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WHAT PREDICTS THE OWN-AGE BIAS IN FACE RECOGNITION MEMORY?

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Younger and older adults' visual scan patterns were examined as they passively viewed younger and older neutral faces. Both participant age groups tended to look longer at their own-age as compared to other-age faces. In addition, both age groups reported more exposure to own-age than other-age individuals. Importantly, the own-age bias in visual inspection of faces and the own-age bias in self-reported amount of exposure to young and older individuals in everyday life, but not explicit age stereotypes and implicit age associations, significantly and independently predicted the own-age bias in later old/new face recognition. We suggest these findings reflect increased personal and social relevance of, and more accessible and elaborated schemas for, own-age than other-age faces.

Human faces provide information critical for social interactions. Some of the information extracted from faces (e.g., expression, race, or age) affects how faces are encoded and remembered (Bäckman, 1991; Ebner & Johnson, 2009; Meissner & Brigham, 2001). For instance, people of different ages are more likely to attend to, and are faster and more accurate in recognizing, faces of their own than another age group (Anastasi & Rhodes, 2005; Ebner & Johnson, 2010; Lamont, Stewart-Williams, & Podd, 2005; see Harrison & Hole, 2009, for an overview). There are several factors that may predict the own-age bias in face recognition as discussed below.

VISUAL INSPECTION OF OWN-AGE AND OTHER-AGE FACES

Differential attention can be reflected in patterns of looking at faces (Buswell, 1935; Isaacowitz, Wadlinger, Goren, & Wilson, 2006; Knight, Seymour, Gaunt, Baker, Nesmith et al., 2007), and visual scan pattern can affect encoding and recognition of faces (Henderson, Williams, & Falk, 2005). For example, face recognition is im-

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paired when eye movements during face encoding are restricted to the center of a face instead of allowing for free sampling of facial features and their interrelations (Henderson et al., 2005).

Younger and older adults differ in how they visually scan faces: Whereas younger adults look more at eyes than mouths, older adults show the reverse pattern on an emotional expression identification task (Murphy & Isaacowitz, 2010; Sullivan, Ruffman, & Hutton, 2007; Wong, Cronin-Golomb, & Neargarder, 2005, but see Ebner, He, & Johnson, in press). But do younger and older adults differently scan faces of their own age group as opposed to faces of the other age group, and if so, do differences in scan pattern predict the own-age bias in later face recognition? To our knowledge, the only study that addressed these questions asked younger and older adults to rate the quality of pictures of younger and older faces and to evaluate the age of the faces (Firestone, Turk-Browne, & Ryan, 2007). Under these conditions, there was no indication of an own-age bias in visual inspection of faces. Rather, overall looking time, number of fixations, and number of transitions between facial features were greater for younger than older faces in both age groups and visual scan pattern did not correlate with old/new face recognition. However, the particular rating tasks used may have increased similarity among participants in how they scanned faces. It may be that under more natural, passive free viewing conditions, scan patterns would show an own-age bias in attention which would be related to memory.

AMOUNT OF EXPOSURE TO OWN-AGE AND OTHER-AGE PERSONS

Both younger and older adults report a greater amount of exposure to individuals of their own as compared to another age group in their daily lives. In addition, the more contact younger adults report to have with older adults the better they are able to later correctly recognize older faces, but no such effect is observed for older adults (Ebner & Johnson, 2009). It seems reasonable to suppose that, as a consequence of more frequent encounters with persons of their own age, individuals develop and/or maintain better schemas supporting own age face recognition. However, older adults may engage a less than optimal scan pattern when inspecting faces, offsetting a potential benefit from available schemas. Further examination of age differences in both scan patterns and amount of exposure to individuals of different ages, and the independent contributions of these factors to predicting own-age bias in face recognition should be informative.

EXPLICIT AGE STEREOTYPES AND IMPLICIT AGE ASSOCIATIONS ABOUT OWN-AGE AND OTHER-AGE PERSONS

In the context of artificially assigned minimal group membership, individuals evaluate in-group members more positively than out-group members (Brewer, 1979), and recognize in-group faces more accurately than out-group faces (Bernstein, Young, & Hugenberg, 2007). If age operates like an in-group, then younger and older adults should show age-related stereotypes that favor their own age group. These stereotypes may guide attention to, and potentially enhance memory for, individuals of different ages (as shown in the context of the own-race bias, see Meissner & Brigham, 2001). However, studies of age-related stereotyping indicate that younger and older individuals view older persons more negatively than younger persons (Ebner, 2008; Gluth, Ebner, & Schmiedek, 2010; Kite, Stockdale, Whitley, & Johnson, 2005) and both age groups have more negative implicit associations toward older targets (Hummert, Garstka, O'Brien, Greenwald, & Mellott, 2002). These findings suggest that both younger and older adults should be influenced in the same direction by explicit and implicit age associations and should show more attention to, and better memory for, the more positively viewed (i.e., the younger, not older) individuals.

PURPOSE OF THE STUDY

The aim of this study was to examine whether visual inspection, amount of exposure, explicit age stereotypes, and/or implicit age associations independently predicted the own-age bias in face recognition memory in younger and older adults. We recorded eye movements of younger and older adults during passive free viewing of younger and older neutral faces. This was followed by a surprise old/new face recognition memory task, a questionnaire assessing exposure to younger and older persons in daily life, and assessment of explicit age stereotypes and implicit age associations. We hypothesized that younger and older participants would (1) look longer at own-age than other-age faces, and (2) report more exposure to individuals of their own than the other age group. Furthermore, we expected that (3) differences in looking time at younger and older faces and differences in the amount of exposure to younger and older individuals would independently contribute to the own-age bias in old/new face recognition memory. Given the two, somewhat contradictory, lines of evidence in the literature, we did not have predictions regarding own-age bias in explicit age stereotypes and implicit age associations and their relations to face recognition memory.

METHODS

PARTICIPANTS

Forty-seven younger adults (age range 18-30 years, M = 22.2, SD = 2.9, 57% women) were recruited through flyers on campus, and 33 older adults (age range 63-92 years, M = 74.9, SD = 7.8, 70% women) from the community through flyers posted in, or mailing to, community or senior citizen centers. Only participants who had more than 67% trials with valid gazing information (defined as gazes focused within 1º of visual angle for at least 0.1 seconds) were included in the analyses, resulting in a final sample of 25 younger participants (age range 19-29 years, M = 22.2, SD = 2.9, 60% women) and 24 older participants (age range 63-92 years, M = 73.9, SD = 7.8, 71% women). All participants were compensated for participation. The majority of the younger participants were Yale University undergraduates (varying majors). Older participants reported a mean of 16.7 years of education (SD = 1.6). Younger and older participants did not differ in self-reported health,

TABLE 1. Means/Percentages (Standard Deviations) and Significance Tests for Health, Cognition, and Vision Measures for Younger and Older Participants

Measures	Younger Participants *M*/% (*SD*)	Older Participants *M*/% (*SD*)	Age Group Differences
Self-Reported Health	4.36 (0.70)	4.21 (0.72)	$F(1, 48) = 0.56$, $p = .46$, $\eta_p^2 = .01$
Hearing Difficulties	0.0%	58.3%	$\chi^2(1, N = 49) = 20.42$, $p < .001$
Near Vision (binocular)	22.40 (5.02)	52.08 (50.43)	$F(1, 48) = 8.58$, $p < .001$, $\eta_p^2 = .15$
Contrast Sensitivity (binocular)	1.72 (0.09)	1.54 (0.19)	$F(1, 48) = 18.82$, $p < .001$, $\eta_p^2 = .29$
Visual-Motor Processing Speed	67.48 (11.96)	45.46 (7.86)	$F(1, 48) = 57.50$, $p < .001$, $\eta_p^2 = .55$

Note. Self-reported health: "*In general (i.e., over the past year), how would you rate your health and physical well-being?*" (1 = poor, 5 = excellent); hearing difficulties: "*Do you have any hearing difficulties?*" (yes, no); near vision: Rosenbaum Pocket Vision Screener (Rosenbaum, Granham-Field Surgical Co Inc, New York, NY; lower scores indicate better vision); contrast sensitivity: MARS Letter Contrast Sensitivity Test (Arditi, 2005; higher scores indicate better sensitivity); Visual-motor processing speed: Digit-Symbol-Substitution Test (Wechsler, 1981; higher scores indicate higher speed in performance).

but they differed in near vision, contrast sensitivity, and visual-motor processing speed (Table 1).[1]

STIMULI AND EQUIPMENT

Stimuli were taken from the FACES database, a standardized set of color photographs of naturalistic Caucasian (frontal view) faces of different ages (Ebner, Riediger, & Lindenberger, 2010). Equal numbers of faces from younger (18-31 years) and older individuals (69-80 years), half male and half female, were presented on a 17-inch display (1024 x 768 pixels) at a distance of 24 inches (face stimuli: 623 x 768 pixels). Stimulus presentation was controlled using Gaze Tracker (Eye Response Technologies, Inc., Charlottesville, VA) for the eye tracking task and E-Prime (Schneider, Eschman, & Zuccolotto, 2002) for the other computer tasks. An Applied Science Laboratories (Bedford, MA) Model 504 Eye Tracker recorded eye movements at a rate of 60 Hz.

PROCEDURE

After giving consent, participants rested their head on a chinrest to minimize head movement. The eye tracking camera was adjusted to locate the corneal reflection and pupil of participants' left eye, followed by an individual 9-point calibration covering the area of stimulus presentation. Participants first worked on the *Passive Face Viewing Task* (described below) for about 10 minutes. They then filled in a short demographic and physical health questionnaire on paper and worked on the

1. Entering near vision, contrast sensitivity, and visual-motor processing into the model did not change the results.

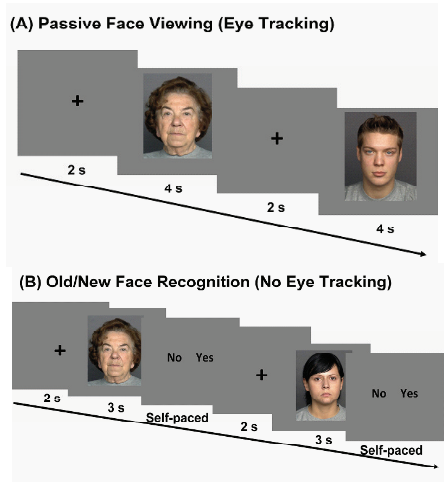

FIGURE 1. Experimental Tasks: (A) Passive Face Viewing During Which Eye Movements Were Recorded; (B) Old/New Face Recognition Task During Which No Eye Movements Were Recorded.

Digit-Symbol-Substitution Test as a measure of processing speed (Table 1). After 10 minutes, participants performed the (surprise) *Old/New Face Recognition Task* (described below), followed by the Rosenbaum Pocket Vision Screener and the MARS Letter Contrast Sensitivity Test (Table 1).

Participants then took the *Older-Younger Implicit Association Task* (Age IAT; Hummert et al., 2002), as a measure of implicit age associations. In this task participants responded to either younger or older faces using the same key as responding to positive or negative words and response times were measured. Higher positive IAT scores indicate more positive associations for younger than older targets (for calculation of this difference score, see Greenwald, Nosek, & Banaji, 2003).

Participants indicated the amount of social exposure to persons of their own and the other age group using the same 8-point scale for each question where 1 = *less than once per year*, and 8 = *daily* (Media exposure: "*How often are you exposed to younger [approx. between 18-30 years of age]/older [approx. 65 years of age and older] adults on television or in other media ?*"; Personal exposure: "*How often do you have personal contact with younger/older adults?*"; Other types of exposure: "*How often do you have other types of contact with younger/older adults?*").

Finally, they responded to the AGED Inventory (Knox, Gekoski, & Kelly, 1995), as a measure of explicit age stereotypes, comprising 28 adjective pairs, with respect to younger (*approx. between 18-30 years of age*) and older (*approx. 65 years of age and older*) adults. Only the subscale of "*positiveness*" (including seven adjective pairs, e.g., 1 = *pessimistic*, 7 = *optimistic*; 1 = *unproductive*, 7 = *productive*) was used in the final analysis.

EXPERIMENTAL TASKS: PASSIVE FACE VIEWING AND OLD/NEW FACE RECOGNITION

As show in Figure 1, the experiment consisted of two tasks: (A) a *Passive Face Viewing Task* during which eye movements were recorded; and (B) an *Old/New Face Recognition Task* during which key press responses and response times, but no eye tracking, were recorded. For both tasks, the experimenter gave verbal instructions and a computer program provided additional written instructions and practice runs.

During the *Passive Face Viewing Task*, participants saw 24 younger and 24 older faces, one face at a time, for a fixed presentation time of 4 seconds. Participants were instructed to "*Look naturally at whatever is interesting to you in the images as if you were at home watching TV*," while blinking naturally. A black cross on a grey background appeared for 2 seconds between trials. No more than two faces of the same age or gender repeated in a row. Overall gaze time and number of gazes (defined as amount of time, and number of times, participants' pupil and corneal reflection were recorded during face presentation) were extracted. In addition, each face was divided into an upper (covering the area around the eyes) and a lower (covering the area around the mouth) half, without overlap or gap, and gaze time of these two areas of interest was extracted.

During the *Old/New Face Recognition Task* participants were shown 48 (24 younger and 24 older) target faces from the passive viewing phase and 48 (24 younger and 24 older) new, distracter faces, again one face at a time, for a fixed interval of 3 seconds. After the face disappeared, the computer prompted participants to make an old/new judgment for the face, before the next face presentation. Again a black cross on a grey background appeared for 2 seconds between trials. No more than two faces of the same age or gender and no more than three target or distracter faces repeated in a row. Target and distracter faces were counterbalanced across participants.

RESULTS

OWN-AGE BIAS IN OLD/NEW FACE RECOGNITION MEMORY

We conducted a mixed-model analysis of variance (ANOVA) on old/new face recognition memory (indexed by d'; Green & Swets, 1966) with *Age of Participants (younger, older)* as a between-subjects factor and *Age of Faces (younger, older)* as a within-subject factor. The main effects of *Age of Participants,* $F(1, 47) = 10.60$, $p < .01$, $\eta_p^2 = .18$, *Age of Faces,* $F(1, 47) = 4.32$, $p < .05$, $\eta_p^2 = .08$) and the *Age of Participants* x *Age of Faces* interaction, $F(1, 47) = 14.79$, $p < .001$, $\eta_p^2 = .24$) were significant (Figure 2A): Both younger and, marginally significant, older participants recognized own-age faces better than other-age faces[2] (Younger participants: $M(d')_{\text{Younger faces}} = 1.99$, $SD = 0.84$, $M(d')_{\text{Older faces}} = 1.42$, $SD = 0.67$; $t(24) = 3.53$, $p < .01$; $M(hits)_{\text{Younger faces}} = 17.2$, $SD = 3.30$, $M(hits)_{\text{Older faces}} = 16.32$, $SD = 3.00$; $M(FA)_{\text{Younger faces}} = 6.75$, $SD = 4.92$, $M(FA)_{\text{Older faces}} = 8.25$, $SD = 4.05$; Older participants: $M(d')_{\text{Younger faces}} = 1.07$, $SD = 0.63$, $M(d')_{\text{Older faces}} = 1.24$, $SD = 0.54$; $t(23) = 1.67$, $p = .11$; $M(hits)_{\text{Younger faces}} = 15.42$, $SD = 4.2$, $M(hits)_{\text{Older faces}} = 19.08$, $SD = 3.84$; $M(FA)_{\text{Younger faces}} = 8.05$, $SD = 5.93$, $M(FA)_{\text{Older faces}} = 10.48$, $SD = 4.80$).

2. In the total sample ($N = 80$; including participants without valid gazing information), the effect was significant in both participant age groups, $F(1, 77) = 16.88$, $p < .001$, $\eta_p^2 = .18$; Younger participants: $M(d')_{\text{Younger faces}} = 1.95$, $SD = 0.80$, $M(d')_{\text{Older faces}} = 1.47$, $SD = 0.66$; $t(46) = 4.07$, $p < .001$; Older participants: $M(d')_{\text{Younger faces}} = 1.02$, $SD = 0.73$, $M(d')_{\text{Older faces}} = 1.22$, $SD = 0.62$; $t(31) = 1.97$, $p = .05$.

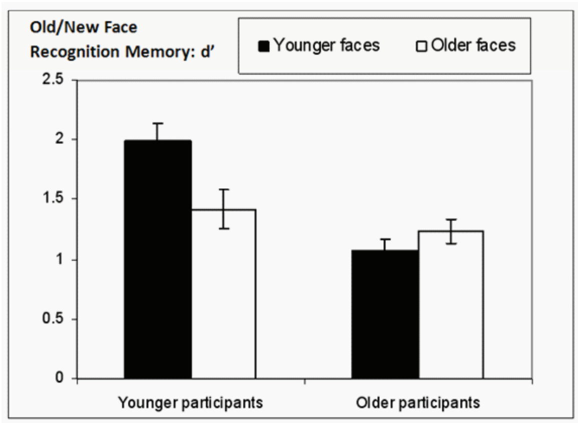

FIGURE 2A.

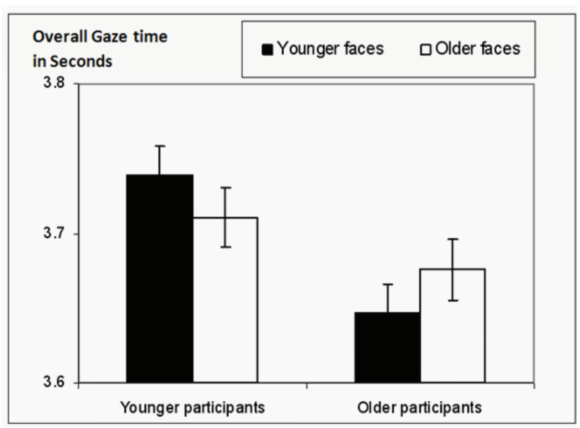

FIGURE 2B.

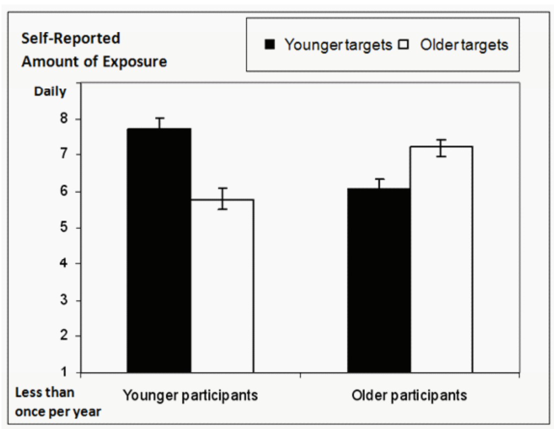

FIGURE 2C.

FIGURE 2A. Significant interaction between *Age of Participants* and *Age of Faces* Observed in Old/New Face Recognition Memory (d′).

FIGURE 2B. Significant interaction between *Age of Participants* and *Age of Faces* Observed in Overall Gaze Time (in Seconds).

FIGURE 2C. Significant interaction between *Age of Participants* and *Age of Targets* Observed in Self-Reported Amount of Exposure to Younger and Older Persons.

Note. Error bars represent standard errors of condition mean differences.

PREDICTORS OF OWN-AGE BIAS IN OLD/NEW FACE RECOGNITION MEMORY

Next, we addressed the questions of whether either overall gaze time at younger and older faces, self-reported amount of exposure to younger and older persons, explicit age stereotypes, and/or implicit age associations predicted the observed own-age bias in old/new face recognition memory. We first tested for an own-age bias in each of these variables.

Overall Gaze Time. We conducted a mixed-model ANOVA on overall gaze time (in seconds) with *Age of Participants (younger, older)* as a between-subjects factor and *Age of Faces (younger, older)* and *Target Face Recognition (correct recognition, missed recognition)* as within-subject factors. None of the main effects were significant but the *Age of Participants* by *Age of Faces* interaction was significant, $F(1, 43) = 4.66$, $p < .05$, $\eta_p^2 = .10$; Figure 2B). The interaction resulted because both age groups tended to look longer at own-age than other-age faces, although neither comparison was independently significant (Younger participants: $M_{\text{Younger faces}} = 3.74$, $SD = 0.29$, $M_{\text{Older faces}} = 3.71$, $SD = 0.28$; $t(23) = 1.40$, $p = .17$; Older participants: $M_{\text{Younger faces}} = 3.65$, $SD = 0.29$, $M_{\text{Older faces}} = 3.68$, $SD = 0.29$; $t(20) = -1.73$, $p = .10$). This pattern of results was similar in the number of gazes on younger and older faces.

Gaze Time at Upper and Lower Half of Faces. To explore gaze time differences in upper versus lower half of faces, respectively, we conducted separate mixed-model ANOVAs with *Age of Participants* as a between-subjects factor and *Age of Faces* and *Target Face Recognition* as within-subject factors. For looking time at lower half of faces there was a significant main effect for *Old Face Recognition* $F(1,43) = 5.22$, $p < .05$, $\eta_p^2 = .11$, with longer gaze time at correctly remembered ($M = 1.00$, $SD = 0.60$) than missed ($M = 0.93$, $SD = 0.65$) faces. No other effect was significant. In addition, for older, but not younger, participants longer gaze time at the upper half of older faces predicted more accurate recognition of older faces ($r = .42$, $p < .05$), while longer gaze time at the lower half of older faces predicted worse recognition of older faces ($r = -.45$, $p < .05$).

Self-Reported Amount of Exposure. We then conducted a mixed-model ANOVA on amount of exposure to younger and older persons (composite score [max: 8, indicating daily contact] of media, personal, and other types of exposure) with *Age of Participants (younger, older)* as a between-subjects factor and *Age of Targets (younger, older)* as a within-subject factor. There were no significant main effects, but the interaction between *Age of Participants* and *Age of Targets* was significant, $F(1, 46) = 55.98$, $p < .001$, $\eta_p^2 = .55$). As shown in Figure 2C, both participant groups had more contact with persons of their own than the other age group (Younger participants: $M_{\text{Younger targets}} = 7.72$, $SD = 0.69$, $M_{\text{Older targets}} = 5.80$, $SD = 1.62$, $t(24) = 6.11$, $p < .001$; Older participants: $M_{\text{Younger targets}} = 6.06$, $SD = 1.39$, $M_{\text{Older targets}} = 7.20$, $SD = 0.76$; $t(22) = 4.46$, $p < .001$).

Explicit Age Stereotype. A mixed-model ANOVA of explicit age stereotype scores (composite score [max = 7] of items from the *positiveness* subscale) with *Age of Participants (younger, older)* as a between-subjects factor and *Age of Targets (younger, older)* as a within-subject factor showed a main effect for *Age of Targets*, $F(1,46) =$

TABLE 2. Results of Multiple Linear Regression Analysis: Predictors of Old/New Face Recognition Memory (Younger Faces/Targets Minus Older Faces/Targets)

Variables	B	SE B	β
Step 1			
Overall Gaze Time (YF - OF)	3.67	1.26	.40*
Step 2			
Overall Gaze Time (YF - OF)	3.46	1.21	.38*
Self-Reported Amount of Exposure (YT - OT)	0.11	0.05	.30*
Step 3			
Overall Gaze Time (YF - OF)	3.40	1.23	.37*
Self-Reported Amount of Exposure (YT - OT)	0.09	0.05	.25+
Explicit Age Stereotypes (YT - OT)	0.02	0.11	.02
Implicit Age Associations	-0.36	0.28	-.17

Note. $R^2 = .28$, and $\Delta R_{Step1}^2 = .16$, $\Delta R_{Step2}^2 = .09$, $\Delta R_{Step3}^2 = .03$; YF = Younger faces, OF = Older faces; YT = Younger targets, OT = Older targets. **p* < .05, +*p* < .10.

34.05, $p < .001$, $\eta_p^2 = .43$): Participants rated younger targets as more positive ($M = 4.98$, $SD = 0.74$) than older targets ($M = 4.17$, $SD = 0.86$). No other effect was significant.

Implicit Age Associations. Conducted separately within younger and older participants, one-sample t-tests (test against 0, which indicates no difference in response time between associating younger faces with positive words as compared to older faces) showed that both age groups had more positive implicit associations for younger than older faces (Younger participants: $M = 0.41$, $SD = 0.30$, $t(24) = 6.99$, $p < .001$; Older participants: $M = 0.55$, $SD = 0.27$, $t(23) = 10.01$, $p < .001$). The difference between younger and older participants was not significant.

Testing Independent Predictors of Own-Age Bias in Old/New Face Recognition Memory. We then conducted a multiple linear regression analysis to examine whether overall gaze time, self-reported amount of exposure, explicit age stereotypes, and implicit age associations (independently) predicted old/new face recognition memory for younger and older faces in younger and older participants. As presented in Table 2, in a first step we entered the difference between overall gaze time at younger as compared to older faces as predictor of the difference between remembering younger as compared to older faces. Overall gaze time significantly predicted old/new face recognition memory. In a second step, we introduced the difference between self-reported amount of exposure to younger as compared to older persons as additional predictor into the model. This variable significantly predicted old/new face recognition memory, over and above overall gaze time. In a third step, we entered the difference between ratings for younger and older persons in terms of positiveness (explicit age stereotypes) and implicit age associations toward younger over older persons as additional predictors. In this model, overall gaze time remained a significant predictor, self-reported amount of exposure became marginally significant, while neither explicit age stereotypes nor implicit age associations significantly predicted the own-age bias in face recognition memory (Table 2).

DISCUSSION

The present study is largely in line with previous findings of an own-age bias in old/new face recognition memory[3] (see Harrison & Hole, 2009). Furthermore, it provides evidence of an own-age bias in visual inspection of younger and older faces (see also Ebner, He, & Johnson, in press), and in the self-reported amount of exposure to younger and older persons in everyday life in younger and older adults. Most importantly, it shows that own-age biases in visual inspection and in self-reported amount of exposure, but neither explicit age stereotypes nor implicit age associations, constitute independent predictors of the own-age bias in face recognition memory. In addition, looking at upper half of older faces was beneficial for old/new face recognition memory in older, but not younger, adults. Below we discuss possible interpretations of these findings.

GREATER PERSONAL AND SOCIAL RELEVANCE OF OWN-AGE THAN OTHER-AGE FACES

It seems likely that greater personal and social relevance for own-age than other-age faces plays an important role in generating the own-age bias in attention and memory observed in the present study (see also Harrison & Hole, 2009). The self-reference effect (Rogers, Kuiper, & Kirker, 1977) suggests that information related to the self is encoded more elaborately and retrieved more accurately than non-self-referential information (Symons & Johnson, 1997). Participants in the present study may have used more self-referential encoding for own-age than other-age faces, as own-age persons are more likely to be similar to the self and to be personally relevant as potential social partners. This greater personal and social relevance may affect individuals' interest in, and their motivation to, carefully scan own-age as compared to other-age faces as reflected in longer overall gaze time and consequently better recognition memory.

MORE ACCESSIBLE AND ELABORATED SCHEMAS FOR OWN-AGE THAN OTHER-AGE FACES

Both younger and older adults reported more everyday contact with own-age than other-age persons (see also Ebner & Johnson, 2009). This is likely to result in more

[3] Whereas young adults were better at remembering own-age than other-age faces, this effect was only marginally significant in older adults. This is consistent with several studies suggesting a more reliable own-age bias in old/new face recognition in younger than older adults (Bartlett & Leslie, 1986; Fulton & Bartlett, 1991; but see Anastasi & Rhodes, 2006; Ebner, Riediger, & Lindenberger, 2009). It is possible that the slightly greater exposure of older adults to younger individuals as compared to younger adults to older individuals as self-reported by participants (see also Ebner & Johnson, 2009) makes the own-age bias less prominent in older adults. In addition, or alternatively, in the present study the age range of older participants (age range: 63-92 years) was much larger than that of younger participants (age range: 18-30 years). This greater age heterogeneity in older participants and the fact that some of the presented older (age range: 69-80 years) but not younger (age range: 18-31 years) faces were not overlapping with the age range of the older participants may have contributed to a less pronounced/homogenous own-age bias in this group.

accessible and elaborated schemas—general knowledge structures or set of beliefs that guide perception, organize information, and reconstruct memory (Bartlett, 1932; Bransford & Johnson, 1973)—for own-age than other-age faces. This interpretation is in line with *Face Space Theory* (Valentine, 1991) suggesting that representations of social in-group (e.g., own-age or own-race) faces are stored along dimensions optimized for individuation of those faces. In contrast, representations of social out-group (e.g., other-age) faces, according to this theory, are stored closer to each other and thus are more difficult to differentiate from one another.

EXPLICIT AND IMPLICIT MEASURES OF POSITIVE/NEGATIVE AGE ASSOCIATIONS

In line with the literature on the negative aging stereotype (Gluth et al., 2010; Hummert et al., 2002; Kite et al., 2005), both younger and older participants showed more positive explicit stereotypes and implicit associations for younger than older persons. Furthermore, in line with indications of no direct influence of racial attitudes and preferences on the own-race bias in face recognition memory (Meissner & Brigham, 2001), neither explicit age stereotypes nor implicit age associations were related to overall looking time, or predicted the own-age bias in face recognition memory. This finding is particularly intriguing, in that it suggests that personal and social relevance and appropriate schemas based on experience, rather than age-related stereotypes, affect how younger and older adults visually inspect and later remember faces of their own as opposed to another age group. If so, there are important practical implications for face recognition contexts, such as eye-witness testimony, or screening for individuals at airports. Stereotypes may affect accuracy at face recognition less than perceived social relevance and available schemas for face processing.

IN-GROUP/OUT-GROUP DIFFERENTIATION

The present findings for age of face are similar to those obtained in studies on race of face. There is an "own-race bias" (Meissner & Brigham, 2001) reflected in more fixations on own-race than other-race faces with differences in visual scan patterns predicting better recognition of own-race than other-race faces (Goldinger, He, & Papesh, 2009). These similarities in the pattern of results pertaining to age and race of faces suggest general in-group/out-group processing differences at encoding and/or retrieval of faces (Ebner, He, Fichtenholtz, McCarthy, & Johnson, 2010; Symons & Johnson, 1997).

WHAT PREDICTS THE OWN-AGE BIAS IN FACE RECOGNITION MEMORY?

To conclude, during passive free viewing, younger and older adults tended to spend more time looking at own-age than other-age faces, which is possibly related to greater self-relevance of, and social motivation for, faces of their own age group. Furthermore, both age groups reported more frequent exposure to own-age than other-age persons in their daily routines, which likely leads to a more available repertoire of exemplars/associations ("that person looks like Joe") or better schemas for configural encoding of features of own-age individuals. Importantly, both these effects (longer looking time and greater self-reported amount of exposure for own-age faces), but not age-related attitudes and associations, made unique contributions to explaining better recognition memory for own-age than other-age faces.

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