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Recognizing faces across continents: The effect of within-race variations on the own-race bias in face recognition

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People are better at recognizing faces of their own race than faces of other racial groups. This own-race bias (ORB) in face recognition manifests in some studies as a full crossover interaction between race of observer and race of face, but in others the interaction is accompanied by main effects or other complexities. We hypothesized that this may be due in part to unacknowledged within-race variation and the implicit assumption that the terms *white* and *black* describe perceptually homogeneous race categories. We therefore tested white and black South Africans on their recognition of black and white American faces and black and white South African faces. Our results showed the expected interaction, but only for South African faces. This finding supports explanations of the ORB that are premised on intergroup contact and perceptual experience and highlights the danger of assuming homogeneity of appearance within groups.

Previous studies have shown that people recognize faces of their own race more accurately than they recognize faces of other races, a finding that has become known as the *cross-race effect*, or the *own-race bias* (Malpass & Kravitz, 1969; see Meissner & Brigham, 2001, for a meta-analytic review). A number of theoretical explanations for this effect have been proposed (see Sporer, 2001, for a review). One of the most widely accepted explanations for this effect is that poorer recognition of *other-race* faces may be rooted in the observer's perceptual learning and the amount of contact that he or she has had with people of other races. An alternative explanation, proposed by Levin (1996) and MacLin and Malpass (2001), suggests that racial categorization occurs automatically and early in the perceptual encounter with faces of another race, taking attention away from individuating characteristics of the face.

An own-race recognition bias typically manifests as a disordinal (full crossover) interaction between race of observer and race of face, so that observers from each group show superior recognition performance on own-race over other-race faces (although see Sporer, 2001). Most studies have reported a significant interaction between race of observer and race of face that is accompanied by a significant main effect either of race of participant or of race of face (see, e.g., Chiroro & Valentine, 1995; Ng & Lindsay, 1994; Sporer, 1999). For example, Sporer (1999) found that Turkish participants did not differ in their ability to recognize Turkish and German faces, whereas German participants recognized German faces better than they did Turkish faces. Similarly, Walker and Hewstone (2006) found an own-race bias among white U.K. residents in their recognition of South Asian faces, but not for Asian people living in the U.K. A reversal of the own-race bias effect has also been reported in the literature, where participants appeared to recognize other-race faces better than they did own-race faces. For example, Wright, Boyd, and Tredoux (2003) found that whereas white South African students showed the expected own-race recognition advantage for white faces, black South African students showed a surprising recognition advantage for white faces.

Thus, although the cross-race effect has been confirmed in several individual studies, as well as in meta-analyses (e.g., Antony, Copper, & Mullen, 1992; Both-

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well, Brigham, & Malpass; 1989; Meissner & Brigham, 2001; Shapiro & Penrod, 1986), the results have varied widely between studies. Some of this variation may be accounted for by differences in the way the studies have been conducted. For example, the meta-analysis by Meissner and Brigham showed that the own-race bias is moderated by type and nature of stimulus material used, encoding time, and delay between study and test. These factors may explain some of the differences between findings across studies.

Ecological factors, such as variations in population distribution and patterns of contact, could explain an additional amount of the variance and may, in particular, explain why interactions are often accompanied by main effects. In habitats where minority groups are sparse, for instance, it is feasible to expect that minority groups will be provided far greater opportunity for learning cross-race faces than will members of the majority, and that they will show less recognition bias.

However, we suspect that an additional, largely unacknowledged factor—what might be called *within-race face variation*—may explain a further amount of the effect variance.

In particular, the race categories *white* and *black* have been assumed in the literature to be perceptually homogeneous, but this may be far from the truth. Faces that are categorized in the U.S. as *black* may differ in many ways from those similarly categorized as *black* in Africa or South America, and this may be difficult to discern without a "trained eye"—particularly difficult, we daresay, for cross-race recognition researchers, who tend to be white Americans and Europeans. Even within each continent, huge variations appear to exist in the facial and bodily physiognomy of racial groups. For example, the Maasai of Kenya look very different from the Zulu people of South Africa, and both of those ethnic groups share few similarities with typical black Americans. For the Maasai or Zulu people, black U.S. faces may indeed be unfamiliar and constitute an *out-group* stimulus set. From a theoretical point of view, these within-race variations in physiognomy are likely to be mapped onto differences in intergroup contact, and this should show in face recognition performance.

Thus, a primary aim of the present experiment was to test whether people of a common race will exhibit an own-race bias that is independent of geographic region. To assess this, white and black South Africans were presented with black and white faces from both South Africa and the United States. We anticipated that the black and white South Africans would demonstrate an in-group face recognition advantage that is geographically specific. Thus, the black South Africans were expected to show superior recognition of black South African faces over all other comparison groups.

METHOD

Participants

Forty-eight undergraduate students at a large, multiracial university in South Africa volunteered to participate in the study by responding to poster invitations. Twenty-four were black South Africans (M = 21.05 years, SD = 1.56) and 24 were white South Africans (M = 20.34 years, SD = 1.67). An equal number of male and female participants were included in each racial group. Each participant received R20 (approximately $3) for his or her time.

Apparatus and Stimuli

Four sets of photographs were used: 24 black and 24 white U.S. faces, and 24 black and 24 white South African faces. The South African faces were collected by the second author, and the U.S. faces by the fourth author. The four sets of faces were selected from larger sets of stimuli on the basis of their (approximately equal) memorability ratings, as provided by 16 independent raters of white South African descent. (It should be noted that prior studies have demonstrated strong correlations in interracial perceptions of memorability; see, e.g., Meissner, Brigham, & Butz, 2005.) All the faces were digitally removed from their backgrounds, using RealDraw Pro 3.1, and were equated for light contrast, using GIMP 2.0. Two different frontal views of each face in neutral pose were generated by applying a lighting and color transformation, one for use during study and the other for use at test. SuperLab Pro v2.0 was used to control exposure duration and interstimulus interval. The participants' responses were captured via a Cedrus RB560 response box. All the stimuli were presented on a 15-in. color monitor connected to a Pentium 4 computer, with resolution set at 1,024 × 768 pixels. Color resolution was set at 24 bits.

Design

The study utilized a 2 × 2 × 2 mixed design in which race of participant (black vs. white) varied between participants and race of face (black vs. white) and country of stimulus origin (South Africa vs. United States) were manipulated within participants. Each face served as a target and as a distractor in each of the conditions an equal number of times.

Procedure

The participants were tested individually in a quiet room. During study, each face was shown for 3 sec, with an interstimulus interval of 1.5 sec. The participants were requested to remember the faces presented to them. At test, the *yes–no* recognition procedure was used. During study and at test, black and white faces were presented randomly (i.e., mixed study and test lists were used). At test, presentation of faces was response terminated; the participants responded by pressing one of two keys on the Cedrus RB560 response box. The keys were clearly marked "yes" (for faces seen previously) or "no" (for new faces). Hits and false positives made by each participant on each category of faces were recorded. The participants were thanked and debriefed at the end of the experiment.

RESULTS

Hits and false positives were combined to form signal detection measures of discrimination accuracy (d') and response criterion (c), and a three-way split-plot factorial ANOVA was performed on these measures. Of particular interest in this study was the three-way interaction involving country of origin of faces, race of face, and race of participant. This interaction was statistically significant for d' [$F(1,46) = 5.24$, $p < .026$, $r^2 = .10$], but not for c [$F(1,46) = 1.98$, $p > .17$, $r^2 = .04$].

Figure 1 shows the mean d' scores and suggests that the two-way interaction of race of participant and race of face was significant for the participants when they were tested with South African faces, but not when they were tested with U.S. faces. This was confirmed with follow-up tests of each of the simple interaction effects [$F(1,46) = 21.37$,

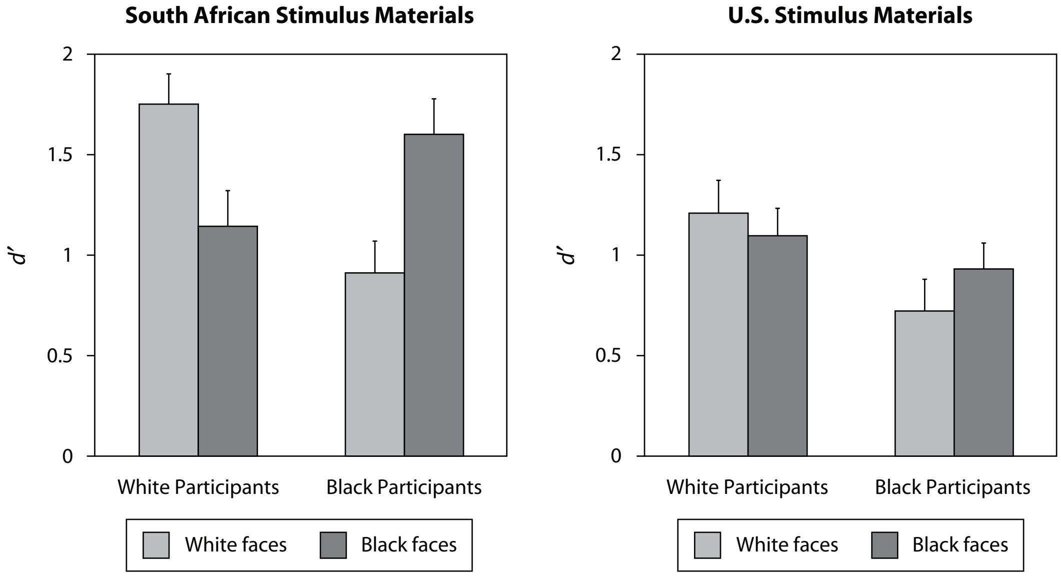

Figure 1. Discrimination (*d′*) of South African and U.S. faces by South African observers. The *t* bars above each column represent standard errors.

$p < .001$, $r^2 = .31$; and $F(1,46) = 1.19$, $p > .27$, $r^2 = .03$, respectively]. Consistent with our predictions, U.S. faces were treated as an *out-group*, with performance significantly more accurate for South African faces than for U.S. faces: A linear contrast testing this effect was significant for both black [$F(1,23) = 11.13$, $p < .003$, $r^2 = .04$] and white [$F(1,23) = 13.34$, $p < .002$, $r^2 = .04$] participants.

DISCUSSION

Face recognition researchers have investigated the own-race recognition bias for almost 40 years, but few have attempted to provide a definition of *race*. This is not surprising, since the concept of race is notoriously unclear, with most biologists asserting that it has no defensible definition (e.g., Tobias, 1972; see also Sternberg, Grigorenko, & Kidd, 2005, who call it a "folk taxonomy"). Specifically, if *black* (or *white*) is used to denote a race of people, and if there is a true own-race bias in face recognition, black people living on one continent could be expected to show a recognition advantage for black faces from another continent. The results from our study refute this, showing instead that the recognition advantage for own-group faces is ethno-geographically specific: White South Africans showed a recognition advantage for white South African faces but not for white U.S. faces, and black South Africans showed a similar recognition advantage for black South African faces but not for black U.S. faces. In fact, our results show that white and black South Africans exhibit a recognition advantage for their own ethnic group over all three of the comparison groups.

A possible counterexplanation we wish to dismiss is that the U.S. faces we used may themselves be somewhat unusual and that U.S. participants might not show the own-group recognition bias with these faces. The U.S. faces used in this study were taken from a larger set of stimuli that has been used in several studies demonstrating an own-group recognition bias with U.S. participants (e.g., Meissner et al., 2005). Given that this exact set of study/test stimuli has not been used previously, however, we concede that a replication of the present experiment with U.S. participants would appear warranted.

Nevertheless, this demonstration of a regional basis for the recognition advantage for own-race faces supports explanations that are premised on intergroup contact and perceptual experience (Brigham & Malpass, 1985; Meissner & Brigham, 2001). Populations develop perceptual expertise for faces that they regularly interact with, and this is probably moderated by the perceived utility of the interaction (Chiroro & Valentine, 1995; Malpass, 1990). South African blacks and whites have a heritage of enforced segregation (Worden, 2000), and the presence of an other-race recognition deficit occurs most likely as a result of their lack of meaningful contact. They also show a recognition deficit for faces from other geographic regions, regardless of race.

In the end, we wonder whether it is perhaps time that the concepts of *race* and, specifically, *own-race bias* be retired from this literature. Race cannot be defined with any precision (Malpass, 1993), and reliance on it may lead to false conclusions, as demonstrated by the results from this study. It may also lead to linguistic difficulties, since recognition advantages have now been established for age (Wright & Stroud, 2002) and sex (Rehnman & Herlitz, 2006). One solution may be to take the lead from Sporer's (2001) face-processing model and refer to the phenomenon as the *in-group face recognition advantage*.

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