator (implicit prejudice) and DV (RT priming effect on own-race vs. other-race faces) was significant. The relationship between race and priming effect becomes insignificant when considering implicit prejudice as the mediator. * < 0.09, ** < 0.01, *** < 0.001.

priming effect on own-race vs. other-race faces). We chose a classic approach to establish mediation (Judd and Kenny, 1981; Baron and Kenny, 1986), and our data met the four conditions for establishing mediation. The model that regressed IV, mediator and DV was significant (= 3.337, = .048). The relationship between IV and DV was marginally significant (β = .287, = .090) but was insignificant when including the implicit prejudice as the mediator in the regression model (β = .109, = .562, Figure 4), suggesting that the own-race advantage in RTs was mediated by the implicit prejudice shown in the IAT.

The IAT results indicate stronger positive attitudes toward one's own-race than toward other-race members in Han Chinese participants, consistent with previous findings of own-race bias (Greenwald et al., 1998; Dasgupta, McGhee, Greenwald, & Banaji; 2000; Ottaway, Hayden, & Oakes, 2001). Consistent with Study 1, Study 2 also showed that the NAP reduced the own-race advantage in RTs, providing further evidence that positive attitudes toward own-race members contribute to the own-race advantage in responses to the identification of own-race and other-race faces. Moreover, the mediator effect provided further evidence for our hypothesis that positive attitudes play a key role in implicit social categorization of racial faces in the perceptual task of judging face orientations.

The present study first showed evidence for implicit categorization of own-race and other-race during perception of faces. Participants responded faster to own-race faces relative to other-race faces in a task that required judgment of a perceptual feature (i.e., face orientation) that was irrelevant to race identity. The own-race advantage in RTs was evident in both Chinese and European American participants, suggesting that implicit categorization of own-race versus other-race faces occurs independently of participants' cultural background. In addition, we showed evidence that the own-race advantage observed in the face orientation judgment task can be attributed to the implicit positive attitude toward own-race faces. Specifically, both Studies 1 and 2 showed that own-race advantage in RTs was significantly reduced by the NAP that reduced positive attitudes toward own-race members. After the NAP procedure, responses were even slower to own-races face than to other-race faces. This indicates that, although the own-race advantage was eliminated, participants were still able to differentiate between own-race faces and other-race faces. The results suggest that the NAP effect on own-race advantage reflects the variation of the positive attitude toward own-race faces rather than the lack of distinction between own-race and other-race faces. More importantly, the mediator effect observed in Study 2 suggested

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 -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 other-race faces in the perceptual task. This is in agreement with the previous findings that positively toned words are categorized faster than negatively toned words (Feyereisen, Malet, & Martin, 1986) and responses are faster to names of "good" people than those of "bad" people (Cunningham, Johnson, Gatenby, Gore, & Banaji, 2003). Taken together, these findings provided evidence that attitudes play a key role in categorization of stimuli independently of stimulus domains.

One may notice that European American participants recruited in Study 1 were international exchange students who lived in Beijing, China, when they participated in this study. Thus, to some extent, these participants represent a unique population of European Americans who were living abroad. However, similar NAP effect on own-race perception was observed in Study 2 that recruited Han Chinese who lived in their home country. Thus, the NAP effect on own-race advantage was evident regardless whether participants live abroad or in their home country. The results of Study 2 showed a trend of own-race advantage, which, however, was not significant. Since the own-race advantage was mediated by the implicit prejudice shown in the IAT, it is likely that the absence of significant own-race advantage arose from the large variation of positive attitudes towards own-race group across participants,

as indicated by variations in the IAT effect (range = 66 ms, = 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 whether mere exposure to a stimulus target is sufficient to trigger person categorization. A prior study used repetition priming to assess automatic person categorization by sex based on perception of faces (Quinn & Macrae, 2005). The authors showed that categorization of faces based on sex occurred only for the faces that had been actively categorized based on sex. In addition, active categorization of faces based on age did not help categorization of faces based on sex. Unlike this study, the current research showed that person categorization by race may occur in a task that requires identification of a perceptual feature (i.e., face orientation) that is not explicitly related to race. These results suggest that participants may be more sensitive to race than to sex during person categorization. This is possibly due to the fact that the processing of social information differs between different dimensions of faces (i. e., sex, age or race). Racial categorization provides a basis for coalitional alliance (Kurzban et al., 2001; Cosmides et al., 2003) and thus may occur in an automatic fashion (Taylor, Fiske, Etcoff, & Ruderman, 1978). Consistent with this, social psychologists have shown that adults encode individuals' race (Black/White) regardless of whether they pay attention to targets' race and whether other competing dimensions such as sex are involved in the same task (Stangor, Lynch, Duan, & Glass, 1992). Race encoding also occurs when participants are instructed to attend to individuating information over category-based information (Fiske & Neuberg, 1990). Together these findings reveal the important role of race for person categorization and social interaction.

It should be noted that social attitude may not be the only factor that influences response speeds in categorization of racial faces. Prior cross-race classification advantage was observed in Whites who explicitly classified faces by race (Levin, 1996; 2000) or searched for a target racial face (Levin, 2000; Chiao, Heck, Nakayama, & Ambady, 2006). Faster responses to Black than to White faces in explicit face recognition tasks observed in the previous research do not simply imply that Whites possess greater positive attitudes toward Blacks than Whites. Increased attention or alert may also induce faster responses to Black faces that imply threats (Correll et al., 2002). While positive attitudes may facilitate response speeds to own-race faces (e.g., American participants responded faster to Caucasian than to Asian faces in the current work), increased alert to danger signals may also speed up responses to racial outgroup faces (e.g., Whites respond faster to Black than to White faces in visual search and classification, Levin, 1996; 2000). Attitudes toward a target and alert induced by a target may interact with each other to determine behavioral performances in the classification of racial faces. In addition, the explicit race-relevant task used in the previous studies and the implicit race-irrelevant task used in our study may also contribute to the different findings. This can be tested in future research.

In summary, the current research showed evidence for differential processing of own-race and other-race faces in a perceptual task that is irrelevant to the identification of race. Moreover, our findings showed that attitudes toward a target influenced implicit racial face categorization, which was observed in participants from different cultures (e.g., American and Chinese). In comparison with the previous finding that Japanese were more accurate than Americans in detecting configural changes as compared to figural changes (Miyamoto et al., 2006), our results suggest that positive attitudes may facilitate implicit categori-

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.

This work was supported by National Natural Science Foundation of China (Project 30910103901, 30630025, 30828012), National Basic Research Program of China (973 Program 2010CB833903), and the Fundamental Research Funds for the Central Universities. We thank Xiaojing Xu for helping data collection in Study 2.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. , , 1173–1182.

Brewer, M. B. (1988). A dual process model of impression formation. , , 1–36.

Chiao, J. Y., Heck, H. E., Nakayama, K., & Ambady, N. (2006). Priming race in biracial observers affects visual search for Black and White faces. , , 387–392.

Correll, J., Park, B., Judd, C. M., & Wittenbrink, B. (2002). The police officer's dilemma: Using ethnicity to disambiguate potentially threatening individuals. , , 1314–1329.

Cosmides, L., Tooby, J., & Kurzban, R. (2003). Perceptions of race. , , 173–179.

Cunningham, W. A., Johnson, M. K., Gatenby, J. C., Gore, J. C., & Banaji, M. R. (2003). Neural components of social evaluation. , , 639–649.

Cunningham, W. A., Johnson, M. K., Raye, C. L., Chris Gatenby, J., Gore, J. C., & Banaji, M. R. (2004). Separable neural components in the processing of black and white faces. , , 806–813.

Dasgupta, N., McGhee, D. E., Greenwald, A. G., & Banaji, M. R. (2000). Automatic preference for white Americans: Eliminating the familiarity explanation. , , 316–328.

Feyereisen, P., Malet, C., & Martin, Y. (1986). Is the faster processing of expressions of happiness modality-specific? In H. D. Ellis, M. A. Jeeves, F. Newcombe & A. Young (Eds.), (pp. 349–355). Boston: Martinus Nijhoff.

Fiske, S., & Neuberg, S. (1990). A continuum of impression formation, from category-based to individuating processes: Influences of information and motivation on attention and interpretation. In M. Zanna (Ed.), (Vol. 23, pp. 1–74). New York: Academic Press.

Golby, A. J., Gabrieli, J. D., Chiao, J. Y., & Eberhardt, J. L. (2001). Differential responses in the fusiform region to same-race and other-race faces. , , 845–850.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The implicit association test. , , 1464–1480.

Greenwald, A. G., & Farnham (2000) Using the implicit association test to measure self-esteem and self-concept. , , 1022–1038.

Hart, A. J., Whalen, P. J., Shin, L. M., McInerney, S. C., Fischer, H., & Rauch, S. L. (2000). Differential response in the human amygdala to racial outgroup versus ingroup face stimuli. , , 2351–2355.

Ito, T. A., & Urland, G. R. (2003). Race and gender on the brain: Electrocortical measures of attention to the race and gender of multiply categorizable individuals. , , 616–626.

Ito, T. A., & Urland, G. R. (2005). The influence of processing objectives on the perception of faces: an ERP study of race and gender perception. , , 21–36.

Judd, C. M., & Kenny, D. A. (1981). Process analysis: Estimating mediation in evaluation research. , , 602–619.

Kurzban, R., Tooby, J., & Cosmides, L. (2001). Can race be erased? Coalitional computation and social categorization.
, , 15387–15392.

Levin, D. T. (1996). Classifying faces by race: The structure of face categories.
, , 1464–1382.

Levin, D. T. (2000). Race as a visual feature: Using visual search and perceptual discrimination tasks to understand face categories and the cross-race recognition deficit.
, , 559–574.

Liu, Y. (1990).
. Beijing: Space Navigation Press.

Ma, Y., Ge, J., Xu, X., Fan, Y., Yang, S., & Han, S. (2009). Asymmetric neurocognitive representation of ethnic in-group/out-group faces.
, , 2076–2081.

Ma, Y., & Han, S. (2009). Self-face advantage is modulated by social threat—Boss effect on self-face recognition. , , 1048–1051.

Ma, Y., & Han, S. (2010). Why respond faster to the self than others? An implicit positive association theory of self advantage during implicit face recognition.
, , 619–633.

Meissner, C. A., & Brigham, J. C. (2001). Thirty years of investigating the own-race bias in memory for faces: A meta-analytic review.
, , 3–35.

Miyamoto, Y., Nisbett, R. E., & Masuda, T. (2006). Culture and the physical environment: Holistic versus analytic perceptual affordances.
, , 113–119.

National Bureau of Statistics of China (2006).
. Beijing: Chinese Statistics Press.

Ottaway, S. A., Hayden, D. C., & Oakes, M. A. (2001). Implicit attitudes and racism: The effect of word familiarity and frequency in the Implicit Association Test. , , 97–144.

Pettigrew, T. F., & Tropp, L. (2000). Does intergroup contact reduce prejudice? Recent meta-analytic findings. In S. Oskamp (Ed.),
(pp. 93–114). Hillsdale, NJ: Lawrence Erlbaum Associates.

Quinn, K. A., & Macrae, C. N. (2005). Categorizing others: The dynamics of person construal.
, , 467–479.

Shriver, E. R., Young, S. G., Hugenberg, K., Bernstein, M. J., & Lanter, J. R. (2008). Class, race, and the face: Social context modulates the cross-race effect in face recognition.
, , 260–274.

Sporer, S. L. (2001). The cross-race effect: Beyond recognition of faces in the laboratory.
, , 170–200.

Stangor, C., Lynch, L., Duan, C., & Glass, B. (1992). Categorization of individuals on the basis of multiple social features.
, , 207–218.

Sui, J., & Han, S. (2007). Self-construal priming modulates neural substrates of self-awareness.
, , 861–866.

Sui, J., Liu, C. H., & Han, S. (2009). Cultural difference in neural mechanisms of self-recognition.
, , 402–411.

Tajfel, H. (1982). Social psychology of intergroup relations. , , 1–30.

Tajfel, H., & Turner, J. (1986). The social identity theory of intergroup behavior. In S. Worchel & W. G. Austin (Eds.),
(pp. 7–24). Chicago: Nelson-Hall.

Taylor, S. E., Fiske, S. T., Etcoff, N. L., & Ruderman, A. J. (1978). Categorical bases of person memory and stereotyping. , , 778–793.

Valentine, T., & Endo, M. (1992). Toward an examplar model of face processing: The effects of race and distinctiveness.
, , 161–204.

is a PhD candidate in the Department of Psychology, Peking University, China. Her research addresses how cultural and sensory experiences influence cognitive and neural mechanisms of self-reflective thoughts and self-face recognition.

is a professor of ethnology and sociology at the School of Ethnology and Sociology, Minzu University of China. He studies methodology of ethnology. His research focuses on the history and culture of the minorities in the northwest of China and other areas of the central Asian continent.

is a professor of psychology and cognitive neuroscience at the Department of Psychology, Peking University, China. His research aims to uncover neurocognitive mechanisms underlying human social cognition. His current work focuses on cultural influences on cognitive and neural substrates involved in self-reflective thoughts and self-face recognition, and variation of cognitive and neural processes of empathy for pain as a function of social relation by measuring behavioral performances and brain activity, using brain imaging such as functional magnetic resonance imaging and event-related brain potential.