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Recognizing the Other: Training's Ability to Improve Other Race Individuation

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RECOGNIZING THE OTHER: TRAINING'S ABILITY TO IMPROVE OTHER RACE INDIVIDUATION

by

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(Under the Direction of Amy Hackney, Ph. D.)

ABSTRACT

Members of one race or ethnicity are less able to individuate members of another race compared to their own race peers. This phenomenon is known as the other race effect (ORE) or the cross race effect (CRE). Not only are individuals less able to identify members of the other race but they are also more likely to pick those individuals out of a crowd. The categorization-individuation model predicts that this deficit arises from a lack of motivated individuation; in which members of the other race are remembered at the category level as a prototype while own race members are remembered by name with individual characteristics. Discrimination training regimes derived from animal research for use in humans have demonstrated efficacy at improving discrimination of novel stimuli after several hours of training because participants are motivated to remember the face as an individual. The current study tested a shortened individuation training program using twelve own race/other race stimuli paired with names or letters. A go/no-go task was used to measure transfer of individuation ability. The present research demonstrates that a regimen as short as described is not sufficient to improve recognition. Future directions for research are discussed in consideration of tentative results including modifications of both the training task and transfer test.

INDEX WORDS: Other race effect, individuation training, perceptual expertise, motivation, prejudice, bias,

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Recognizing the Other:

Training's Ability to Improve Other Race Individuation

In 1971, five Black men were wrongfully convicted for the murder of a deputy sheriff. Five White eyewitnesses convicted them without any direct physical evidence of their involvement. The state argued in that case that the eyewitnesses, who expressed no overt discrimination, should be perfectly able to remember and recall the physical characteristics of Black men. These men, now known as the Quincy Five, have since been exonerated (Meissner & Brigham, 2001). They were the victims of eyewitness misidentification. According to the Innocence Project, at least 40% of wrongful convictions in the U.S. are due to cross racial misidentifications (The Innocence Project, April 21, 2013). Research indicates that individuals have difficulty distinguishing between the faces of members of another race.

This other race effect (ORE) or cross race effect (CRE) manifests in two ways: individuals identify members of the other race more quickly in a crowd and are slower in differentiating individuals of the other race from one another (Bothwell, Brigham, & Malpass, 1989; Lipp, et. al., 2009; Zhao & Bentin, 2011). According to the categorization-individuation model (Hugenberg, Young, Bernstein, & Sacco, 2010) an individual's superior own race face recognition is based on two factors: massive passive exposure to own race faces and frequent attempts to individuate own race people at the subcategory level of name. Other race people are more likely to be individuated as members of their race and remembered as prototypes. People spend most of their lives surrounded by friends and family who look like them, with names and back stories they are expected to remember. This practice in individuating own race members leads people who look like us to be processed as individuals and people who do not look like us are processed as others. As will be detailed below, this model explains why people who grew up in diverse neighborhoods show some increase in individuation but also predicts that training that requires people to remember members of another race by name can improve other race individuation (Hugenberg, et al., 2010).

The Other Race Effect

The ORE has a powerful and enduring influence over our interpersonal relationships that withstands training and exposure and has been documented in infants as young as 6 months old by Wheeler and colleagues (2011). Ellis, Deregowski and Shepherd (1975) studied the features used by Black and White participants to describe own and other race faces. They discovered that White participants focused primarily on eye color, hair color, and texture while Black participants focused more on facial features such as brow position and profile. This difference in the features that constitute identity diagnostic criteria across race is a key feature in perceptual expertise models of the ORE.

Another key feature is the amount of identifying information someone is able to extract from a face. Amount of information gleaned is predicted by the viewer’s expertise but also by the presentation style of the face. For example, faces in motion contain more information than static faces and are easier to individuate. In a study by Wheeler and colleagues (2011) White infants aged six to ten months with little exposure to Black faces were shown silent videos of Black or White women counting for thirty seconds. The researchers tracked the infant's eye movements as they attended to features of the face and the face as a whole. On average, infants spent similar amounts of time attending to own and other race faces and older infants in the study spent less time looking at the face regardless of stimulus race. Infants attended more to the eyes and less to the mouth of own race faces as a function of age with older infants attending most to the eyes. There was no change in fixation for other race faces as a function of age (Wheeler, et.

al., 2011). Butcher, Lander, Fang, and Costen (2011) showed adult participants videos of moving faces or static images of faces and tested for memory of the stimulus faces. Results demonstrated that own race faces in motion were recalled most and static other race faces were recalled the least; other race faces in motion, however, were individuated at a rate greater than static own race faces. Faces in motion present a more complete representation of the face than a static face, which would explain how participants were able to extract more identity diagnostic information from an other race moving face than an own race static face. Awareness of the features that differentiate members of another race from each other predicts recognition ability as well as the presentation style.

The ORE is evident when tested with both cognitive and physiological measures. Hayward, Rhodes, & Schwaninger (2007) tested the facial perception ability of self and other race faces when the face was scrambled or blurred. Across all trials, own race faces were better remembered than those of other races. Other race faces appear to require more effort to process for the participant. Research on eye tracking and pupillometry shows that when trying to encode other race faces participants fixate on features longer but less frequently than when viewing own race faces. Pupils were also more dilated when participants viewed other race faces when compared to own race faces implying that the participant is autonomically aroused (Goldinger, He, & Papesh, 2009). Studies using functional magnetic resonance imaging (fMRI) have demonstrated that individuals viewing other race faces show different patterns of neurological activation compared to own race faces. The pattern is predictable enough that an observer can identify the race of the stimulus by looking at the readout even when they are blind to the studies conditions (Natu, Raboy, & O’Toole, 2010). The ORE is evident across many experimental modalities, develops early in life and impacts behavior across the life span.

The Categorization-Individuation Model

Social psychological models to explain the cause of the other race effect fall into one of two categories: perceptual experience and social cognition. Models based on perceptual experience state that the ORE arises from our de facto segregation and subsequent frequent experience individuating own race faces and infrequent experience with other race people (Meissner & Brigham, 2001). Social cognition models state that the ORE arises from a tendency to think of in-group members as individuals and of out-group members as representatives of a category.

There are two prominent social cognition models: Feature selection and cognitive disregard. The feature selection model (Levin, 2000) states that, when observing an other race face, people look for category diagnostic features, which blocks the encoding of identity diagnostic criteria. This model predicts a recognition deficit for other race faces but also predicts that other race faces will be categorized faster because the participant will stop encoding an other race face at the category level but will continue to scan an own race face for identity diagnostic criteria. The cognitive disregard model (Rodin, 1987) states that when a face is categorized as other an individual is less willing to extend cognitive resources to individuate and is more likely to rely on generalizations. This model predicts that, in a test of other race recognition, participants will guess outright or show preference for an exemplar of the category. This preference for the exemplar is explained within the model in that a participant will choose the face that most closely matches the general, internal representation of that category if they don't recall the encoded face.

A new model integrates perceptual expertise and social cognition models into a new model called the categorization individuation model (CIM). The CIM includes three components: categorization, motivation, and experience. The first step in encoding a face is a category judgment and after categorization situational cues and individual motivation predict the energy the individual is willing to extend to individuate. The final component is perceptual experience with the category of face being encoded. The CIM makes predictions that provide insight into the effect of training on individuation namely that individuation experience allows for improved face memory and that individuation is relative to motivation. Experience allows people to identify the features that set category members apart from each other and motivation encourages them to pay close attention to (or ignore) those identifying characteristics (Hugenberg, et al., 2010).

Expertise models alone cannot fully account for the ORE because these models do not differentiate between quality and quantity of interracial contact and do not provide an explanation of the internal moderators of cross race facial recognition. Expertise models also cannot explain how the presentation of the face (as angry, happy or high status, etc.) alters recognition. Social cognition models suffer due to evidence that other race recognition can be trained and that considerable, early experience with other race people during development alters the own race bias. For example, infants adopted into other race families exhibit a less drastic to reversed ORE compared to infants raised in own race families. Social cognition theories of the ORE assume that the effect is driven by personal identification and categorization (Young, Hugenberg, Bernstein, & Sacco, 2011). An integrated model such as the CIM can explain the process of individuation training because there are two processes involved in improved face recognition. Participants will gain perceptual expertise during the training but will also be trained to see an other race face as an individual by recalling that face by name.

Mitigation of the ORE

There are potential ways to mitigate the ORE in practice. Cassidy, Quinn, & Humphreys (2010) improved individuation of other race members by adding in-group salience to the facial stimuli in a same/different task. White participants were randomly assigned to view either pictures of students paired with the logo of the university where the research was performed or with the logo of a rival university. All participants viewed pictures of both own and other race faces manipulated to be either in- or out-group. Participants were best able to individuate own race faces from the home university but adding in-group saliency to other race faces improved performance on the individuation task compared to out-group or no group membership.

Kask and Rundu (2011) were not able to replicate an effect of in-group saliency in a study in their native Estonia. In their study group saliency was manipulated using names to represent White people with different countries of origin. Own race faces were shown to participants with names common to Estonians (own country or in-group) or Russians (other country or out-group) as well as Black faces with names common to Africans. The Black faces were included so that results for other country faces could be compared to the results for other race faces. Participants exhibited no difference in their memory and recognition of own and other country faces but exhibited deficits for memory and recognition of other race faces.

Tanaka and Pierce (2009) trained participants to recognize faces of other race individuals by either categorizing the faces according to race or by individuating the faces according to a label arbitrarily assigned to the face. After training, participants who took the individuation training showed improvement over their pretest ability. Participants who took categorization training showed no improvement on post-test individuation ability. This is predicted by the categorization-individuation model because people recall other race faces at a category level and requiring them to remember the face by name would encourage future individuation (Hugenberg, et al., 2010).

The facial recognition system appears to be plastic early in life and early experiences with members of another race diminish but do not eliminate the ORE in adults. Research on Korean infants adopted into other race families at an early age demonstrates that their facial recognition ability for other race faces was similar to the recognition ability of children raised by their own parents and of adults. The study children behaved as if they were White children, not Korean children (Sangrigoli, Pallier, Argenti, Ventureyra, & de Schonen, 2005).

This pattern of results was replicated in a study by de Heering, de Liedekerke, Deboni, & Rossion (2010) on Asian infants adopted and raised by White families. Asian infants adopted by White families were matched by age, gender and socioeconomic status with White infants raised under similar circumstances in White families. Adopted Asian children did not demonstrate a complete reversal of own race preference but their own race preference was less than is usually observed.

It is not clear from these results if massive exposure to other race faces early in life is required to mitigate the ORE or if there is some effect from living in a mixed race household or a diverse neighborhood (de Heering, de Liedekerke, Deboni, & Rossion, 2010). Research on a small (1%) population of African immigrants living in Israel suggests that children from a small minority population experience less own race preference even if their immediate rearing environment is made up primarily of own race people (Bar-Haim, Ziv, Lamy, & Hodes, 2006). Similar research on Chinese immigrants in Australia replicates these findings. Participant’s recognition ability of Caucasian faces improved as a direct function of their time in Australia

(Rhodes, et al. 2009). Increased time as a minority amongst the majority decreases the effect of the ORE because of increased individuation experience (Rhodes, et al. 2009).

Immigrants and members of the minority are often in a low status position relative to the predominant racial group and status has a demonstrated effect on individuation ability (Ratcliff, et al., 2011). Across three studies on recognition accuracy status of the stimulus face was manipulated by telling the participant that the stimulus was of someone of high status (doctor or general) or of low status (cook or mechanic) or by showing the stimulus face in clothes indicative of those positions. Even when the faces were scrambled there was improved accuracy for high status faces and participants used more precise encoding strategies (Ratcliff, et al., 2011).

A study by Young and Hugenberg (2011) tested the motivational component of the categorization-individuation model by using explicit instructions as motivators. All participants were White and assessed for their cross race experience. In experiment one participants were told to pay special attention to other race faces and in a second experiment faces were displayed with an angry or neutral expression. Anger was hypothesized to motivate participants because it was a signal for potential danger. In both experiments the stimulated motive to individuate diminished the ORE. In experiment 1 individuation ability was still reliant on participants' experience with other race people and in experiment 2 motivation alone without experience was enough to improve individuation. Training programs provide a motivation to individuate not only through instructions but also with feedback and a participant's desire to reach criterion and exit the task. While the ORE is consistently demonstrated across contexts, racial groups, and the lifespan it is not inevitable. Situational variables such as experience and motivation can alter face memory and recognition.

Individuation Training

The ORE is in place early in child development but there are promising results from individuation training regimens in adults to diminish the effect. Tanaka, Curran and Sheinberg (2005) developed a training scheme to help people discriminate between bird species. Participants were trained to categorize birds at the basic family level or at the subordinate level. Participants were required in different conditions to select whether the stimulus was a wading bird or an owl and in another condition to identify the species of bird. Participants who received family level training showed a significant improvement over pretest bird discrimination ability.

The program was later adapted to improve individuation of infant faces. Neo-natal nurses over the course of their careers have seen thousands of infant faces but are no better at infant individuation when compared to other women of similar age and background. Experience alone is not enough to affect individuation even when that exposure is to countless faces in many circumstances. The nurses were not motivated to see the infants as anything more than infants so they did not develop the ability to discriminate infants at a subcategory level. After nurses completed focused training for infant individuation their newborn face recognition improved significantly (Yovel, et. al., 2012).

A study using the same training paradigm but with Black and White faces as the training stimuli confirmed the efficacy of individuation training with human faces (McGugin, Tanaka, Lebrecht, Tarr, & Gauthier, 2011). The regimen used by all of these studies is onerous involving many hours of training over several days to complete but is effective nonetheless. There are five phases to the training:

- Phase 1: Individuation inspection. Participants are shown the training faces with names for 5 seconds.

- Phase 2: Naming with response. Participants are shown the training faces and names and asked to indicate the first letter of the corresponding name.
- Phase 3: Naming with feedback. Faces are presented and participants must indicate the first letter of the correct name. Feedback is given for incorrect responses.
- Phase 4: Naming. Same as phase 3 but no feedback is given.
- Phase 5: Verification. A name is shown for 1 second followed by a face and the participant must indicate whether the name and face match. Feedback is given for incorrect responses.

On day one, participants are given a pretest and start training on the first six of twelve faces working through phases 1 through 5 in order. On day two, training on faces 1 through 6 is given but only using phases 3 through 5. Day two training also includes training on faces 7 through 12 using phases 1 through 5. On day three, faces 7 through 12 are trained using phases 3 through 5. After training, there is a post-test on the trained faces and one on a set of novel faces. Training takes around thirty minutes on days one and three and sixty minutes on day two for a minimum of two hours total (Yovel, et al., 2012). Individuation training is based in a perceptual expertise model of the ORE and the CIM predicts that expertise alone is not enough to improve individuation; an individual also needs motivation. Intergroup attitudes predict motivation to individuate (Hugenberg, et al., 2010).

Intergroup Attitudes

Attitudes are general evaluations of people, ideas, or places and are traditionally measured using self-report measures (Smith & Fabringer, 2000) or more recently using implicit measures such as the implicit association task (IAT). IATs measure the ease with which people associate concepts with each other and are most often used to measure the association between groups of people and concepts of good or bad. Ease of association is measured by the reaction time when one response corresponds to a pair of attitudes (Greenwald & Banaji 1995).Implicit attitudes impact behavior in subtle ways that are below voluntary recall and develop at a similar time in life as the ORE. Implicit and self-reported attitudes might provide insight into individuation ability (Gawronski, 2009).

In a study by Ferguson, Rhodes, Lee, & Sriram (2001) prejudice was not found to influence cross-race face recognition. The study used the bona fide pipeline measure of implicit bias (See Fazio, Jackson, Dunton, & Williams, 1995) with White and Chinese faces and good or bad words and Walker's (1994) Attitudes towards Asian scale as a measure of self-reported prejudice against Asians. No impact of prejudice was found for either measure of recognition accuracy. Participants were shown Asian or White faces and were later assessed for recall of those faces as a measure of recognition bias. There was no interaction effect between prejudice levels and race of the face on measures of recognition accuracy. There was an interaction between participant race and self-reported prejudice such that White participants with high levels of own race preference showed increased own race recognition (Ferguson, Rhodes, Lee, & Sriram, 2001). The extent to which intergroup attitudes influence and are influenced by individuation ability is not yet certain.

Individuation training similar to the process outlined above has a demonstrated effect on implicit racial bias when compared to categorization training in Caucasian participants. Lebrecht, Pierce, Tarr, and Tanaka (2009) measured implicit race bias using the affective lexical priming score (ALPS) which combines a facial recognition task with a lexical decision task with positive and negative words. In the ALPS bias is measured by the amount of time to respond to a letter string after a face when those words are negative or positive. Fast responses to other race faces and positive words imply low bias and vice versa. The ALPS was administered before and after a training program where stimulus faces had to be remembered by letter or by their racial category. Participants administered individuation training experienced significant reduction in their other race bias. Training with names should magnify this effect if names are successful at increasing individuation. Attitudes towards own and other race people can predict motivation and ability to individuate and in turn may be affected by training.

Research Summary and Description of Procedures

The other race effect is one of the most consistently observed social psychological phenomena (Meissner & Brigham, 2001). The categorization individuation model (CIM) integrates research that finds this deficit results from lack of experience individuating other race faces relative to own race faces and from research that attitudes and motivation are integral as well. Using the CIM we predicted that training would have an effect on other race recognition by giving the participant direct experience individuating other race people and that this training would motivate the participant to individuate by lowering implicit bias against other race people (Hugenberg, et al., 2010). To test these predictions the following tasks were used.

Match to name task. This task extends the individuation training designed by Tanaka, Curran and Sheinberg (2005). In the original task two groups of six faces are trained on different days and the experimental training combines those two training blocks. In the original training the participant only needed to indicate the first letter of the name assigned to the face but we maintained the name because of evidence that giving names to faces affects individuation on subsequent transfer tasks (Kask & Rundu, 2012; McGugin, et al., 2011). Twelve faces were displayed with names underneath for five seconds followed by a half second white mask. After all faces were displayed the participant was shown the faces again in a random order and asked to select the name that corresponded to the face. Feedback was given for correct and incorrect responses and the participant repeated the training from the beginning until the 85% criterion was met. This was the criterion used in a study of concept learning on pigeons (Blaisdell, & Cook, 2005) and existing literature on animals supports using stimuli in groups of six or twelve (Cook, Kelly, & Katz, 2003). The human individuation training also supports stimuli in groups of twelve (McGugin, et al. 2011; Yovel, et. al., 2012) and stimulus presentation of five seconds (Tanaka, Curran, & Sheinberg, 2005). See Appendix A.

Match to letter task. The procedure for match to letter was identical to match to name but using the letters A-L instead of names. This task served to control the match to name task and determine if the addition of a name contributed to individuation ability more than an arbitrary label. See Appendix A.

Go/no-go task. The extent to which race is a social construct or a natural distinction has long been disputed in social science research (Smedley & Smedley, 2005). Comparative psychology includes research on concept learning that may explain the process involved with individuation training. Concepts are the rules by which sets of stimuli can be organized. To learn the concept is to learn that associative rule. Classic work on concept learning creates a distinction between natural and unnatural concepts. An unnatural concept has an order established by the researcher and a natural concept comes by its rule naturally. Natural concepts are more readily learned and more easily generalized by non-human animals (Herrnstein, 1979; Wasserman, Kiedinger, Bhatt, 1988). “Human” has been tested as a natural concept and monkeys were able to acquire that concept faster than non-human related stimuli (D'Amato, & Van Sant, 1988). A go/no-go (GNG) task is a common task of learning in animal subjects and was used to test the extent to which the participants had learned to individuate. A set of twelve faces was displayed one by one to the participant for five seconds each. Six of the faces were go faces and the other six were no go faces. Successful completion of a go trial required the user to press the spacebar within the first two seconds the face was displayed. The participant was given explicit instructions before the session starts. Successful completion of a no-go trial required users to abstain from pressing the spacebar for the whole five-second display time. Feedback was given for both correct and incorrect responses to help the participant improve on subsequent sessions. The session repeated from the beginning with the faces randomized four more times for a total of five sessions. Successful completion of the GNG task depended on the participant's ability to individuate and remember a face.

Implicit Association Test. The IAT used in this study is based on the original published by Greenwald and Banaji (1995) and is divided into five blocks, three training blocks and two test blocks. In block 1 participants had to identify the race of the stimulus picture using the "Q" or "P" keys. The participant was instructed to press Q if the stimulus was White or P if the stimulus is Black; there were labels at the top left and right of the screen to remind the user of the appropriate response. In block 2, participants had to correctly identify words that are either positive (love, peace, happiness, etc.) or negative (war, hunger, ugly, etc.). In block 3, the first test block, participants had to correctly identify if the stimulus is a Black/White face or a positive/negative word. Block 4 was another race identification task but with the responses reversed with White on the right and Black on the left (see figure 1). In block five Black was paired with good and White was paired with bad and participants must respond accordingly. Feedback was given in each block for incorrect responses. See Appendix B.

Hypotheses

The primary hypothesis was that brief training as outlined had the possibility of improving other race face recognition as measured by performance across GNG sessions. The secondary hypothesis was that training with names as compared to training with letters would increase individuation as measured by the number of trials to criterion during the training and differential performance during the GNG task as participants would need to remember the stimulus at an individual level to continue. It was also hypothesized that other race training may affect implicitly measured racial attitudes.

Chapter 2 - Method

Participants

One hundred twenty-four participants completed this study (77 female, 42 male, 5 declined to answer; 44 White, 49 Black, 31 Other or declined to answer). The average age of participants was 19.7 years (*SD* = 3.3). Participants were recruited through the Georgia Southern SONA systems and compensated with course credit or extra credit for their participation.

Stimuli

All faces were compiled by Cassidy, Quinn, & Humphreys (2010) to support their research. They were sourced from the Cal/Pal face database (Minear & Park, 2004), the Stanford Face Data Base (Eberhardt, Davies, Purdie, Vaughns, & Johnson, 2006) and to support research performed by Shriver and colleagues (2008). Faces were presented in gray scale with clothes and background cropped out. See Appendix A for sample stimuli.

Design

A 2 (name or letter) by 2 (own or other) by 5 (GNG trials) design was used in this study with repeated measures on the last factor.

Measures

Blocks to criterion. Number of blocks of training to reach the criterion of better than 85% accuracy on the recognition test.

Go/No-go Performance. Performance across GNG trials was measured using a discrimination ratio (DR) by block. DR was calculated by dividing the number of responses to go trials by the total number of responses in the block (Liesing, Wolf, & Ruprecht, 2013).

Implicit Association Score: the score reported for IAT was difference in reaction time to all but the first two trials during the test blocks (3 and 5). Reaction time was log transformed to control for individual differences in responding.

Figure 1

Procedure

Participants completed the experimental procedure in small groups of no more than five participants. Participants first completed a basic demographics measure. Next, participants began the training with either Black faces or White faces and either letters or names as described above. Each participant was greeted individually and shown to the computer to complete the task. Participants were told that the task was a test of memory for faces. At no time were participants told that the task was a measure of individuation ability. Race of stimuli during the GNG test was determined by the participant's self-reported race at the beginning of the study and was always of the other race. If the participant reported being neither White nor Black then they were randomly assigned to a test race. Participants could decline to respond to any of these measures by pressing 0. The IAT was completed as described in the introduction above. Participants were told to work as quickly and accurately as possible.

Chapter 3 – Results

Seventy-seven participants were included in the analyses. Two were removed as outliers on the training task for requiring more than three standard deviations above the mean to complete the training. Twenty were removed for not responding during any of the five GNG trials and twenty-five were removed for being neither White nor Black. Table 1 reports the zero-order correlations between the number of blocks required to reach the criterion of 85% accuracy (Blocks to Criterion), the discrimination ratio for each GNG trial (GNG B1 DR-GNG B5 DR), and IAT scores. The DR was calculated by summing the responses during go trials and dividing that number by the total number of responses during the block. As the participant reaches mastery on the task DR approaches 1 (Liesing, Wolf, & Ruprecht, 2013). IAT scores were calculated for each participant by removing the first two trials of the two testing blocks (blocks three and five); log transforming the reaction times during the block and then subtracting the results from each other. The first two trials were removed because they were considered practice for the rest of the testing block. Negative scores indicate pro-White bias and positive scores indicate pro-Black bias (Greenwald, Nosek, & Banaji, 2003). See Table 1 for correlations between dependent variables.

Table 1 - Zero-order correlations between dependent variables.

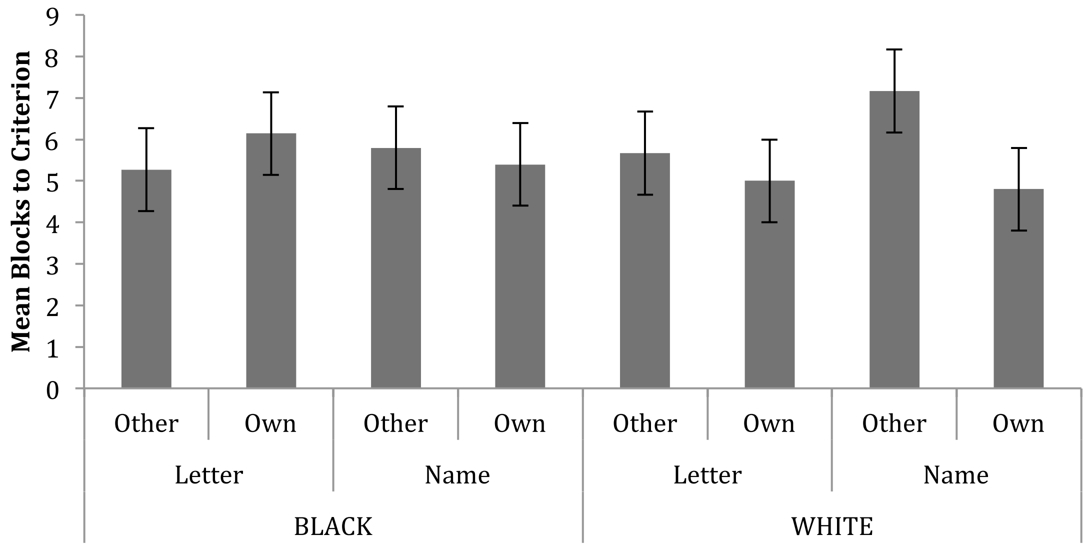
		1	*2*	*3*	*4*	*5*	*6*	*7*
1	Blocks To Criterion							
2	GNG B1 DR	*0.13*						
3	GNG B2 DR	*-0.09*	*0.21*					
4	GNG B3 DR	*0.11*	*0.15*	*.337***				
5	GNG B4 DR	*0.07*	*0.12*	*0.00*	*.418***			
6	GNG B5 DR	*-.253**	*-0.10*	*0.05*	*.393***	*.377***		
7	IAT	*0.08*	*0.03*	*-0.02*	*-0.04*	*0.17*	*-0.05*	

*. Correlation is significant at $p < .05$ level. **. Correlation is significant at $p < 0.01$ level.

Blocks to Criterion

A 2 (participant race: White or Black) by 2 (training type: name or letter) by 2 (training race: own or other) ANOVA was performed on the number of testing blocks required by each participant to reach criterion. There was no significant main effect of participant race $F(1, 69) = 0$, $p = .99$, training type $F(1, 69) = .21$, $p = .65$, or training race $F(1, 69) = 1.2$, $p = .28$. There was no significant interaction between training type and training race $F(1, 69) = 1.61$, $p = .21$, training type and participant race $F(1, 69) = 2.24$, $p = .14$, training type and participant race $F(1, 69) = .42$, $p = .52$ or of participant race, training type, and training race $F(1, 69) = .03$, $p = .86$. Although the three-way interaction was not significant it was greatly underpowered. Visual examination of the means suggested that the effects of training type and training race might depend upon participant race. Therefore separate 2 (training type) by 2 (training race) ANOVAS were conducted within each race. For White participants, there was a significant interaction between training type and training race, $t(35) = 3.01$, $p = .005$. The same test for Black participants was not statistically significant $t(38) = -51$, $p = .61$. Follow up simple effects testing demonstrated a significant difference between number of blocks to criterion between own and other training with names for White participants $t(25) = 3.42$, $p = .002$ such that other race training ($M = 7.17$, $SEM = .61$) required more blocks for participants than own race training ($M = 4.80$, $SEM = .38$). The difference between number of blocks to criterion between own and other training for White participants trained with letters was not significant $t(8) = .54$, $p = .60$. Numbers of training blocks to reach criterion only differed significantly for a small subset of the participant pool. See Appendix C for cell means and standard deviations.

Figure 1 – Blocks to Criterion by participant race (White or Black), training type (letter or name) and training race (own or other) with bars representing standard error of the mean.



Go/No-Go Performance

A 2 (participant race: White or Black) by 2 (training type: name or letter) by 2 (training race: own or other) by 5 (Discrimination ratio by GNG test block) mixed ANOVA was performed on the discrimination ratio (DR) for each participant. There was a significant effect of block on DR $F(4, 276) = 15.05$, $p < .001$ such that participants improved from block 1to block 2 $t(76) = -2.85$, $p = .01$, maintained from block 2 to block 3 $t(76) = -1.78$, $p = .08$, maintained from block 3 to block 4 $t(76) = -1.79$, $p = .08$ and improved from block 4 to block 5 $t(76) = -2.58$, $p = .01$. There was no significant main effect of participant race $F(4, 276) = .58$, $p = .68$, training type $F(4, 276) = .64$, $p = .64$, or training race $F(4, 276) = .33$, $p = .86$. There was no significant interaction between participant race and training type $F(4, 276) = .93$, $p = .45$, participant race and training race $F(4, 276) = 1.31$, $p = .27$, training type and training race $F(4, 276) = 1.17$, $p = .32$, nor of participant race, training type, and training race $F(4, 276) = 1.02$, $p = .40$.

Participants learned how to accomplish the task but there was no transfer of skill from the training to the GNG task. See Appendix D for cell means and standard deviations.

Figure 2 – Mean discrimination ratio for White and Black participants trained with letters across the five GNG blocks with bars representing standard error of the mean.

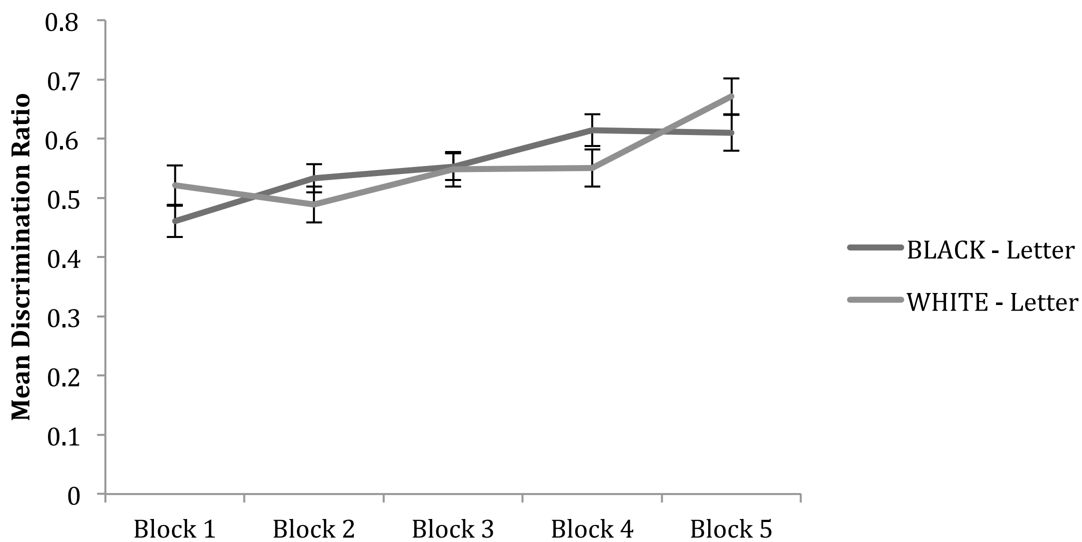


Figure 3 – Mean discrimination ratio for White and Black participants trained with names across the five GNG blocks with bars representing standard error of the mean.

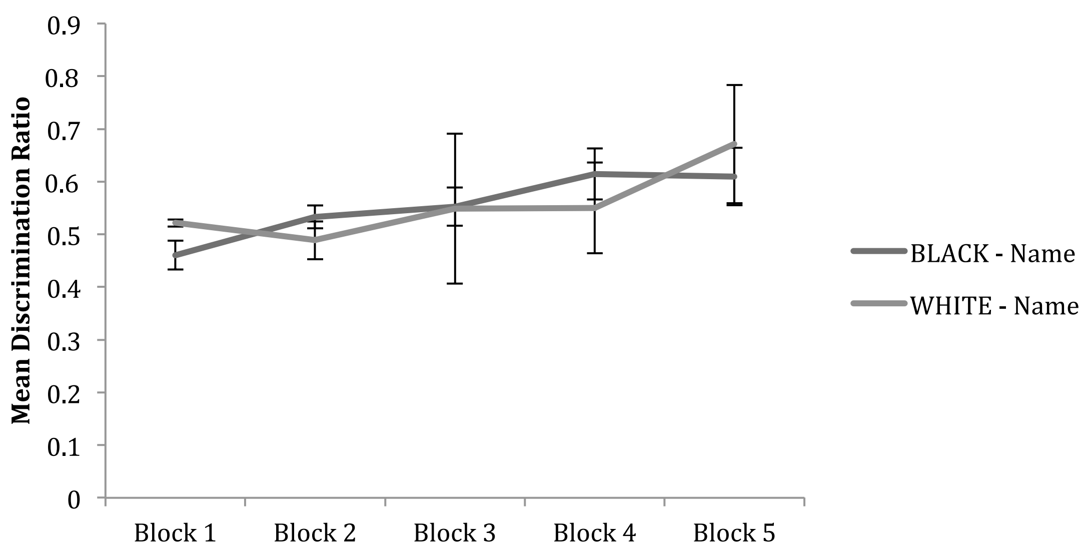


Figure 4 – Mean discrimination ratio for Black participants trained with letters and names across the five GNG blocks with bars representing standard error of the mean. GNGB1DR

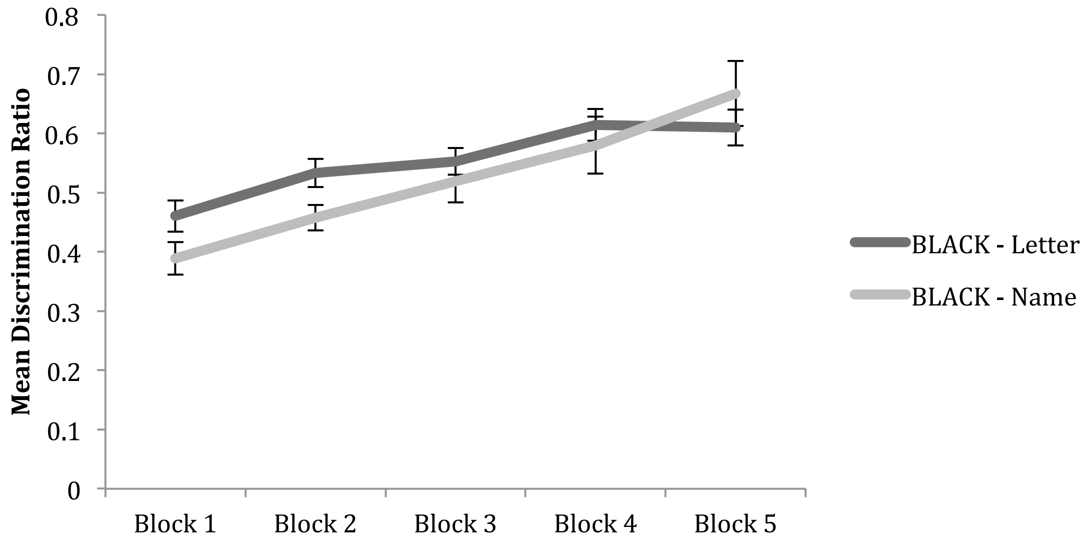
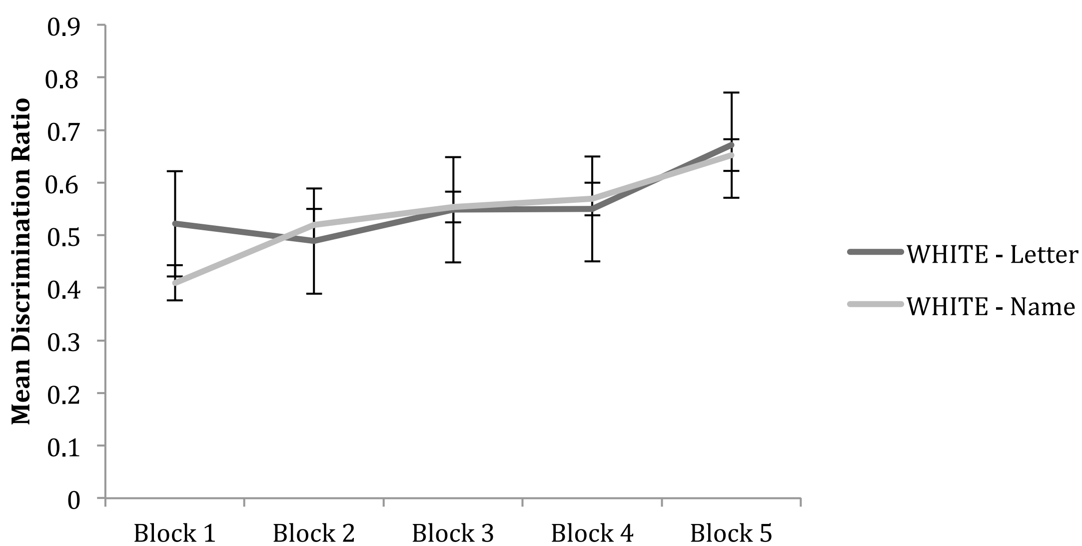


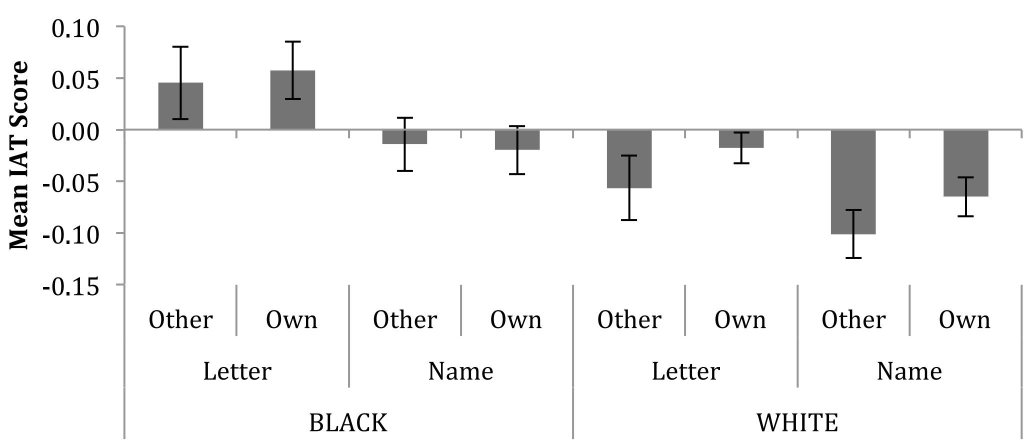
Figure 5 – Mean discrimination ratio for White participants trained with letters and names across the five GNG blocks with bars representing standard error of the mean.



IAT Scores

A 2 (participant race: White or Black) by 2 (training type: name or letter) by 2 (training race: own or other) ANOVA was performed on the IAT scores for each participant. There was a significant main effect of participant race $F(1, 69) = 12.2$, $p = .001$ such that Black participants showed consistent pro Black bias ($M = .03$, $SEM = .02$) and White participants showed consistent pro-White bias ($M = -.07$, $SEM = .02$), $t(75) = -4.77$, $p < .001$. There was also a significant main effect of training type $F(1, 69) = 6.68$, $p = .01$ such that participants trained with letters showed more pro-Black bias ($M = .02$, $SEM = .02$) than participants trained with names ($M = -.06$, $SEM = .01$), $t(75) = 3.94$, $p < .001$. There was no significant main effect of training race $F(1, 69) = .85$, $p = .36$. There was also no interaction between participant race and training type $F(1, 69) = .26$, $p = .61$, participant race and training race $F(1, 69) = .59$, $p = .45$, training type and training race $F(1, 69) = .05$, $p = .82$, nor of participant race, training race, and training type $F(1, 69) = .03$, $p = .86$. Participants exhibited positive in-group bias and participants trained with letters exhibited more pro black bias but the training had little effect on participant bias. See Appendix E for cell means and standard deviations.

Figure 6 – Mean IAT scores by participant race (White or Black), training type (letter or name) and training race (own or other) with bars representing standard error of the mean.



Chapter 4 – Discussion

Training with names did not require fewer blocks to reach criterion as hypothesized. The training was also not sufficient to cause an increase in individuation on the GNG test as hypothesized. A decrease in own race bias was only observed in Black participants trained with name while White participants trained with name showed more pro White bias. These results do not confirm our hypothesis that training with names would cause participants to see other race people as individuals, thus diminishing their own race bias. Counter hypothetical results could be for several reasons including the structure of the training and the tasks used as evidence of transfer and implicit bias.

Set size for recall and encoding is known to influence results of other vs. own race recall; time to encode also has an effect. Marcon, Meissner, Frueh, Susa, and MacLin studied the effect of set size and encoding time on other race facial perception and discovered that a set size of greater than six is enough to significantly affect recall. The set size (12) used in this experiment is ample and may be larger than necessary. Participants had five seconds to encode faces during training and this is likely too long; encoding time of longer than one second results in equal recall rate for own and other race faces (Marcon, Meissner, Frueh, Susa, & MacLin, 2010). Future training should maintain or lower the set size and lower the encoding time (Marcon, et al., 2010). Own race training seems to not be effective at affecting recall generally and future experiments may not need own race training as a control. It is interesting that during training own and other race training required the same numbers of blocks to reach criterion. As previously discussed, the training may not have been stringent enough and so the observed results were a floor effect. We recommend maintaining own race training as a control until it can be conclusively determined whether our results are a floor or not. It was observed that White participants showed more improvement in their performance on the GNG task as compared to Black participants. This phenomenon wherein the majority shows a differential ORE than the minority is well documented (see Brigham, Bennett, Meissner, & Mitchell, 2007).

A GNG task is a common measure of concept acquisition (Gomez, Ratcliff, & Perea, 2007; Verbruggen & Logan, 2008) and as a measure of cognitive processes (Frederick, Rojas-Líbano, Scott, & Kay, 2011) and it is for those reasons that it was selected for this study. Nosek, & Banaji (2001) adapted the technique to test positive and negative associations with objects and people. Differential performance in go trials compared to no-go trials when the tasks are compared with attitude objects is evidence of implicit bias. In their paradigm participants had at most 1000 msec to respond to the stimulus. Our deadline of 2000 msec for go trials and 5000 for no-go trials was too long. If this task is to be used in future studies the response latencies will need to be shortened to 1000 msec. We also only started to see improvement on the task in session five so more sessions will be necessary. In the identification literature the most common tasks are same different (Cassidy, Quinn, & Humphreys, 2010) and match to sample tasks (Yovel et al., 2012). In a same different task two stimuli are displayed side by side that are either the same face or different face. The participants must quickly decide whether they are the same or different. In a match to sample task a stimulus is displayed for a set period of time and then a line-up of stimuli is displayed. The participants must select the previously encoded stimulus. While a GNG task is an appropriate measure of learning transfer other recognition tasks are an option for future research.

Training had a minimal impact on self-reported and implicitly measured prejudice. Previously reported findings from Ferguson, Rhodes, Lee, & Sriram (2001) would indicate that the prejudice the participant brings to the study does not affect facial recognition while the reverse is true, training impacts implicit bias (Lebrecht, et al., 2009). Future studies along this line should focus on how training can influence prejudice independent of how training effects recognition. The experimental training program is based in a perceptual expertise model of the ORE and it must first be established that the training addresses expertise before the components of that expertise can be explored. We could also use the ALPS task developed by Lebrecht and colleagues (2009) instead of the IAT we used to ensure proper replication of their findings. A test of other race empathy may also be necessary. In a test of empathy a confederate is strapped into a chair and the participant is told to shock them. The participant will ask the confederate questions and will be in charge of how much and how often to shock the confederate for incorrect responses. Empathy is measured by how willing the participant is to shock the confederate (Obuchi, Ohno, & Mukai, 1993). Results from this research would help clarify the internal process occurring during training and help us understand if the participant is learning more about the differences between the features of other race people or if they have built more empathy and are therefore more motivated to pay attention to the differences they have always observed.

The ORE is firmly established in the literature (Brigham, Bennett, Meissner, & Mitchell, 2007) and the influence of bias on other race perception and vice versa is known as well (Lebrecht, et al., 2009). Existing research led us to hypothesize that naming an other race face would improve individuation by helping the participant to see that face as more human and therefore encouraging them to extract more identity diagnostic information from that face. Although the current program was not effective at improving other race face individuation the tentative results indicate new and promising directions for research.

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APPENDIX A

TRAINING

James

James

A

A

James	David
John	Richard
Robert	Thomas
Daniel	Christopher
William	Joseph
Michael	Peter

A	G
B	H
C	I
D	J
E	K
F	L

APPENDIX B

IAT

Black or Positive White or Negative

Black or Negative White or Positive

APPENDIX C
BLOCKS TO CRITERION

	Mean Blocks to Criterion	Blocks To Criterion Standard Deviation
Black	5.73	2.60
Letter	5.76	2.62
Other	5.27	2.15
Own	6.14	2.96
Name	5.67	2.66
Other	5.80	2.62
Own	5.40	3.05
White	5.73	2.04
Letter	5.40	1.84
Other	5.67	2.16
Own	5.00	1.41
Name	5.85	2.13
Other	7.17	2.12
Own	4.80	1.47

APPENDIX D
GO/NO-GO PERFORMANCE

	Block 1 Mean	Block 2 Mean	Block 3 Mean	Block 4 Mean	Block 5 Mean
Black	0.43	0.50	0.54	0.60	0.63
Letter	0.46	0.53	0.55	0.61	0.61
Other	0.45	0.53	0.60	0.70	0.65
Own	0.47	0.53	0.52	0.55	0.58
Name	0.39	0.46	0.52	0.58	0.67
Other	0.36	0.46	0.51	0.58	0.68
Own	0.45	0.45	0.54	0.57	0.65
White	0.44	0.51	0.55	0.56	0.66
Letter	0.52	0.49	0.55	0.55	0.67
Other	0.60	0.52	0.50	0.60	0.66
Own	0.41	0.44	0.63	0.48	0.69
Name	0.41	0.52	0.55	0.57	0.65
Other	0.41	0.54	0.60	0.55	0.64
Own	0.41	0.50	0.52	0.59	0.66

	Block 1 Standard Deviation	Block 2 Standard Deviation	Block 3 Standard Deviation	Block 4 Standard Deviation	Block 5 Standard Deviations
Black	0.17	0.15	0.14	0.17	0.19
Letter	0.15	0.11	0.17	0.20	0.23
Other	0.21	0.15	0.20	0.19	0.26
Own	0.10	0.08	0.14	0.18	0.20
Name	0.18	0.19	0.08	0.11	0.11
Other	0.21	0.22	0.06	0.11	0.12
Own	0.10	0.15	0.11	0.13	0.09
White	0.20	0.19	0.18	0.19	0.18
Letter	0.21	0.12	0.20	0.19	0.16
Other	0.25	0.13	0.11	0.21	0.13
Own	0.01	0.07	0.28	0.17	0.22
Name	0.19	0.21	0.18	0.19	0.19
Other	0.21	0.19	0.15	0.18	0.18
Own	0.18	0.23	0.19	0.21	0.21

APPENDIX E

IAT SCORES

	Mean IAT Score	IAT Score Standard Deviation
Black	0.03	0.10
Letter	0.05	0.11
Other	0.05	0.12
Own	0.06	0.10
Name	-0.02	0.07
Other	-0.01	0.08
Own	-0.02	0.05
White	-0.07	0.07
Letter	-0.04	0.06
Other	-0.06	0.08
Own	-0.02	0.03
Name	-0.08	0.08
Other	-0.10	0.08
Own	-0.07	0.07