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FACE PERCEPTION AND IDENTIFICATION

By

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Undergraduate Professional Paper

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Approved by:

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ABSTRACT

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Face Perception and Identification

Faculty Mentor: Yoonhee Jang

The present research aimed to examine the combined effects of the own-race effect and own-age bias in relation to memory performance. The own-race effect suggests that individuals perform better when asked to remember faces of the same race as their own, as opposed to faces of a different race (Meissner, Brigham & Butz, 2005). Own-age bias is a tendency for individuals to perform better when remembering faces from the same age group as their own (Rhodes & Anastasi, 2005, 2012). It was hypothesized that when recognizing faces of a different age and race, memory accuracy would be worse, when compared to faces of either the same age or same race. Significant differences were expected across all conditions. 25 White participants (18 females, 7 males) age 18-31 were recruited online using Sona Systems and flyers posted on campus. E-prime was used to create and run the experiment on a computer. Participants were asked to remember a series of face pictures (adopted from Minear & Park, 2004), which consisted of (1) white-old; (2) white-young; (3) black-old; and (4) black-young face pictures. Their memory was assessed by a "yes-no" recognition memory test in which half of the test items were studied faces (40), and half were non-studied faces (40). Hit rate and false alarm rate were recorded, in order to calculate mean accuracy. No significant differences were found in relation to race. Past studies were replicated in relation to own-age bias, with the white-old and black-old conditions having a significantly lower mean accuracy than the white-young and black-young conditions respectively. The mean accuracy of the black-young condition was marginally higher than the mean accuracy of the white-young condition.

Face Perception and Identification

The own-race effect suggests that individuals perform better when asked to remember faces of the same race as their own, as opposed to faces of a different race (Meissner, Brigham, & Butz, 2005). Own-age bias is a tendency for individuals to perform better when remembering faces from the same age group as their own (Rhodes & Anastasi, 2005, 2012). Studies suggest that own-age bias is influenced by recent exposure (Rhodes & Anastasi, 2005, 2012). As Tham, Bremner, and Hay (2017) mention, the own-race effect is also influenced by exposure. These concepts also have an effect on recognition and memory performance (Meissner, et al., 2005; Rhodes & Anastasi, 2005, 2012). The goal of this research was to examine the combined effects of the own-race effect and own-age bias in relation to memory performance.

In terms of memory, own-age bias and the own-race effect can influence day-to-day life. Often these two phenomena collide in daily life, and it can be important in eyewitness identification, reducing implicit bias, as well as other aspects of life that rely heavily on memory performance. The present research is especially important considering the low level of diversity and high number of Whites living in Montana. As of 2017, African Americans and Blacks make up merely 0.06% of the population in Montana (U.S. Census Bureau, 2017).

In a study by Anastasi and Rhodes (2005), participants were given a “yes-no” recognition task. This was to further examine own-age bias in young children (5-8 years of age), and older adults (55-89 years of age). The study consisted of two phases: a study phase and a test phase. During the study phase, participants were shown a series of 32 face pictures of various ages, with an equal amount of male and female pictures. Each face picture was shown for 10 seconds. Participants were asked to classify each picture into one of four age groups: 5–8, 18–25, 35–45, or 55–75 years old. In-between the study and test phase, a short distractor task was given to the participants, which consisted of an object search puzzle. Following the distractor task, the test phase began. 64 face pictures were shown to the participants, each for 10 seconds. 32 of the face pictures were alternate-pose pictures of the individuals shown during the study phase. The participants were instructed to circle “yes” for a picture they had seen during the study phase, and “no” for a picture they had not seen during the study phase.

A previous study that examined the own-race effect similarly assessed the participants’ memory by using an “new-old” recognition task (Meissner, et al., 2005). During the study phase,

participants were shown a set of 80 male face pictures (40 black, 40 white), for 3 seconds each. The participants were instructed to remember the face pictures. Afterwards, participants were given a short distractor task. This distractor task consisted of a number search puzzle. Immediately following the distractor task, the test phase began. During these trials, participants were asked if each face picture was "new" or "old". The participants were also asked to provide a confidence rating, on a 6-point Likert scale. The Likert scale started with "sure-new" and ended with "sure-old". If a participant said a picture was old, they were also asked to describe their memory using "Remember, Know, Guess" responses. These responses were given to the participants.

The present study used a similar procedure to Meissner, et al. (2005). However, the confidence judgements, "Remember, Know, Guess" responses, distractor task, and response time were excluded. Various studies have been conducted on the own-race effect or own-age bias. However, few studies take measures to combine these two effects. Significant differences were expected across all conditions: (1) white-old; (2) white-young; (3) black-old; (4) black-young. Accuracy was expected to be the lowest for the black-old condition, and highest for the white-young condition.

Method

Participants

25 White participants (18 females, 7 males) age 18-31 (M = 20.61; Median = 20) were recruited online using Sona Systems and flyers posted on campus. Participants who did not fit these demographics were excluded. Compensation was given in the form of 1 credit on Sona Systems or $5.00. Participants were not informed about the nature of the experiment, except a brief description. This brief description involved indicating to the participants that the study involved memory, and different types of face pictures.

Design

A 2 x 2 within-subjects factorial design was used. The independent variables were race (white vs. black) and age (old vs. young). Participants were shown a series of 40 face pictures that consisted of: (1) white-old; (2) white-young, (3) black-old; (4) black-young. The order of the face pictures were randomized and counterbalanced to reduce order effects. 40 of the face pictures (10 white-old; 10 white-young; 10 black-old; 10 black-young) were shown in the study

phase. The 40 remaining face pictures (10 for each condition), in combination with the previous 40 face pictures, were shown during the test phase.

Materials

80 female face pictures were randomly selected from a face database (40 studied, 40 non-studied): 20 white-old; 20 white-young; 20 black-old; 20 black-young (adopted from Minear & Park, 2004: see *Figure 1*). Face pictures were standardized by converting all pictures to black and white, and were cropped to remove clothing items. The white-young and black-young conditions consisted of face pictures from individuals 18-24 years old. For the black-old and white-old conditions, the face pictures were from individuals 60-90 years old. E-prime was used to create and run the study on a computer.

Procedure

The participants were first familiarized with the task. Participants were familiarized with the task by being given a practice trial on the computer before beginning the critical trials. The practice trial had a study and test phase and had the same setup as the critical trials. The sole difference was that it was notably shorter. None of the face pictures used in the practice trial were re-used in the critical trials.

Following the practice trial, participants started the critical trials. The first half of the critical trials consisted of a study phase. 40 face pictures (20 studied, 20 non-studied) were presented to the participants on a computer during the study phase (Minear & Park, 2004). 10 face pictures were shown for each condition (see *Figure 1)*. The pictures were shown for 3 seconds each in a randomized order, and were counterbalanced to reduce order effects. During the study phase, the participants were directed to pay attention to the face pictures and to remember them to the best of their ability.

A short break was given in between the study and practice trials. No distractor task was given during this break. Immediately following the break, the test phase began. For the test phase, the participants' memory was assessed by a “yes-no" recognition memory test in which half of the test items were studied faces, and half were non-studied faces. Participants were shown 80 face pictures during the test phase (20 white-old; 20 white-young; 20 black-old; 20 black-young). A fixation was shown preceding each face picture, and participants were instructed to pay attention to the fixation and pictures. The fixation was presented for 1 second, and the pictures were shown until a response was given. After each face picture, participants

were prompted to respond “yes” if they believed the picture to be a studied face, or “no” if they believed the picture to be a non-studied face. Hit rate and false alarm rate were recorded for each participant.

Results

Hit rate (correctly say “yes” for targets: *Figure 2*) and false alarm rate (mistakenly said yes” for foils: *Figure 3*) were recorded to calculate mean accuracy (Hit rate – False alarm rate: *Figure 4*). For hit rate, no significant differences were found in relation to race, age, or the interaction of age and race: for each, $F(1,24)<1$. These results suggest that there were no significant differences for any of the conditions in relation to mean correct responses for studied faces.

For false alarm rate, no significant differences were found in relation to race, $F(1,24)=1.07$, $p=.312$. Regarding age, significant differences were found, $F(1,24)=29.98$, $p<.001$. Significant differences were found in relation to the interaction of age and race, for the white-young and black-young conditions, $t(24)=2.82$, $p=.009$. No significant differences were found for the black-old and white-old conditions, $t(24)=0.53$, $p=.602$.

In terms of corrected recognition score (mean accuracy), no significant differences were found in relation to race, $F(1,24)<1$. In other words, this study did not replicate past studies (research) in terms of the own-race effect. Significant differences were found for age, $F(1,24)=22.27$, $p<.001$. These results suggest age had an effect on mean accuracy, with both the white-young and black-young conditions showing a significantly higher accuracy than the white-old and black-old conditions respectively. Given past studies, this research successfully replicated own-age bias.

Marginally significant differences were found in regard to the interaction of age and race, for the white-young and black-young conditions, $t(24)=1.90$, $p=.069$. No significant differences were found for the white-old and black-old conditions for the interaction of age and race, $t(24)=0.79$, $p=.439$. Interestingly, the results show that the mean accuracy for the black-young condition was higher than the mean accuracy for the white-young condition.

Discussion

Although previous studies suggest that there is a tendency for individuals to perform better when remembering faces from the same racial group as their own, this study was not able to replicate those findings (Meissner et al., 2005). There were no significant differences found

between the white-old and black-old conditions, as well as the white-young and black-young conditions respectively, in terms of mean accuracy.

Previous research suggests that individuals perform better when remembering faces from the same age group as their own (Rhodes & Anastasi, 2005, 2012). This study was successfully able to replicate those past findings. Significant differences were expected across all conditions. However, the results do not support this. Significant differences were found only in relation to age. Marginally significant differences were found between the white-young and black-young conditions.

The black-young condition unexpectedly had a significantly higher mean accuracy than the white-young condition. A salient possibility for this is the presence of the von Restorff effect, in collaboration with own-age bias. Previous studies suggest the von Restorff effect (distinct stimuli in the midst of homogenous stimuli) can impact memory performance in relation to distinct facial features (Cohen & Carr, 1975; Main, Leland, & Bartlett, 1998).

The memory performance of the black-young condition might have been marginally higher than the white-young condition due to the limited demographic of the subject pool and low diversity rates in Montana. African Americans and Blacks make up 0.06% of the population in Montana (U.S. Census Bureau, 2017). When looking at memory in relation to facial recognition, faces that are rated more distinctive are remembered more accurately than faces that are rated to be non-distinctive (Cohen & Carr, 1975). This suggests that there is a von Restorff effect for faces. This effect could explain the findings of this study. Furthermore, limited exposure to black-young and black-old faces could have had an effect on the mean accuracy of all conditions, due to the von Restorff effect. The lower accuracy of the black-old faces could be attributed to the effects of distinct stimuli being extinguished by own-age bias.

Limitations for this study include small sample size and low diversity in the chosen subject pool. The small sample size and low diversity of the subject pool reduces the validity of generalizing the data to outside populations. Another limitation was the limited amount of face pictures that were available to use for this study. Previous studies have used up to 160 face pictures, while this study only used 80 due to limited available materials (Meissner et al., 2005). Due to most of the face pictures being of traditional college age, it is difficult to find enough face pictures from different age groups. Especially when separated into racial groups.

Additional editing of the face pictures to remove distinct articles of clothing, such as earrings, will ensure that any possible confounding effects are reduced for future research. Other aims will be to expand the target demographic of participants to include multiple racial and age groups, in order to examine the effects of the own-race effect and own-age bias in a more diverse subject pool. Continued examination of the suggested differences between the black-young and white-young condition is imperative. Further research into memory performance in relation to the own-race effect and own-age bias could possibly allow for further conclusions to be reached concerning these results.

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Figures

Figure 1. Example of face pictures used in the study. Participants were shown a series of face pictures which consisted of: (1) white-old; (2) white-young; (3) black-old; (4) black-young.

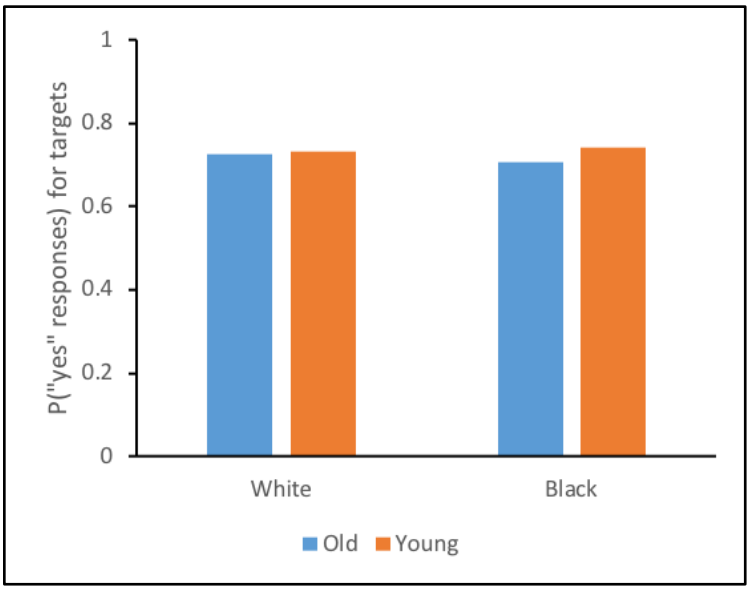

Figure 2. Mean correct responses to studied faces. This figure illustrates the mean number of times participants correctly said “yes” to a studied face picture.

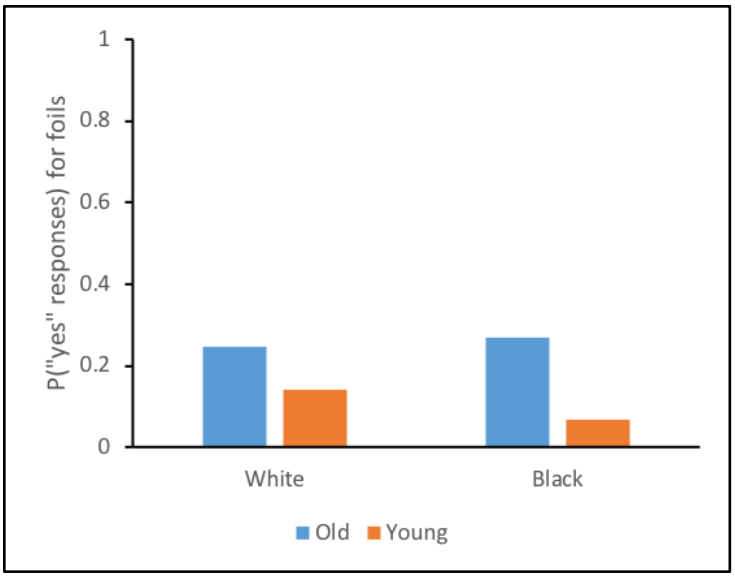

Figure 3. Mean incorrect responses to non-studied faces. This figure illustrates the mean number of times participants said “yes” to a non-studied face picture.

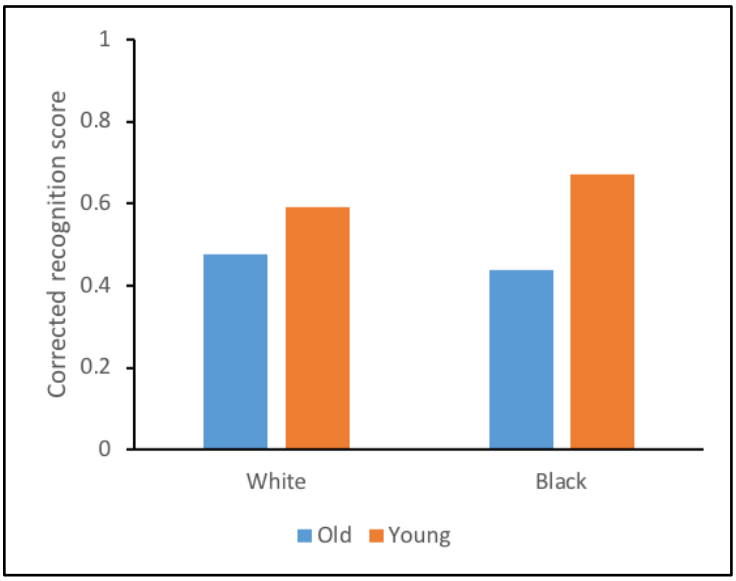

Figure 4. Mean accuracy (hit rate - false alarm rate). This figure illustrates the corrected recognition score (mean accuracy) for all conditions.