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AN OWN-AGE BIAS IN YOUNG ADULTS' FACIAL AGE JUDGMENTS

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The present study examined the influence of differential experience with own- and other-age faces on adults' facial age judgment abilities. In Experiment 1, Chinese participants were asked to make age estimates (i.e., in years) for faces within three Asian stimulus age groups: children, young adults, and middle-age adults. Participants showed the greatest differentiation in their age estimates for own-age young adult stimulus faces relative to the child and middle-age adult stimulus facial age groups. Thus, participants' age estimates for own-age young adult faces appear to be more refined relative to their age estimates for other-age faces. In Experiment 2, the same pattern of results was replicated with a group of Japanese participants. The role of differential experience with own- and other-age individuals in shaping facial age perception is discussed.

Key words: age judgments, facial age, own-age bias

There is growing evidence to suggest that experience plays a crucial role in our face processing ability. Evidence concerning the role of experience is most prominent in the other-race effect: better recognition memory for own-race faces than for other-race faces is typically found among those with greater visual and social experiences with own-race individuals and limited to no experience with other-race individuals (see Meissner & Brigham, 2001 for a review). This race-related effect also extends to categorization in that adults' categorization of other-race faces is faster than their categorization of own-race faces (Caldara, Rossion, Bovet, & Hauert, 2004; Ge et al., 2009; Levin, 1996; Valentine and Endo, 1992). Differences in the recognition and categorization of own- and other-race faces are evident as early as infancy (Anzures, Quinn, Pascalis, Slater, & Lee, 2010; Hayden, Bhatt, Joseph, & Tanaka, 2007; Kelly et al., 2007, 2009; Sangrigoli & de Schonen, 2004).

However, the role of experience in face processing extends beyond race information. Recent evidence also shows a similar other-*age* effect in recognition memory. Macchi Cassia, Kuefner, Picozzi, & Vescovo (2009) found that 3-year-olds who have younger siblings and adults who have experience with infants show comparable accuracy in their recognition of newborn and adult faces, whereas 3-year-olds without younger siblings and adults without experience with infants show a significant impairment in their recognition of newborn faces relative to their recognition of adult faces. Consistent with Macchi Cassia et al.'s findings, Kuefner, Macchi Cassia, Picozzi, & Bricolo (2008) found that adults show superior recognition of adult faces relative to their recognition of infants' and

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children's faces, unless adults have sufficient experience with young children (i.e., 1- to 6-year-olds), in which case, the recognition advantage for adult faces disappears. Anastasi and Rhodes (2005) have also found an own-age bias in the facial recognition of 5- to 8-year-olds and an older group of adult participants (i.e., 55- to 89-year-olds).

Despite the numerous studies that have investigated the role of experience in face recognition, the role that experience plays in facial age judgments has received little attention. The majority of studies on adults' facial age judgments have focused on accuracy in judging facial age, which have shown that adults are generally accurate in judging the age of own-race faces (Burt & Perrett, 1995; George & Hole, 1995, 2000; Henss, 1991). Other studies have also focused on the different facial cues that adults use to judge age, such as craniofacial shape, amount of cranial hair, presence or absence of wrinkles, appearance and height of internal facial features, and skin tone (Burt & Perrett, 1995; Fink, Grammer, & Matts, 2006; George & Hole, 1995, 1998, 2000; Gross, 1997; Mark et al., 1980; Pittenger & Shaw, 1975; Wogalter & Hosie, 1991).

In contrast, only two studies to date have examined the role of differential experience in adults' facial age judgments. Dehon and Bredart (2001) found that Caucasian adults living in Belgium were significantly better in their facial age judgments for own-race Caucasian adult faces relative to their age judgments for other-race African adult faces. However, African adults living in Belgium who had experience with both Caucasian and African faces showed comparable facial age judgments for the Caucasian and African faces. Thus, similar to recognition memory, facial age judgments also appear to be influenced by differential experience with own- and other-race faces. In addition, Anzures, Ge, Wang, Itakura, & Lee (2010) found that differential sociocultural experiences influence the efficiency with which one processes facial age information. That is, compared to individuals from other cultures, those who were exposed to greater sociocultural emphases on attending to the age of their social partners were faster in their relative facial age judgments for child and middle-age adult faces.

There is also some, albeit limited, evidence that differential experience with own- and other-*age* faces influences facial age judgment ability. For example, 4- and 6-year-olds show greater accuracy in a paired relative age judgment task when both stimulus faces are young children relative to when both stimulus faces are adults (George, Hole, & Scaife, 2000). Willner and Rowe (2001) also reported an age-related decline in adults' accuracy in judging the facial age of 13- to 16-year-old male and female stimulus faces, which is consistent with an own-age bias in facial age judgment ability. However, a direct examination of adults' facial age judgment ability for own-age versus other-age faces has yet to be conducted.

Facial age processing offers a unique opportunity for elucidating the specific role of experience in face processing in general. A direct examination of facial age judgments for own- and other-age faces provides an ideal opportunity to ascertain whether the influence of experience on face processing is long-lasting or whether the advantages of such experiences are dependent on the maintenance of those experiences. That is, does experience with a particular age group during a given period lead to more sophisticated processing of those faces regardless of subsequent experience with that age group, or is continued experience with a given age group necessary to preserve that level of sophisticated face processing? Examining the perception of facial age provides us with the advantage of comparing young adults' current age judgment ability for three different age groups: i) own-age young adult faces with which they would typically have an abundance of current experience, ii) children's faces with which they would have had an abundance of previous (but typically limited current) experience, and iii) older adult faces with which they likely have less experience relative to own-age faces.

Experiment 1 examined Chinese young adults' age judgments for child, young adult, and middle-age adult East Asian faces. If the influence of experience with a given age group is long-lasting, then young adults should show greater differentiation in their age estimates for own-age faces and children's faces relative to their differentiation in age estimates for middle-age adult faces. However, if experience with a given age group has to be maintained to preserve the face processing advantages from such experience, then young adults should show greater differentiation in their age estimates for own-age faces relative to their differentiation in age estimates for children's and middle-age adult faces. Thus, there should be a significant interaction between stimulus age group and the stimulus faces within each age group.

EXPERIMENT 1

METHOD

Participants

Participants were 39 young adult university students in China (*M* = 21.54 years, *SD* = 1.10 years, 18 males).

Stimuli

Twenty Chinese male adult faces (i.e., 31- to 40-year-olds, *M* = 34.95, *SD* = 2.82) were used to create an averaged Asian middle-age male adult face, and twenty Chinese male children's faces (i.e., 11- to 12-year-olds, *M* = 11.5, *SD* = .51) were used to create an averaged Asian male child face. Composite faces—rather than individual faces—were created to better control for individual differences in facial growth within a given age group.

The middle-age male adult (100% Old) and the male child (0% Old) average faces were then averaged together to make additional composite faces with varying degrees of old/young facial information that ranged from 100% Old to 0% Old. These composite faces allowed us to examine participants' age estimates while controlling for the amount of age information across the facial stimuli. All photos were presented in grayscale.

Procedure

Participants were tested individually and randomly assigned to one of four conditions that showed the composite faces in a different sequential order. The facial stimuli were shown in PowerPoint presentation on a computer. Participants were asked to judge the age of each face in years (i.e., one absolute age for each face rather than an age range) and to record their responses on a sheet of paper. During this task, participants were able to control the speed with which they moved through each trial, but they were not allowed to move back to previous trials.

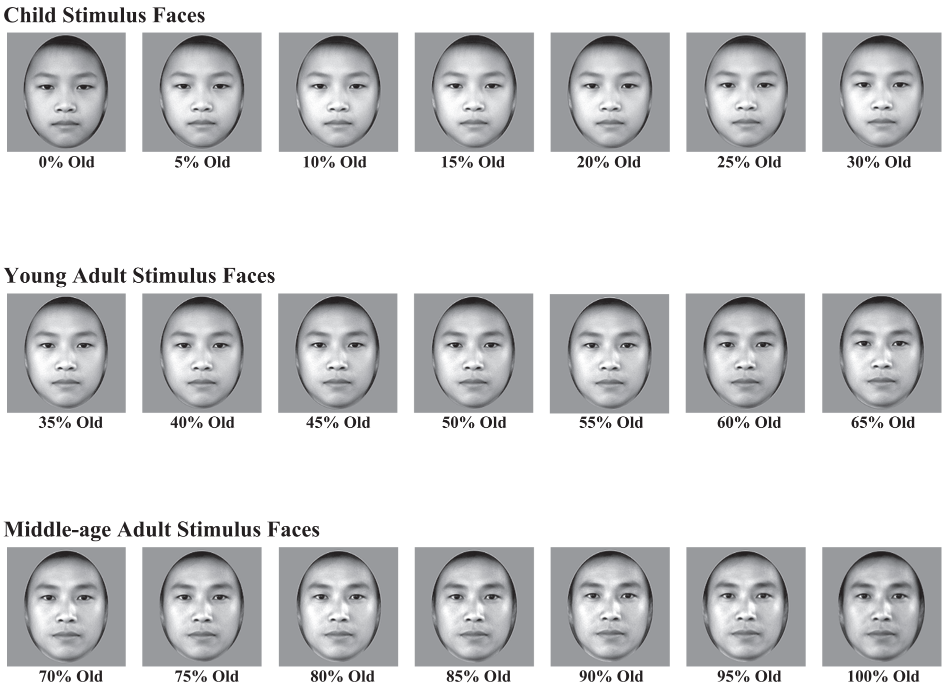

Fig. 1. Face stimuli used in age judgment task.

RESULTS AND DISCUSSION

To examine young adult participants' potential differential facial age judgment ability for own- and other-age faces, we examined participants' age judgments for children's faces (0% to 30% Old faces, mean perceived age = 11.50 years, *SD* = 3.71), young adult faces (35% to 65% Old faces, mean perceived age = 19.65 years, *SD* = 3.54), and middle-age adult faces (70% to 100% Old faces, mean perceived age = 29.90 years, *SD* 4.44), see Fig. 1. We conducted a 2 (participant gender) × 3 (stimulus age group: child, young adult, middle-age adult) × 7 (stimulus: individual faces within each age group) ANOVA with participants' age estimates (in years) as the dependent variable.

The ANOVA revealed a significant main effect of stimulus so that age judgments (in years) increased as the individual faces themselves increased in age, $F(6, 222) = 74.31$, $p < .001$, partial $\eta^2 = .67$. There was also a significant main effect of stimulus age group, so that age judgments increased as the stimulus age group increased in age, $F(1, 49) = 291.24$, $p < .001$, partial $\eta^2 = .89$. Both effects were expected, and they confirmed the fact that our stimulus preparation did indeed mirror the natural facial aging process.

Crucial to the central question of the present study, the analysis revealed a significant interaction between stimulus age group and the stimulus faces within each group, $F(7, 262) = 8.25$, $p < .001$, partial $\eta^2 = .18$. A follow-up simple contrast analysis with young adult stimulus faces as the reference showed a significant difference in the linear

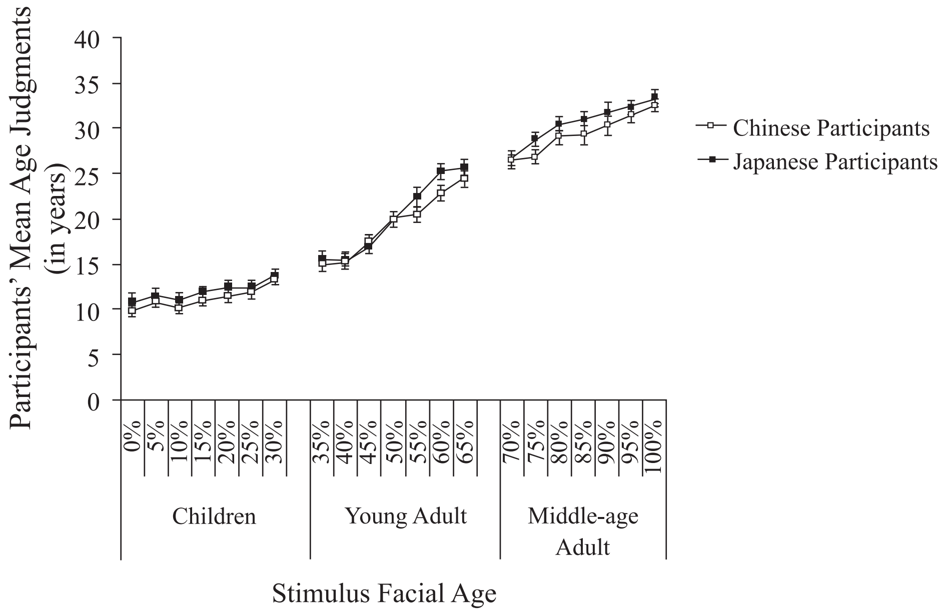

Fig. 2. Young adult participants' mean facial age judgments (in years) for child, young adult, and middle-age adult stimulus faces.

slopes of participants' age judgments for each stimulus age group. Participants' age judgments for own-age young adult stimulus faces showed a significantly greater incline or slope relative to their age judgments for children and middle-age adult faces, $F(1, 37) = 55.09$, $p < .001$, partial $\eta^2 = .60$ and $F(1, 37) = 15.18$, $p < .001$, partial $\eta^2 = .29$, respectively. Thus, despite similar changes in facial age information (i.e., 5% difference between each face within a given stimulus age group), participants' age judgments showed the greatest differentiation between own-age faces from the young adult stimulus age group (see Fig. 2). In contrast, participants' age judgments showed relatively less differentiation between other-age faces from the younger and older stimulus facial age groups. In addition, a comparison of participants' age judgments for other-age faces showed greater differentiation between faces in the middle-age adult stimulus age group relative to children's faces, $F(1, 37) = 22.34, p < .001$, partial $\eta^2 = .38$. The main effect of participant gender and the remaining interactions involving participant gender were not significant (p values > .05).

Overall, the results from Experiment 1 suggest that young adults have an own-age bias in their age judgment ability. However, to ensure that our findings are not specific to our sample and to the Chinese population, we conducted a second experiment with young adult participants in Japan.

EXPERIMENT 2

METHOD

Participants

Thirty-two young adult university students ($M = 22.84$ years, $SD = 2.62$ years, 15 males) in Japan participated in the study.

Stimuli

The stimuli used in Experiment 1 were also used in Experiment 2.

Procedure

The procedure was identical to the procedure used in Experiment 1.

RESULTS AND DISCUSSION

As in Experiment 1, we conducted a 2 (participant gender) × 3 (stimulus age group: child, young adult, middle-age adult) × 7 (stimulus: individual faces within each age group) ANOVA with participants' age estimates (in years) as the dependent variable. The ANOVA revealed a significant main effect of stimulus so that age judgments (in years) increased as the individual faces themselves increased in age, $F(4, 125) = 54.82$, $p < .001$, partial $\eta^2 = .65$. There was also a significant main effect of stimulus age group, so that age judgments increased as the stimulus age group increased in age, $F(1, 36) = 375.07$, $p < .001$, partial $\eta^2 = .93$.

Most importantly, the analysis revealed a significant interaction between stimulus age group and the stimulus faces within each age group, $F(7, 209) = 14.54$, $p < .001$, partial $\eta^2 = .33$. A follow-up simple contrast analysis with young adult stimulus faces as the reference showed a significant difference in the linear slopes of participants' age judgments for each stimulus age group. Similar to the Chinese participants in Experiment 1, Japanese participants' age judgments for own-age young adult stimulus faces showed a significantly greater incline or slope relative to their age judgments for children and middle-age adult stimulus faces, $F(1, 30) = 119.37$, $p < .001$, partial $\eta^2 = .80$ and $F(1, 30) = 40.99$, $p < .001$, partial $\eta^2 = .58$, respectively. That is, despite similar changes in facial age information (i.e., 5% difference between each face within a given stimulus age group), the Japanese participants' age judgments showed the greatest differentiation between own-age faces from the young adult stimulus facial age group (see Fig. 2). In contrast, participants' age judgments showed relatively less differentiation between other-age faces from the younger and older stimulus facial age groups. In addition, similar to the Chinese participants, a comparison of the Japanese participants' age judgments for other-age faces showed greater differentiation between faces in the middle-age adult stimulus age group relative to children's faces $F(1, 30) = 15.25$, $p < .001$, partial $\eta^2 = .34$.

Although the main effect of participant gender and the two-way interactions with participant gender were not significant, the three-way interaction between participant gender, stimulus age group, and stimulus was significant, $F(7, 209) = 2.27$, $p < .05$,

$\eta^2 = .07$. Further analyses showed no difference in male and female participants' age judgments for other-age child and middle-age adult stimulus faces ($p > .05$). However, female participants showed greater differentiation in their age judgments for own-age young adult stimulus faces relative to male participants.

Although there were some minor differences in performance between the male and female Japanese participants, their performance indicated an own-age bias in facial age judgment ability that is similar to that found in the Chinese participants in Experiment 1. Additional analyses that included both the Chinese and Japanese participants showed no differences in performance between the two groups of participants. Thus, this experience-induced bias on facial age judgment ability appears to be a robust phenomenon.

General Discussion

The results of the present study showed that young adults have an own-age bias in their facial age judgment ability. Even when age information across faces from the same age group is varied in equal steps for child, young adult, and middle-age adult faces, young adult participants showed the greatest differentiation between own-age faces relative to other-age faces. This own-age bias in facial age judgment ability likely stems from greater experience (e.g., daily social interactions) with own-age peers and relatively less experience with children and middle-age adults. Such findings regarding the importance of differential experience in face processing are consistent with previous studies that have shown that differential experience with own- and other-race faces and own- and other-age faces influence recognition memory (see Meissner & Brigham, 2001 for a review).

In addition to an own-age bias in facial age judgment ability, our findings also revealed differences in participants' age judgments for the other-age child and middle-age adult stimulus faces. The young adult participants in the present study showed greater differentiation in their age judgments for middle-age adult faces relative to their age judgments for children's faces. This difference in performance for other-age faces may be due to participants' possibly greater experience with middle-age adult faces relative to children's faces (e.g., frequent experience with faculty members and university staff who are typically middle-age adults or older). Alternatively, the difference in performance for other-age faces may stem from the structural differences between own-age young adult faces, children's faces, and middle-age adult faces. Relative to children's faces, middle-age adult faces are more similar in structure to young adult faces. Thus, it is possible that participants' perception of middle-age faces may have benefited from their own-age advantage for young adult faces.

Our results also suggest that one's *current* experience with own-age faces may be most influential in our face processing ability. Although the young adult participants in the current study would have had experience with own-age children in the past, they showed less differentiation in their age estimates for those faces. The superiority of current experience over past experience is consistent with findings by Sangrigoli, Pallier, Argenti, Ventureyra, & de Schonen (2005) who found that Korean adults who were adopted into European Caucasian families during childhood were comparable to Caucasian adults in their face recognition of Korean and Caucasian faces. That is, the Korean adults also showed better recognition memory for Caucasian faces with which they had an abundance of current experience, and poorer recognition memory for *own-race* Korean faces with which they had an abundance of previous, but no current, experience. Thus, our face processing abilities appear to remain malleable so that they are fine-tuned for the most current and frequently encountered faces.

However, it is important to note that the own-age bias in facial age judgments found in the present study is in need of replication among individuals from a different age group (e.g., middle-age adults). An own-age bias in facial age judgments among individuals belonging to various age groups would suggest that the own-age bias is not a result of particular properties of the stimuli that would lead to greater discriminability in the ages of faces within certain age categories relative to other age categories (e.g., young adult faces are not simply easier to discriminate by age relative to faces from other age groups). It should also be examined whether this own-age bias in facial age judgments generalizes to non-Asian adults.

In summary, our results showed that young adults have an own-age bias in their facial age judgments. This own-age bias suggests that our visual perception of facial age may be continuously recalibrated as we age and subsequently gain the most experience with own-age individuals, so that we are always most sensitive to small facial age differences within the age group to which we currently belong. The own-age bias in facial age judgments also has broad implications for our understanding of the nature of the role of experience in face processing. It suggests that our current experiences—rather than past ones—with certain categories of faces may have the most influence on our ability to process faces. While the present study along with other recent studies on facial age processing provide evidence supporting this hypothesis, additional studies in other aspects of face processing such as face race, gender, and species are needed to ascertain whether current face experiences indeed supersede past experiences if they are incongruent with each other. Insights from such studies should shed important light on how our face processing expertise is shaped not only by the amount of our experience with certain facial categories, but also by the nature of such experience.

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