Research Article

Priming Race in Biracial Observers Affects Visual Search for Black and White Faces

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ABSTRACT—*We examined whether or not priming racial identity would influence Black-White biracial individuals' ability to visually search for White and Black faces. Black, White, and biracial participants performed a visual search task in which the targets were Black or White faces. Before the task, the biracial participants were primed with either their Black or their White racial identity. All participant groups detected Black faces faster than White faces. Critically, the results also showed a racial-prime effect in biracial individuals: The magnitude of the search asymmetry was significantly different for those primed with their White identity and those primed with their Black identity. These findings suggest that top-down factors such as one's racial identity can influence mechanisms underlying the visual search for faces of different races.*

People possess a number of social identities (e.g., their race, gender, age, and occupation), and when these social identities are primed,[1] they can profoundly affect cognitive abilities (Aronson, Steele, Salinas, & Lustina, 1998; Spencer, Steele, & Quinn, 1999; Steele & Aronson, 1995). Stereotype-threat research has shown that making one's racial identity salient significantly affects one's performance on math and verbal tests (for a review, see McFarland, Lev-Arey, & Ziegert, 2003; Cheryan & Bodenhausen, 2000). Individuals' multiple social identities can either hinder or facilitate cognitive performance, depending on whether or not the accompanying cultural stereotypes are negative or positive (Shih, Ambady, Richeson, Fujita, & Gray, 2002; Shih, Pittinsky, & Ambady, 1999; Walton & Cohen, 2003). For example, although women are stereotyped as being poor at math, Asians are commonly stereotyped as excelling at math. Examining the effect of social-identity priming on high-level math performance in Asian women, Shih et al. (1999) found that those whose Asian identity was primed performed better than a control group, whereas those whose female identity was primed performed more poorly than the control group.

Although the impact of racial identities and stereotypes on cognition has received much theoretical and empirical attention, less well understood is how race[2] influences visual perception. Visual search is important to everyday functioning (Wolfe, 1998), as detecting a significant or familiar person in a crowd quickly and accurately is necessary for social communication and survival. A number of studies have shown that White participants' ability to visually search for faces varies depending on the race of the target face. Levin (1996, 2000) has shown that Whites detect a Black face among a set of White faces faster than a White face among Black faces, even though, ironically, they remember White faces better than Black faces.

On the basis of these findings, Levin proposed the *race-feature hypothesis*, which suggests that White participants' visual search advantage for other-race faces occurs because out-group faces are processed differently from in-group faces. Specifically, Whites code Black faces according to race-specifying features, a process that facilitates their rapid visual detection and categorization at the expense of other individuation processes necessary for their later successful recognition. Coding out-group faces by race-specifying features speeds their detection and, thus, is an optimal search strategy.

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[1]Priming is an experimental manipulation whereby a category is either explicitly or implicitly activated or made salient in the participant's mind, often with behavioral consequences. For example, racial priming occurs when people are reminded of their racial identity by being asked to state their racial identity or by reading information about their racial identity.

[2]We use the term *race* to refer to a social group whose members share a common ethnic heritage, a country of origin, a set of values, cultural practices, a native language, or physical features (e.g., skin tone, facial and body shape).

Although the studies on the impact of racial identity on visual search performance are provocative, as they demonstrate that race influences visual perception, they are inconclusive because not enough empirical work has been conducted on non-White participants to determine how and why race affects the ability to search for faces of varying races. To further elucidate the effect of race on visual search abilities for Black and White faces, we investigated the ability of participants from multiple racial groups, including a group of White-Black biracials, to visually search for White and Black faces. Although previous research has demonstrated that identity priming can differentially influence cognitive performance of individuals with multiple social identities, little is known about whether or not priming of racial identity can affect more basic perceptual processing, such as visual search ability. Moreover, effects of identity priming on cognition and perception, including visual search ability for faces of varying races, have never been investigated in biracial or multiracial individuals,[3] who compose about 2.5% of the U.S. population according to the 2000 U.S. Census[4] (Shih & Sanchez, in press). Black-White biracial individuals, in particular, provide a unique way of investigating the influence of racial-identity priming on perception and the visual search for faces, because they embody both the majority and the minority race and likely have similar amounts of racial exposure to the two racial groups.[5]

The goal of the current study was to investigate the impact of racial-identity priming on biracial individuals' visual search for same- and other-race faces, and to compare their performance with that of Black and White individuals. We hypothesized that Blacks and Whites would both show a visual search advantage for Black faces, but that this advantage would be smaller for Blacks, and that priming either the White or Black identity of biracials would affect their visual search performance in a manner congruent with the identity prime.

METHOD

Participants

Sixty undergraduate college students (mean age = 20 years) participated in this study. Twenty Black (10 female), 20 White (10 female), and 20 Black-White (11 female) individuals were recruited using Harvard University and Tufts University e-mail lists and posters. The biracials, who identified themselves as having a monoracial White parent and a monoracial Black parent, were recruited through the recommendations of several biracial Harvard students and through a mixed-race organization at Tufts University. All participants gave consent prior to testing and were given either $7 or course credit for participating in the study.

Stimuli

The stimulus faces were presented on a computer with a 16-in. color monitor and were viewed at a distance of approximately 60 cm. They were presented with a resolution of 72 pixels (approximately 23 × 32 mm) per inch. The two faces used were gray-scale images of Black and White prototype faces standardized for size (64 × 90 pixels), mean luminance, and contrast[6] and used previously in visual search tasks involving race classification (Levin, 1996; Levin & Angelone, 2002). They were created from 16 faces of each race by using a morphing technique to produce an average face into which the internal features of the Black and White average morphs, respectively, were placed, thus producing a Black average face and a White average face with matching external features (see Fig. 1a).

Procedure

Prime

All participants were tested in individual sessions. Before completing any computer tasks, individuals in the biracial group were asked to write an essay about the ethnic identity of their mother or their father, depending on the prime condition to which they were randomly assigned (i.e., those in the White-prime condition wrote about the ethnic heritage of their White parent, and those in the Black-prime condition wrote about the ethnic heritage of their Black parent). They were instructed to write as much as they could within 7 min.

Visual Search Task

Participants then sat at a computer desk in the same room and were instructed to detect the presence or absence of a single target face (either a White or a Black face among faces of the opposite race) in a series of trials, as quickly as possible without sacrificing accuracy. The race of the target face was identified before each block and remained constant throughout each block. Target-present and target-absent trials were presented in random order within each block. Participants were told to press the "1" key on the computer keyboard if the target was present and the "2" key if the target was absent. In each block of 96 trials, there were 32 trials with two faces, followed by 32 trials with four faces, and then 32 trials with eight faces.

Each trial started with a blank screen for 1,000 ms, followed by a fixation point for 100 ms, and then a search display (see

[3]We use the term *biracial* to refer to individuals with two monoracial parents, each from a different racial group.

[4]The true percentage is likely much higher, as many multiracial individuals choose to identify themselves with a single racial label (Shih & Sanchez, in press).

[5]Biracial individuals do not necessarily identify with their two racial identities equally and may have different amounts of exposure to the racial groups to which they belong. To account for these factors, which may influence performance, we included exit questionnaires assessing biracial participants' self-reported racial identity and exposure. Correlational analyses from these questionnaires revealed no significant relation between visual search time and self-reported racial identity or exposure.

[6]Levin (1996) histogram-matched the images of the Black and White faces according to mean gray levels and root mean square contrast.

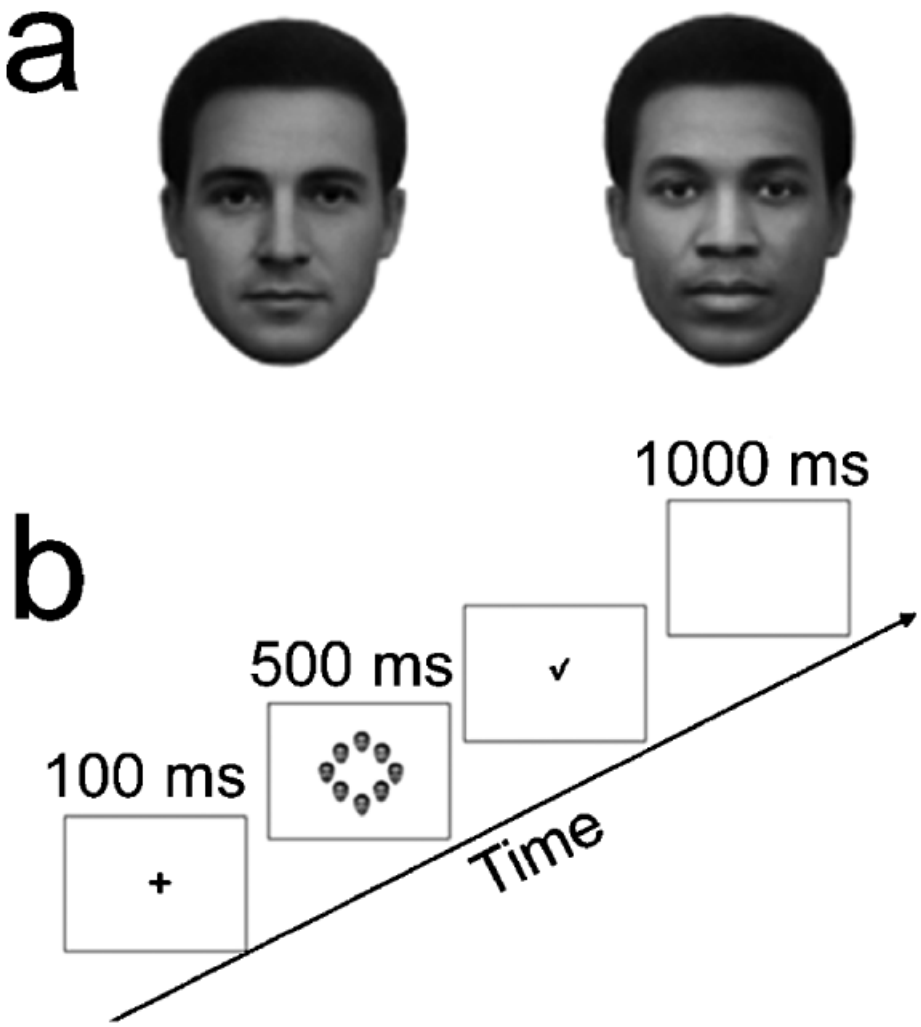

Fig. 1. The White and Black face morphs used in the visual search displays (a) and an illustration of an experimental trial (b). On each trial, a blank screen was shown for 1,000 ms, followed by a fixation cross for 100 ms. Next, a visual search display containing up to seven distractor faces and one target face was shown until a response was made, and finally, feedback was given for 500 ms.

Fig. 1b) that remained on the screen until a response was made. After the response, the participant received visual feedback (a check mark or an *X*). The participant pressed a key to begin the next trial. Before starting the search task, each participant completed a practice session consisting of a block of 24 White-target trials and a block of 24 Black-target trials. The participant then completed six randomly ordered experimental blocks: three with White target faces and three with Black target faces. After the practice blocks and in between experimental blocks, the researcher ensured that the participant had no questions before starting presentation of the next block of trials.

Essay Ratings

Four independent raters were recruited after the completion of the study to read and to rate the essays. All four raters independently read the 20 essays and rated each on 10 dimensions, including descriptiveness, the perceived subject matter, and, most important to the present study, how much they thought that after writing the essay, the author would be thinking about the ethnic identity of his or her mother or father (depending on whether the topic of the essay was the mother or father). Raters judged each essay on each of these criteria using a Likert scale from 1 (*not at all*) to 7 (*very much*). Raters were not told the racial identity of the authors or their mothers and fathers (the topic of the essays). Each rater rated the essays in random order. For the present study, we analyzed only the ratings from the question regarding the extent to which the author would be thinking about his or her parent's ethnic identity.

RESULTS

Essay Ratings and Prime Check

The independent raters judged White-primed biracials as more likely than Black-primed biracials to be thinking about their

White identity after writing the essay about their mother's or father's ethnic identity (White prime: $M = 5.23$, $SE = 0.88$; Black prime: $M = 2.08$, $SE = 0.73$), $F(2, 18) = 38.88$, $p < .0001$, $p_{rep} = .99$. Similarly, raters judged Black-primed biracials as more likely to be thinking of their Black identity than White-primed biracials (White prime: $M = 2.85$, $SE = 1.83$; Black prime: $M = 5.43$, $SE = 0.90$), $F(2, 18) = 8.01$, $p < .003$, $p_{rep} = .97$. Cronbach's alpha coefficients demonstrated good internal consistency ($\alpha < .68$) between raters for the questions specifically related to the priming manipulation. These ratings suggest that it was effective in priming biracials to identify more with one of their two racial identities than with the other.

Visual Search Performance

To examine the effect of racial priming on visual search performance, we calculated mean search times, excluding trials with incorrect responses from the averages. To avoid skewed means as a result of outliers, we also eliminated response times greater than 3,000 ms from the analysis. Data were entered into a 3 (racial group: Black, White, Black-White) × 2 (prime: Black identity, White identity) × 2 (target: Black, White) × 3 (display size: 2, 4, 8) × 2 (target presence: present, absent) mixed-factors analysis of variance with racial group and race of prime as the between-subjects factors.

As in previous studies, overall participants demonstrated a search advantage for Black faces (Black target: $M = 1{,}154$ ms, $SE = 28.9$; White target: $M = 1{,}241$ ms, $SE = 28.5$), $F(1, 56) = 71.38$, $p < .0001$, $p_{rep} = .99$. This Black-target advantage was larger for Black than for White participants, $F(1, 57) = 8.39$, $p < .005$, $p_{rep} = .97$.

The results for the biracial participants are critical to our hypothesis. Black-primed biracials and White-primed biracials differed significantly in the magnitude of their search advantage for Black over White targets, and the direction of this difference was consistent with the prime manipulation, $F(1, 56) = 8.74$, $p < .005$, $p_{rep} = .97$ (see Fig. 2). Specifically, the visual search advantage for Black face targets relative to White face targets

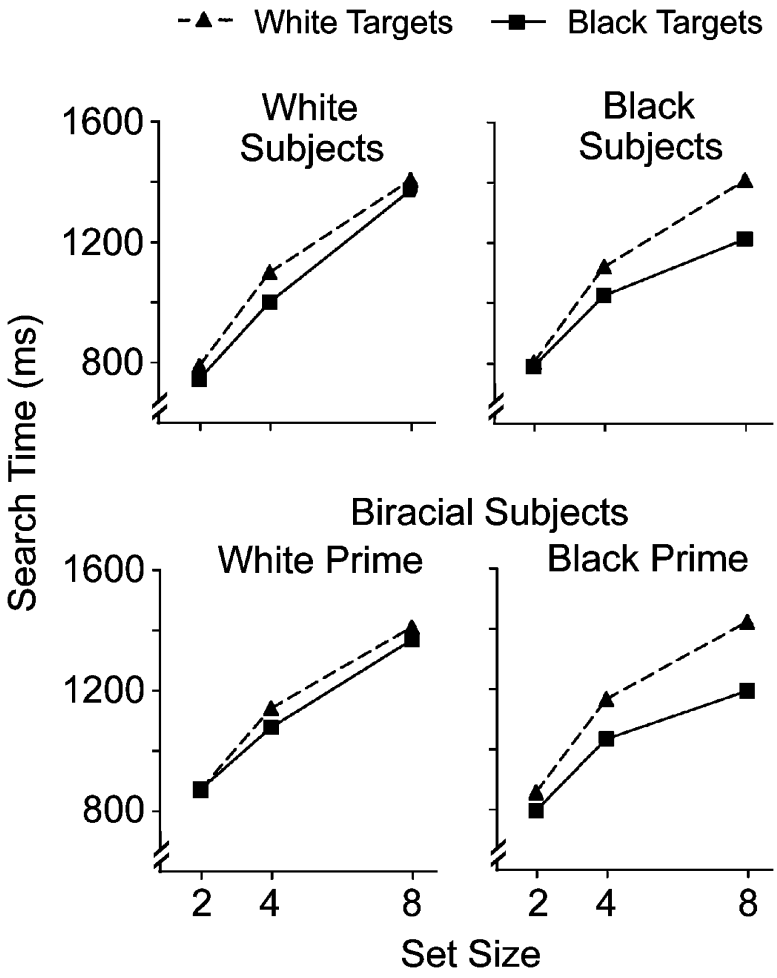

Fig. 2. Mean search times of White, Black, and biracial participants on target-present trials. Search time is graphed as a function of race of the target face and set size. Results are shown separately for White-primed and Black-primed biracial participants.

was significantly larger in Black-primed biracials than in White-primed biracials, $t(18) = 2.473$, $p < .024$, $p_{rep} = .69$. There was no significant difference between Black-primed biracials and Black monoracials in the visual search advantage for Black targets, $t(28) = -0.752$, $p = .458$. Similarly, there was no significant difference between White-primed biracials and White monoracials in the visual search advantage for Black targets, $t(28) = -0.560$, $p = .580$.

Display size also had a significant effect (two faces: $M = 829$ ms, $SE = 24.5$; four faces: $M = 1{,}162$ ms, $SE = 31.0$; eight faces: $M = 1{,}602$ ms, $SE = 35.3$), $F(2, 112) = 724.02$, $p < .0001$, $p_{rep} = .99$, and the Display Size × Target interaction was also significant, $F(2, 112) = 4.72$, $p < .01$, $p_{rep} = .95$, such that response time slowed more for White targets than for Black targets as the number of distractor faces increased.

Additional analysis showed that search slopes[7] on target-present trials were generally less steep for Black targets (Black participants: 71 ms/item; Black-primed biracials: 66 ms/item; White-primed biracials: 83 ms/item) than for White targets (Black participants: 101 ms/item; Black-primed biracials: 94 ms/item; White-primed biracials: 90 ms/item), except for the White participants (Black target: 105 ms/item; White target: 103 ms/item). This pattern was also evident in the significant three-way interaction of display size, target, and racial group, $F(2, 112) = 6.03$, $p < .003$, $p_{rep} = .97$.

There was also a significant effect of target presence; response time was faster when the target was present ($M = 1{,}080$ ms, $SE = 32.0$) than when the target was absent ($M = 1{,}316$, $SE = 32.4$), $F(1, 56) = 243.62$, $p < .0001$, $p_{rep} = .99$. A significant interaction between display size and target presence was also found, $F(2, 112) = 98.77$, $p < .0001$, $p_{rep} = .99$; the increase in response time with increasing display size was smaller for target-present trials than for target-absent trials. Additionally, there was a three-way interaction of display size, target, and target presence, $F(2, 112) = 3.75$, $p < .02$, $p_{rep} = .93$; at all display sizes, response times were fastest for target-present trials with Black targets.

DISCUSSION

The present study demonstrates that White and Black participants, to varying extents, show a visual search advantage for Black target faces relative to White target faces. The results for White participants replicate previous findings (Levin, 1996, 2000). In addition, we found that this visual search advantage for Black faces is larger for Black participants than for White participants, a difference that is not explainable by the race-feature hypothesis. These results highlight the necessity of including multiracial participant groups when examining the effect of race on visual perception.[8] As predicted by our racial priming hypothesis, the pattern of response times among biracials who were primed with either their White or their Black identity was consistent with the priming manipulation. Specifically, biracials primed with their White identity showed a visual search advantage of similar magnitude to Whites', whereas biracials primed with their Black identity had a greater visual search advantage, similar to that of Blacks. These findings demonstrate that visual perception is malleable to top-down influences, such as the orientation provided by one's racial group membership.

Biracial individuals face unique challenges in negotiating their everyday social environment. People often automatically categorize and stereotype others along several social dimensions, including race (Fiske, 1998). Confronted with biracials who defy typical racial categories, monoracial people may apply social pressure on them to identify more with one of their racial identities than with the other. Indeed, biracial individuals report that one of the main sources of their emotional conflict and distress is the frequent social pressure of having to choose to identify with one of their two races more than the other (Shih & Sanchez, in press; Williams, 1996). To cope with such environmental pressure, biracial individuals may adopt cognitive strategies that allow them to identify more with one race or the other depending on the social context. In the present study, biracials demonstrated a robust effect of racial-identity priming such that their performance was consistent with how the corresponding monoracial groups performed. This robust priming effect may be the result of the cognitive flexibility that biracial individuals develop, over the course of their unique social experience, to perceptually orient and think as monoracial individuals would, depending on the social context.

Our study provides a starting point for future examinations into the impact of racial group membership on visual perception and, in particular, how biracial individuals may adopt different perceptual and cognitive strategies depending on their social context. Future research in this area has the potential to contribute to theoretical understanding of the extent to which top-down factors such as racial group membership can influence perception and the mechanisms that underlie this influence.

Acknowledgments—We thank Dan Levin for allowing us to use his facial stimuli. We also thank Reginald B. Adams, Jr.; Steve Franconeri; and two anonymous reviewers for helpful suggestions on earlier versions of this manuscript. This work was

[7]Search slopes reported here were calculated as follows: (mean response time for set size 8 − mean response time for set size 2)/(8 – 2).

[8]Levin (1996, Experiment 6) found that African Nationals, compared with White Americans, showed a smaller visual search advantage for Black target faces, in contrast to the direction of the group difference we found between White and Black Americans in this experiment. It is possible that differences in levels of familiarity with racial out-groups, in relative status of racial groups, and in racial identification with one's in-group can explain this discrepancy. Future research is needed to determine whether these or other factors account for this empirical inconsistency and to uncover its potential theoretical implications for the race-feature hypothesis.

supported by a National Science Foundation Graduate Research Fellowship to J.Y.C. and a Harvard College Research Fund Grant to H.E.H.

REFERENCES

Aronson, J., Steele, C.M., Salinas, M.F., & Lustina, M.J. (1998). The effects of stereotype threat on the standardized test performance of college students. In E. Aronson (Ed.), *Readings about the social animal* (8th ed., pp. 415–430). New York: Freeman.

Cheryan, S., & Bodenhausen, G.V. (2000). When positive stereotypes threaten intellectual performance: The psychological hazards of "model minority" status. *Psychological Science*, *11*, 399–402.

Fiske, S.T. (1998). Stereotyping, prejudice and discrimination. In D.T. Gilbert, S.T. Fiske, & G. Lindzey (Eds.), *Handbook of social psychology* (4th ed., pp. 357–411). New York: McGraw-Hill.

Levin, D.T. (1996). Classifying faces by race: The structure of face categories. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *22*, 1364–1382.

Levin, D.T. (2000). Race as a visual feature: Using visual search and perceptual discrimination tasks to understand face categories and the cross-race recognition deficit. *Journal of Experimental Psychology: General*, *129*, 559–574.

Levin, D.T., & Angelone, B.L. (2002). Categorical perception of race. *Perception*, *31*, 567–578.

McFarland, L.A., Lev-Arey, D.M., & Ziegert, J.C. (2003). An examination of stereotype threat in a motivational context. *Human Performance*, *16*, 181–205.

Shih, M., Ambady, N., Richeson, J.A., Fujita, K., & Gray, H.M. (2002). Stereotype performance boosts: The impact of self-relevance and the manner of stereotype activation. *Journal of Personality and Social Psychology*, *83*, 638–647.

Shih, M., Pittinsky, T.L., & Ambady, N. (1999). Stereotype susceptibility: Identity salience and shifts in quantitative performance. *Psychological Science*, *10*, 80–83.

Shih, M., & Sanchez, D. (in press). Perspectives and research on the positive and negative implications of having multiple racial identities. *Psychological Bulletin*.

Spencer, S.J., Steele, C.M., & Quinn, D.M. (1999). Stereotype threat and women's math performance. *Journal of Experimental Social Psychology*, *35*, 4–28.

Steele, C.M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology*, *69*, 797–811.

Walton, G.M., & Cohen, G.L. (2003). Stereotype lift. *Journal of Experimental Social Psychology*, *39*, 456–467.

Williams, T.K. (1996). Race as a process: Reassessing the "What are you?" encounters of Biracial individuals. In M.P.P. Root (Ed.), *The multiracial experience: Racial borders as the new frontier* (pp. 191–210). Thousand Oaks, CA: Sage.

Wolfe, J.M. (1998). Visual search. In H. Pashler (Ed.), *Attention* (pp. 13–56). London: University College London Press.

(RECEIVED 2/14/05; REVISION ACCEPTED 7/14/05;
FINAL MATERIALS RECEIVED 8/26/05)