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# Not So Black and White: Memory for Ambiguous Group Members

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Exponential increases in multiracial identities, expected over the next century, create a conundrum for perceivers accustomed to classifying people as their own- or other-race. The current research examines how perceivers resolve this dilemma with regard to the *own-race bias*. The authors hypothesized that perceivers are not motivated to include ambiguous-race individuals in the in-group and therefore have some difficulty remembering these individuals. Both racially ambiguous and other-race faces were misremembered more often than own-race faces (Study 1), though memory for ambiguous faces was improved among perceivers motivated to include biracial individuals in the in-group (Study 2). Racial labels assigned to racially ambiguous faces determined memory for these faces, suggesting that uncertainty provides the motivational context for discounting ambiguous faces in memory (Study 3). Finally, an inclusion motivation fostered cognitive associations between racially ambiguous faces and the in-group. Moreover, the extent to which perceivers associated racially ambiguous faces with the in-group predicted memory for ambiguous faces and accounted for the impact of motivation on memory (Study 4). Thus, memory for biracial individuals seems to involve a flexible person construal process shaped by motivational factors.

*Keywords:* own-race bias, biracial, motivated person perception, ambiguity in memory

The burgeoning multiracial population in the United States blurs the boundaries of contemporary notions of race. As of 2000, 1 in 40 Americans identified themselves as multiracial (Lee & Bean, 2004), with 70% of the multiracial population younger than 35 years of age (U.S. Census Bureau, 2001). It is projected that this multiracial population will continue to increase, possibly reaching an astounding 21% of the population by the year 2050 (Smith & Edmonston, 1997). Although mixed-race peoples are not a new population (Morning, 2003), until recently they have remained largely hidden, and sometimes actively excluded, from social consciousness (see Shih & Sanchez, 2005; Wardle, 1999).

Social psychology as a discipline is guilty of many of the same assumptions prevalent in U.S. society, with race defined by rigid categorizations that exclude nonprototypical group members. Consequently, the extensive literature on stereotyping and prejudice (e.g., Brewer, 1988; Devine, 1989; Hamilton & Trolier, 1986; Park & Rothbart, 1982) has traditionally excluded multiracial individuals, who are not prototypical exemplars of a particular racial group. Recent research, however, has underscored the need to go beyond studying the most prototypical exemplars (Livingston & Brewer, 2002; K. B. Maddox & Gray, 2002). That is, feature typicality construed as a more continuous variable has been shown to influence categorizations (Locke, Macrae & Eaton, 2005), automatic evaluations (Livingston & Brewer, 2002), activation of stereotypes (Blair, Judd, Sadler, & Jenkins, 2002), and even capital-sentencing decisions (Eberhardt, Davies, Purdie-Vaughns, & Johnson, 2006). The conclusion from much of this recent research has been that the effects of racial group membership (e.g., stereotypes) are strongest for especially typical category members.

Here, we offer an expanded perspective on feature typicality. The influence of feature typicality in determining perceptions, attitudes, and behavior may function differently at the boundaries of a category. We argue that when features are sufficiently atypical as to render a biracial target truly ambiguous, perceivers treat this target as they would any other out-group member. We examine this idea in the domain of memory. Although perceivers clearly have better memory for same-race than other-race targets, there is little research on the effects of racial prototypicality on facial recognition. Our hypothesis was that memory for truly ambiguous biracial targets would be limited because of insufficient motivation to include fringe individuals in the in-group; as such, ambiguous-race targets would be treated as out-group in memory.

## In-Group and Out-Group Memory

Over 100 studies have shown that people have difficulty recognizing and remembering faces of a race besides their own, a

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tendency referred to as the *own-race bias* (e.g., Malpass & Kravitz, 1969; Meissner & Brigham, 2001). This bias may be of a larger collection of memory biases in which members of the in-group are remembered better than members of the out-group (Anastasi & Rhodes, 2006; Bernstein, Young, & Hugenberg, 2007; Huart, Corneille, & Becquart, 2005; MacLin & Malpass, 2001; Rule, Ambady, Adams, & Macrae, 2007; Shriver, Young, Hugenberg, Bernstein, & Lanter, 2008; Shutts & Kinzler, 2007; Wright & Sladden, 2003). For example, arbitrary group distinctions created in the lab (*red* or *green* personality types) are sufficient to produce an in-group memory advantage (Bernstein et al., 2007). These memory biases are among the most well-established social–cognitive biases with substantial research on the underlying mechanisms (e.g. perceptual expertise and differential encoding; Ellis, Deregowski, & Shepherd, 1975; Golby, Gabrieli, Chiao, & Eberhardt, 2001; Goldstein & Chance, 1985; Hancock & Rhodes, 2008; Levin, 1996, 2000; McKone, Brewer, MacPherson, Rhodes, & Hayward, 2007; Michel, Corneille, & Rossion, 2007; Michel, Rossion, Han, Chung, & Caldera, 2006; Rodin, 1987; Tanaka, Kiefer, & Bukach, 2004; Turk, Handy, & Gazzaniga, 2005; Walker, Silvert, Hewstone, & Nobre, 2008), moderators (e.g., facial affect, mood, interracial contact; Ackerman et al., 2006; Chiroro & Valentine, 1995; Cross, Cross, & Daly, 1971; Feinman & Entwisle, 1976; Johnson & Frederickson, 2005; Sangrigoli, Pallier, Argenti, Ventureyra, & de Schonen, 2005), and correlates (e.g., racial attitudes; Brigham & Barkowitz, 1978; Carroo, 1987; Ferguson, Rhodes, Lee, & Sriram, 2001; Lavrakas, Buri, & Mayzner, 1976) of the effect, especially among racial groups.

Studies on the topic have used stimuli that were clearly in-group or out-group, as accomplished through stimulus labels, group identifying cues, or perceptually unambiguous stimuli. This methodology is reasonable given that memory biases are thought to develop after people have been identified as in-group or out-group (e.g., Sporer, 2001). Yet with the use of unambiguous stimuli, researchers may have dramatically underestimated the role of motivational factors in the own-race bias. Perceivers encounter real people in social life, whose social identities may often be ambiguous and not easily identifiable through obvious cues or labels. Moreover, even visually identifiable social identities may be obscured by conflicting cues or contexts. The ambiguity inherent to identifying group identity is likely to invite motivational influences to this process of deciding whether to associate others with the in-group. In other words, motivational processes may influence the automatic assignment of most individuals to the in-group or out-group and thereby influence memory for these individuals. If so, group-based memory biases may be extended beyond the current limits imposed by previous methodological approaches.

## Motivational Influences on Social–Cognitive Processing

Since the advent of the New Look movement in psychology, scholars have argued that ambiguity in the field invites motivational influences on cognitive processing. For example, Bruner and Goodman (1947) argued that increases in stimulus ambiguity heighten the opportunity for motivation to influence cognitive processes. Their classic observation that a coin was remembered as larger in size, particularly for a poor rather than a nonpoor child, was indirect support for their argument. Between 1947 and today, a veritable plethora of studies have examined how motivation impacts the cognitive processing of ambiguous stimuli (Alloy & Tabachnik, 1984; Atkinson & Walker, 1956; Balcetis & Dunning, 2006; Changizi & Hall, 2001; Duncan, 1976; Eberhardt, Dasgupta, & Banaszynski, 2003; Fazio, Ledbetter, & Towles-Schwen, 2000; Fazio, Powell, & Herr, 1983; Higgins & Tykocinski, 1992; Lambert, Solomon, & Watson, 1949; Lim & Pessoa, 2008; Muise, Brun, & Porelle, 1997; Postman & Crutchfield, 1952; Strachman & Gable, 2006; Trope, 1986; Wyer, 1974). For example, Balcetis and Dunning (2006) observed that an ambiguous figure (the figure 13) was more often perceived as "B" or "13" depending on which of these interpretations was associated with a positive outcome for the perceiver. In a study more directly related to face perception, participants conditioned to associate aversive shock with fearful faces were especially likely to see "fearful" responses in emotionally ambiguous faces (this effect was much smaller in less ambiguous faces; Lim & Pessoa, 2008).

Following the logic that ambiguity invites motivational influences on processing, memory for ambiguous targets should be influenced by motivational factors. Beyond influencing the encoding of faces given as in-group or out-group (Hugenberg, Miller, & Claypool, 2007), motivation may impact the extent to which ambiguous individuals are associated with the in-group or out-group and consequently memory via the own-race bias. Indeed, several studies have demonstrated that racial prejudice moderates the processing of racially ambiguous faces (Blascovich, Wyer, Swart, & Kibler, 1997; Hugenberg & Bodenhausen, 2004; Pettigrew, Allport, & Barnett, 1958). Of particular interest, *in-group overexclusion* (Leyens & Yzerbyt, 1992) occurs when individuals at the periphery of group boundaries are treated as out-group members to protect the in-group from the contamination of miscategorized out-group members. Indeed, research on in-group overexclusion has demonstrated that categorization of faces with ambiguous racial group membership depends on group identification, most often resulting in out-group categorizations (Castano, Yzerbyt, Bourguignon, & Seron, 2002). Building on this model, we propose that in the absence of inclusionary motives perceivers associate ambiguous-race individuals with the out-group and consequently misremember ambiguous-race faces.

Although motivated racial exclusion may provide a novel account of race-based memory deficits, it would unfortunately not be a novel account of racial history. For example, centuries of American history reflect the *one-drop rule*, in which one drop of Black blood identifies an individual as Black (Davis, 1991), a practice that was officially codified during the Jim Crow era (Jones, 2000; Mangum, 1940). Although states eventually overturned these laws, this historical norm still exerts its influence today (Davis, 1991; Zack, 1993). Because our interest was motivational influences in the present and not the past, we created a stimulus set in which ambiguous faces were equally likely to be categorized White as Black. In other words, the ambiguous faces were not simply considered Black by virtue of a cognitive one-drop rule. Memory for these faces should thus be less about White or Black categorization than it is about the group inclusion or exclusion of the target (where a group is simply "like us"). Evidence for a memory deficit under these circumstances would dovetail nicely with the growing literature on group-based memory biases beyond race. If truly ambiguous targets (not clearly White or Black) are associated with the out-group, and memory deficits arise from this association, the own-race effect may be less about categorizing targets as White or

Black than it is about categorizing targets as "like us" (in-group) or "not like us" (out-group).

## Overview of Studies

In the present work, we examined memory biases in the recognition of racially ambiguous faces, postulating that motivation plays a significant role in memory for these faces. Before conducting the four experiments reported here, a series of pilot studies were conducted to validate the faces we used. This extensive pilot testing was necessary to both establish that our target faces varied according to the main factor of interest (ambiguity) and to rule out potential confounding factors.

In Study 1, we examined White and Black participants' memory for (a) prototypical Black faces, (b) prototypical White faces, and (c) ambiguous Black–White faces. We predicted that majority and minority group members would show different patterns of recognition reflecting different patterns of inclusion motives. In Study 2, we manipulated motivation by encouraging some participants not to exclude biracial individuals from their racial in-group. If a lack of memory for racially ambiguous individuals derives from a lack of motivation for including these individuals, encouraging an inclusive mindset should eliminate or greatly reduce these memory deficits. In Study 3, we examined the memory consequences of short-circuiting motivational processes by eliminating the ambiguity in these faces (faces were paired with racial labels; cf., Eberhardt et al., 2003). Finally, in Study 4 we explored the role of out-group associations in mediating the relationship between motivation and memory for racially ambiguous faces.

## Study 1

In Study 1, we examined majority and minority group members' memory for prototypical Black faces, prototypical White faces, and ambiguous Black–White faces. We expected that both majority (White) and minority (Black) perceivers would misremember truly ambiguous faces but that this confusion in memory would be greater for majority group perceivers. Given the relative power of their in-group, White perceivers have a particular reason to protect their in-group from those who possess non-White phenotypic characteristics, just as Americans from centuries ago tried to protect the White in-group. Thus, although both White and Black perceivers may misremember racially ambiguous individuals, this effect may be especially strong for White perceivers.

### *Method*

#### *Generation of Facial Stimuli*

Stimuli were created with FaceGen Modeller 3.1, which enables racial morphing along parameters of skin color, texture, and face shape and also allows creation of faces given specific parameters, such as racial group, age, gender, facial symmetry, and attractiveness. We first generated 50 prototypical Black male faces and 50 prototypical White male faces using this software. Prototypical Black faces possessed more Afrocentric facial features (e.g., dark skin, broad nose, full lips), whereas White faces possessed more Eurocentric facial features (e.g., light skin, narrow nose, thin lips; Blair et al., 2002; K. Maddox, 2004). Additionally, when generating the faces we directed the program to create faces within a narrow range of age, facial symmetry, and attractiveness. Next, we morphed the two sets of Black and White prototypical (parent) faces together using FaceGen. For each of the 50 parent face pairs, we created five morphs clustered around 50%: two skewed slightly more Black than the midpoint (e.g., a 53%/47% and 56%/44% Black–White combination), two skewed slightly more White than the midpoint (e.g., 47%/53%, 44%/56%) and one face at the midpoint of 50%/50%. This amounted to a set of 250 racially ambiguous male faces, all clean-shaven, young adult men with neutral facial expressions. A set of 250 racially ambiguous female faces was created using the same procedure. Finally, to reduce suspicion among perceivers we created a new set 20 prototypically Black faces (10 female, 10 male) and 20 prototypically White faces (10 female, 10 male) using the parameters described above.

All pictures were edited using Adobe Photoshop, placed on a gray background and cropped with a white oval to display only the head region. Pictures had no jewelry, clothing, or distinctive markers of any sort. These faces also had no hair. Thus, ovals were placed to frame the face at mid-forehead level so participants could not tell whether the faces had hair or not. Lastly, all pictures were adjusted to uniform size and resolution (275 $\times$ 360 pixels; 3.8 $\times$ 5.0 inches; 72 pixels/inch).

*Pilot Study 1: Initial selection of racially ambiguous faces.* We wanted to select only the most ambiguous faces of the original 500. To select perceptually ambiguous targets (at the midpoint between Black and White), we conducted a pilot test with a convenience sample of 26 participants (16 women, 10 men) composed of a diversity of groups (17 White, 3 Black, 2 Asian, 2 Asian biracial, and 2 Hispanic; see Pilot Study 3 for further prototypicality ratings from White and Black perceivers). These participants completed a forced-choice racial categorization task on the ambiguous faces only. Of the 500 rated pictures, the 40 (20 male, 20 female) faces perceived as the most ambiguous were used in the final stimulus set. Each of the 40 pictures was perceived as Black equally as often as it was perceived as White, that is, the final 40 pictures chosen did not differ from 50% (i.e., as measured using binomial tests; $P\ [\pi = 0.5|\ \text{data}] > .05$). A pilot test was later conducted to confirm that the attractiveness and distinctiveness of the selected photos did not differ from that of the Black or White faces (see Pilot Study 3, below).

*Pilot Study 2: Confirmation of White and Black prototypicality.* Participants in Pilot Study 1 returned for a second session in which they categorized the prototypically Black and prototypically White faces. To check that prototypically Black and White targets were correctly categorized, we dummy coded responses to each photo (0 = Black and 1 = White). Black targets were categorized as Black ($M = .007$); White targets were categorized as White ($M = .99$). These 20 Black and 20 White faces, combined with the 40 racially ambiguous faces, comprised the final set available for use in Pilot Study 3 and the recognition task, amounting to a total of 80 faces (see Figure 1 for example stimuli).

*Pilot Study 3: Confirmation of White, Black, and ambiguous prototypicality and measurement of extraneous influences.* A group of 17 White participants (12 women, 5 men) and 9 Black participants (5 women, 4 men) rated each face on prototypicality, attractiveness, and distinctiveness using Likert-type scales (ranging, for example, from 1 = *not at all attractive* to 7 = *very attractive*). Prior to making the prototypicality rating for each face, participants categorized the face as White or Black; prototypicality

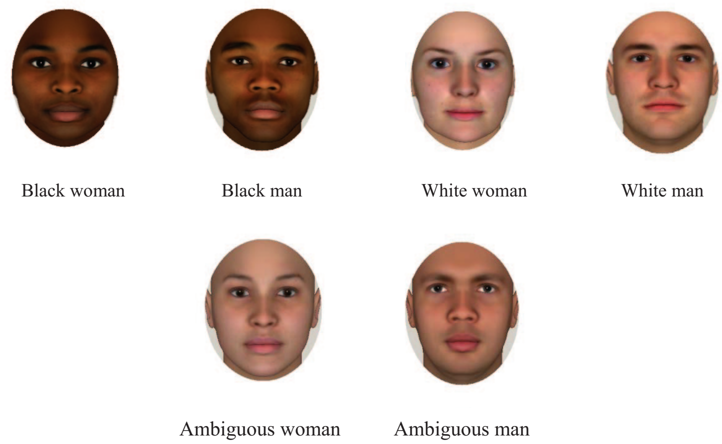


*Figure 1.* Examples of stimuli.

ratings were made in reference to the participant's categorization. Distinctiveness ratings were made on the basis of "how much the face would stand out in a crowd."

Reliable ($\alpha = .92$) prototypicality ratings revealed (a) the expected target race differences, $F(2, 48) = 96.2$, $p < .0001$, $\eta^2 = .80$ and (b) that these differences did not interact with participant race, $F(2, 48) = 1.32$, $p = .28$, $\eta^2 = .05$. Post hoc Bonferroni-corrected comparisons revealed that the Black faces ($M = 5.47$, $SD = 0.75$) and White faces ($M = 5.10$, $SD = 0.58$) were both seen as more prototypical than the ambiguous faces ($M = 3.42$, $SD = 0.61$; $ps < .0001$).

Ratings of attractiveness and distinctiveness were also reliable ($\alpha s = .94$). The faces did not differ in attractiveness for target race, $F(2, 48) = 1.51$, $p = .23$, $\eta^2 = .06$, and neither White nor Black participants rated the three groups of faces any differently in attractiveness, $F(2, 48) = 0.87$, $p = .43$, $\eta^2 = .03$. The faces also did not differ in distinctiveness, $F(2, 48) = 1.80$, $p = .18$, $\eta^2 = .07$, and neither White nor Black participants rated the three groups of faces any differently in distinctiveness; $F(2, 48) = 0.77$, $p = .47$, $\eta^2 = .03$.

In Pilot Study 3, then, White and Black participants agreed that the racially ambiguous faces were less prototypical than either the White or Black prototypical faces. Moreover, these participants agreed that the three groups of facial stimuli (White, Black, and ambiguous) did not differ in attractiveness or distinctiveness.

Overall, the final stimuli consisted of three groups of color photographs with 40 pictures of racially ambiguous individuals and 20 pictures each of prototypical Black or White individuals. Prototypical Black and White faces were equally and extremely prototypical of their respective races, whereas the ambiguous faces were equally likely to be categorized as White or Black and were rated low in prototypicality. The stimuli were equated with respect to attractiveness and distinctiveness across the three groups of faces (Black, White, and ambiguous). Although only 20 of the ambiguous faces (10 female and 10 male) were used in Studies 1 and 2, all 40 faces were used in Studies 3 and 4.

### *Participants and Design*

Forty-six undergraduates were recruited in exchange for partial course credit or payment. An a priori exclusion criterion was based on the idea that participants would perform differently if they knew that the photographs were computer generated. Participants were probed for suspicion of the stimuli in debriefing; specifically, participants were asked if any of the pictures looked unusual or odd. Only those who did not express suspicion about the stimuli were included in analyses. Thus, data from 7 participants were eliminated. The final sample included 20 White participants (14 women, 6 men) and 19 Black participants (11 women, 8 men).

This study had a 3 (race of target: Black, White, ambiguous) × 2 (participant race: White, Black) mixed-model design with repeated measures on the first factor. The primary dependent measure was recognition memory (as measured by $d'$).

### *Materials*

For this study, a randomly selected half of the ambiguous photos were used. Thus, the photographs used consisted of 20 racially ambiguous faces (equally as likely to be Black as White) and 20 photographs each of unambiguously Black or White faces.

### *Procedure*

Following informed consent procedures, participants completed a face recognition task programmed with Superlab software. Participants were told they would see a series of pictures, and their task was to remember as much as they could about each particular picture. In the learning phase, participants saw 10 Black faces (5 female, 5 male), 10 White faces (5 female, 5 male), and 10 ambiguous faces (5 female, 5 male). Each face was presented for a total of 5 s, preceded by a fixation point with an intertrial interval of 1010 ms.

After completion of the learning phase, individuals worked on an unrelated filler task (a word search puzzle) for 5 min before moving on to the recognition phase. In the recognition phase, participants were presented with the 30 faces from the learning phase plus 30 foils. The foils included faces that had not been presented during the learning phase: 10 Black faces (5 female, 5 male), 10 White faces (5 female, 5 male), and 10 ambiguous faces (5 female, 5 male). The faces used in learning and the faces used as foils were counterbalanced across participants. Faces were presented in a randomized order and remained on the screen until the participant made a judgment. Participants were instructed to respond as quickly and accurately as possible, and response keys were counterbalanced across participants. After completing the recognition task, participants filled out a demographic information form, were fully debriefed, and thanked.[1]

## *Results and Discussion*

### *Data Transformation*

Hits and false alarms from the face recognition task were combined into $d'$ scores, where $d'$ is equivalent to $z$ score (hits)–$z$ score (false alarms). In cases in which the proportion of hits or false alarms equals 1 or 0, $d'$ cannot be calculated because of an inability to calculate a $z$ score for these values. To correct for this, we transformed proportions of hits and false alarms into Bayesian proportions.[2] No differences were obtained as a function of participant gender or gender of the photograph, so analyses were collapsed across these variables.

### *Recognition Performance*

The mean $d'$ data were subjected to a 3 (target race: Black, White, ambiguous) × 2 (participant race: White, Black) mixed-model analysis of variance (ANOVA). As depicted in Figure 2, only the predicted interaction of Target Race × Participant Race emerged, $F(2, 74) = 6.13$, $p = .003$, $\eta^2 = .14$. We explored this difference via planned contrasts.

White participants were superior at recognizing White faces compared with either Black or ambiguous faces, $t(74) = 2.63$, $p = .005$, $r = .29$, and $t(74) = 2.39$, $p = .01$, $r = .27$, respectively. White participants' memory for Black faces did not differ significantly from their memory for ambiguous faces, $t(74) = 0.24$, $p = .40$, $r = .03$. Black participants recognized Black faces significantly better than White faces, $t(74) = 2.10$, $p = .02$, $r = .24$, and ambiguous faces at an intermediate level, not different from how they recognized White faces, $t(74) = 1.27$, $p = .10$, $r = .15$, or Black faces, $t(74) = 0.83$, $p = .20$, $r = .10$.

Thus, in Study 1, both Black and White participants had some difficulty recognizing racially ambiguous individuals. Whereas Black participants remembered Black faces especially well and White participants remembered White faces especially well, neither group remembered racially ambiguous faces especially well. The pattern of results is consistent with theories of in-group overexclusion, though this study does not demonstrate the role of motivation (see Study 2). Likewise, consistent with the idea that the majority race is not especially motivated to include racially ambiguous individuals, White participants drew a stronger distinction between in-group and ambiguous faces than did Black participants.

## Study 2

We have argued that people (perhaps especially the racial majority) misremember racially ambiguous individuals because of a lack of motivation for including such individuals in the in-group. Indeed, the results of Study 1 show that racially ambiguous faces are misremembered at a similar rate as other-race faces and more often than same-race faces. Although these findings are consistent with a motivational explanation, they do not demonstrate that motivation played a role in memory for ambiguous faces. In Study 2, we sought definitive evidence for the role of motivational factors.

Our motivational explanation can be contrasted with the much more common cognitive and perceptual explanations offered elsewhere for racial memory biases. Among the most popular of accounts is that individuals gain perceptual expertise in own-race faces via contact and individuation (see Meissner & Brigham, 2001) and consequently process these faces holistically or configurally as compared with other-race faces (Hancock & Rhodes, 2008; McKone et al., 2007; Michel et al., 2007, 2006; Rhodes, Tan, Brake, & Taylor, 1989; Tanaka et al., 2004; Turk et al., 2005). A related account builds on recent demonstrations of group-level memory bias beyond race (Bernstein et al., 2007; Huart et al., 2005; MacLin & Malpass, 2001; Michel et al., 2007; Rule et al., 2007; Shriver et al., 2008; Shutts & Kinzler, 2007). Such findings suggest that perceivers simply use different encoding processes for in-group and out-group members. Indeed, instructions to individuate out-group faces appear to eliminate the own-race bias for unambiguous faces (Hugenberg et al., 2007). Finally, people may cognitively disregard individuals categorized as out-group members to help conserve resources (e.g., Rodin, 1987).

The various cognitive–perceptual and social–cognitive accounts of the own-race bias are not inconsistent with a motivational account, but the former tend to downplay or disregard motivational mechanisms that may exert their influence at the stage of deciding who is an in-group or out-group member. Hence, it seemed important to definitively demonstrate the role of motivational factors in the ambiguous-race memory bias observed in Study 1.

In Study 2, we more directly examined the motivational account of social memory by encouraging some participants to include racially ambiguous individuals in the in-group. Such findings

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[1] To examine whether experience with biracial individuals could account for differences in biracial memory between Black and White participants, we asked participants to complete several measures of biracial contact at the conclusion of the experiment. Participants indicated the percentage of their high school, college, and neighborhood population composed of biracial individuals. Participants' responses to these items were averaged together to form a composite of "exposure to biracial individuals." White ($M = 4.07\%$) and Black ($M = 5.42\%$) participants did not differ in their estimates for biracial exposure, $F(1, 38) = 1.38$, $p = .25$, suggesting that differences in exposure to biracial individuals are unlikely to be an explanation for differences in memory between White and Black participants. Although this measure cannot capture all possible aspects of contact (e.g., seeing someone on the street vs. friendly contact), the ethnic make-up of participants' immediate environments should be correlated with the ethnic make-up of other life domains. Hence, we believed that this measure was a sufficient proxy for biracial exposure. To examine this assumption, we asked 26 White and 30 Black participants to complete the above exposure measure but also to indicate the extent to which (a) their teachers or bosses have been biracial, (b) they often spend time with biracial people, (c) they spend a lot of their free time doing things with biracial people, (d) they have biracial people over to their house or apartment, and (e) they go over to the houses or apartments of biracial people. These items (individually or as a single index) correlated with our original measure of exposure. Individual correlations ranged from $r = .29$ to .44, and the overall index measure correlated with our original measure, $r = .45$, all $ps < .05$.

[2] Where $s$ = successes and $f$ = failures, $P(s) = (s + 1)/(s + f + 2)$. $S$ is either equal to the number of hits or false alarms and $s + f$ is equal to the total number of possible trials for that type of face.

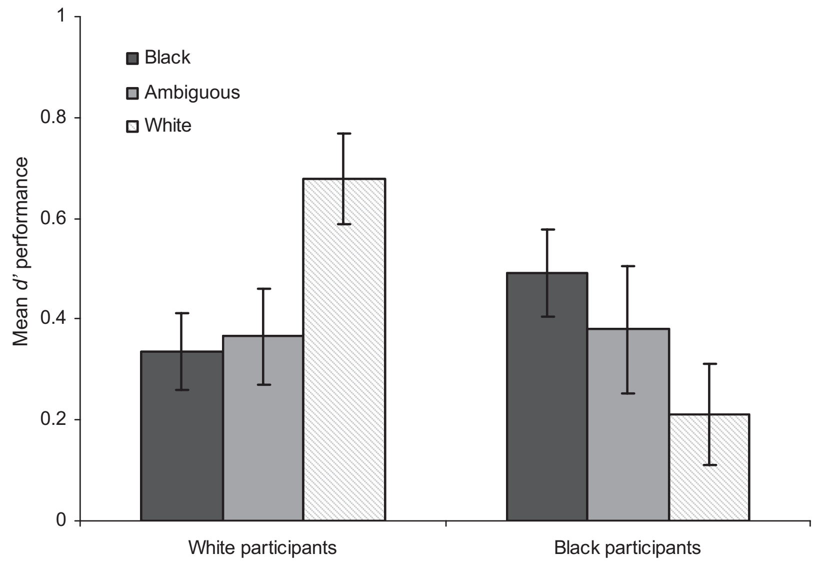


*Figure 2.* Study 1: White and Black participants' mean $d'$ performance for Black, ambiguous, and White faces. Error bars denote standard errors.

would provide evidence for a motivational account of the ambiguous-race memory bias.

### Participants and Design

Forty-seven undergraduates were recruited in exchange for partial course credit or payment. On the basis of an a priori exclusion criterion (see Study 1), only participants who did not express suspicion about the stimuli were included in analyses. Thus, data from 6 participants were eliminated. The final sample included 41 White participants (21 women, 20 men).

This study had a 3 (race of target: Black, White, ambiguous) $\times$ 2 (motivation condition: inclusion, accuracy) mixed-model design with repeated measures on the first factor. The primary dependent measure was recognition memory (as measured by $d'$). Relative to accuracy motivation, inclusion motivation should significantly improve memory for ambiguous faces but not White or Black faces. Moreover, memory for White faces should be better than memory for ambiguous faces, but only in the accuracy motivation condition. Finally, the accuracy motivation condition should replicate Study 1, with memory for ambiguous faces no different from memory for Black faces, and both lower than memory for White faces.

### Materials

The same subset of photos used in Study 1 were used in this study, totaling 20 racially ambiguous, 20 prototypically Black, and 20 prototypically White photographs.

### Procedure

Following informed consent procedures, participants completed a face recognition task programmed with Superlab software. Participants were given one of two sets of instructions. In the accuracy motivation condition they received the same instructions used in Study 1, plus one additional sentence evoking a general accuracy motivation: "Do your best to remember the faces accurately." In the inclusion condition, participants received a nearly identical set of instructions, but instead of the accuracy instructions, they were told that "previous research has shown that people who are prejudiced tend to exclude biracial individuals from their group. Pay close attention to how you categorize and view biracial faces in order to avoid appearing prejudiced." This manipulation applied the pervasive American motivation to appear nonprejudiced (e.g., Dunton & Fazio, 1997; Norton, Vandello, & Darley, 2004; Plant & Devine, 1998) to racially ambiguous targets. We expected that this extra motivation to process ambiguous individuals as in-group members would ameliorate poor memory for ambiguous targets. As in Study 1, the face recognition task comprised two phases: learning and recognition. All other details of the study were identical to Study 1.

## Results and Discussion

As before, hits and false alarms were calculated using Bayesian proportions and $d'$ was calculated on the basis of these scores. No differences were obtained as a function of participant gender or gender of the photograph, so analyses were collapsed across these variables.

The mean $d'$ data were subjected to a 3 (target race: Black, White, ambiguous) $\times$ 2 (motivation condition: inclusion, accuracy) mixed-model ANOVA. Although White participants recognized White faces ($M$ = .58, $SD$ = .48) better than Black faces ($M$ = .29, $SD$ =.43) with ambiguous faces in the middle ($M$ =.37, $SD$ = .51), $F(2, 78) = 5.11$, $p = .008$, $\eta^2 = .12$, this effect was qualified by the predicted target race by motivation interaction depicted in Figure 3, $F(2, 78) = 3.27$, $p = .043$, $\eta^2 = .08$. To test the hypotheses noted in the Design section, we explored the interaction with a series of planned contrasts.

First, as compared with accuracy motivation, inclusion motivation improved memory for ambiguous faces, $t(78) = 3.18$, $p$ =

.001, $r = .34$, but not for White faces, $t(78) = -0.13$, $p = .45$, $r = .01$, or Black faces, $t(78) = 0.27$, $p = .39$, $r = .03$. Second, memory for White faces was higher than memory for ambiguous faces in the accuracy motivation condition, $t(78) = 3.25$, $p < .001$, $r = .35$, but not in the inclusion motivation condition, $t(78) = -0.18$, $p = .43$, $r = .02$. Finally, the accuracy motivation condition replicated the results of Study 1. Memory for White faces was higher than memory for ambiguous faces (noted above) and Black faces, $t(78) = 2.52$, $p = .007$, $r = .27$, and memory for ambiguous faces did not differ significantly from memory for Black faces, $t(78) = -0.73$, $p = .23$, $r = .08$.

The results of Study 2 were consistent with hypotheses: The experimental increase of inclusion motivation improved memory for ambiguous faces and eliminated the memory deficit associated with these faces. These effects were not due to heightened effort in general because the control (accuracy motivation) condition also included instructions to enhance effort (but did not improve memory for ambiguous faces). It is particularly interesting that improvements to memory were observed as a consequence of a general intergroup motivation (to avoid biracial exclusion) rather than a task-specific motivational strategy related to memory. For example, Hugenberg et al. (2007) instructed participants to avoid the cross-race effect by using a particular encoding method (individuation), and these instructions were associated with a substantial memory improvement for unambiguously Black faces. Although these latter findings suggested a method for reducing the own-race bias, they did not show that broad motivational states could play a role in the own-race bias. In summary, the results of Study 2 supported hypotheses regarding the role of inclusion motives in memory for ambiguous faces and went beyond previous work by showing that general intergroup motivational states could play a role in the own-race bias.

## Study 3

In Study 2, differences in memory for ambiguous and same-race targets were eliminated through increasing inclusion motives. This finding implies that perceivers are not simply incapable of remembering racially ambiguous faces; instead, motivation influences memory deficits associated with ambiguous faces though changes at the categorization stage. We have argued that motivation plays a role in social memory because ambiguity invites motivational influences on cognitive processing (cf., Alloy & Tabachnik, 1984; Balcetis & Dunning, 2006; Bruner & Goodman, 1947; Postman & Crutchfield, 1952; Trope, 1986). The main theoretical thrust behind Study 3 was to determine if removing racial ambiguity (but retaining visual ambiguity) eliminated memory deficits for ambiguous targets. We reasoned that when categorical ambiguity was eliminated and targets were clearly in-group or out-group to the perceiver, overexclusion should also be greatly reduced or eliminated.

In one previous study that attempted to remove categorical ambiguity, stereotypical hairstyles were used to manipulate perceived racial category (MacLin & Malpass, 2001). Indeed, stereotypical hairstyles actually altered perception of facial features, a phenomenon referred to as the *ambiguous-race face illusion* (MacLin & Malpass, 2003). Although the hairstyle manipulation has proven to be effective in altering memory, we were concerned that such a manipulation (a) does not veridically manipulate categorization and (b) changes the visual stimuli themselves. Instead, we aimed to manipulate racial category information directly and without actually manipulating the visual stimuli in any way. Specifically, previous research suggests that participants accept the racial labels provided for ambiguous-race targets (Eberhardt et al., 2003). Indeed, the same faces given different (in-group vs. out-group) labels or cues to group membership are processed and remembered differently (Bernstein et al., 2007; Huart et al., 2005; MacLin & Malpass, 2001; Michel et al., 2007; Shriver et al., 2008;

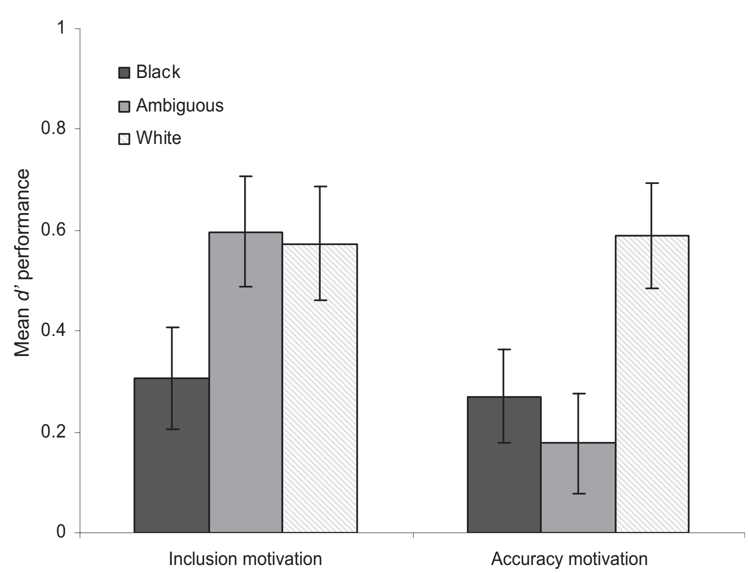


*Figure 3.* Study 2: White participants' mean $d'$ performance for Black, Ambiguous, and White faces when motivated to include biracial faces compared with a general accuracy motivation. Error bars denote standard errors.

Shutts & Kinzler, 2007). Of particular interest, Michel et al. (2007) demonstrated that ambiguous faces received greater holistic processing when paired with in-group category cues than when paired with out-group category cues. Thus, removing ambiguity through use of category information guided the way the face was processed.

In Study 3, a reduction in categorical ambiguity was accomplished by providing racial labels for the ambiguous faces. As such, instead of relying on their motivations to process these faces, individuals would rely on the given categories. In other words, the own-race bias would occur for actual in-group faces and ambiguous faces known to be in-group, as compared with actual out-group faces and ambiguous faces known to be out-group.

With the removal of ambiguity (via labels), we expected a simple form of the own-race memory bias to occur. Specifically, we expected White participants to remember faces labeled "White" at a higher rate than faces labeled "Black," even when the face itself was visually ambiguous. Conversely, we expected Black participants to remember faces labeled "Black" at a higher rate than faces labeled "White," even when the face itself was visually ambiguous.

## *Method*

### *Participants and Design*

Eighty-six undergraduates participated in exchange for partial course credit or payment. Data from 16 participants were eliminated for suspicion of the stimuli (based on our a priori exclusion criterion discussed in Study 1). Only the remaining 42 White participants (26 women, 16 men) and 28 Black participants (15 women, 13 men) were included in the analyses reported below.

This study had a 2 (labeled race of target: Black, White) × 2 (type of face: prototypical, ambiguous) × 2 (participant race: White, Black) mixed-model design with repeated measures on the first two factors. The primary dependent measure was face recognition memory (as measured by $d'$). Only a two-way interaction was expected: Participants should have better memory for faces with own-race labels than for faces with other-race labels.

### *Materials*

As described in Study 1, the set of stimuli consisted of 40 racially ambiguous photographs (equally as likely to be Black as White) and 20 photographs each of unambiguously Black or White people.

### *Procedure*

Following informed consent procedures, participants were told that we were interested in how memory for verbal and numerical information interacts with memory for faces (for use of similar cover story, see Eberhardt et al., 2003). Instructions presented on a computer screen informed participants that they would see a series of slides. Each slide was to contain information about individuals alongside pictures of these individuals.

Participants completed the same type of face recognition task as in the first two studies. In the learning phase, participants were instructed to try to memorize each of the faces and its accompanying demographic information (sex, race, and age). The demographic information allowed us to manipulate the racial label. Half of the ambiguous faces were randomly labeled Black, and half were randomly labeled White, counterbalanced across participants. Prototypical faces were always paired with an accurate label. Participants saw 40 faces paired with demographic information presented in a randomized order, including 10 randomly chosen ambiguous faces labeled Black (5 women, 5 men) and 10 randomly chosen ambiguous faces labeled White (5 women, 5 men), 10 clearly Black faces (5 women, 5 men), and 10 clearly White faces (5 women, 5 men). Each pair was presented for a total of 5 s and was preceded by a fixation point. The intertrial interval was 1010 ms.

After completion of the learning phase, individuals worked on an unrelated filler task (a word-search puzzle) for 5 min before moving on to the recognition phase. In the recognition phase, participants were presented with the original 40 faces they had been exposed to plus 40 foils. The foils included additional faces they had not seen previously: 20 racially ambiguous faces (10 female, 10 male), 10 Black faces (5 female, 5 male), and 10 White faces (5 female, 5 male). No demographic information appeared on the screen during this phase; participants only saw faces and indicated whether the face appeared during the learning phase. The set of 40 faces used in learning and the set of 40 faces used as foils were counterbalanced across participants. All other parameters of the procedure were identical to Studies 1 and 2.

## *Results and Discussion*

As before, hits and false alarms were calculated using Bayesian proportions (performance on all ambiguous foils were used to form an overall false alarm score for ambiguous faces). No differences were obtained as a function of participant gender or gender of the photograph, so analyses were collapsed across these variables.

The mean $d'$ data were subjected to a 2 (labeled race of target: Black, White) × 2 (type of face: prototypical, ambiguous) × 2 (participant race: Black, White) mixed-model ANOVA with repeated measures on the first two factors. Results revealed only the predicted two-way interaction between participant race and labeled race of the target, $F(1, 68) = 7.42$, $p = .008$, $r = .31$. There were no main or interactive effects implicating the type of face (prototypical or ambiguous). Consequently, the two-way interaction was deconstructed with a priori contrasts that collapsed across this variable. Specifically, we examined the influence of labels (Black, White) on memory separately for White perceivers and Black perceivers.

The memory of White participants was better for faces labeled White ($M = 0.48$, $SD = 0.31$) than faces labeled Black ($M = 0.32$, $SD = 0.34$), $t(68) = 2.42$, $p = .02$, $r = .28$, consistent with the own-race bias. The memory of Black participants was better for faces labeled Black ($M = 0.35$, $SD = 0.37$) than for faces labeled White ($M = 0.20$, $SD = 0.48$), $t(68) = 1.83$, $p = .04$, $r = .22$, also consistent with the own-race bias. Figure 4 illustrates that these effects held independent of whether the faces were prototypical or ambiguous; as such, there was no three-way interaction ($p = .27$). Although there was no three-way interaction involving whether the faces were ambiguous or prototypical, memory differences for just the ambiguous faces may be of interest. Although in-group labeled ambiguous faces were better remembered than out-group labeled ambiguous faces for both White (*M*s = 0.39 and 0.34, *SD*s = 0.38

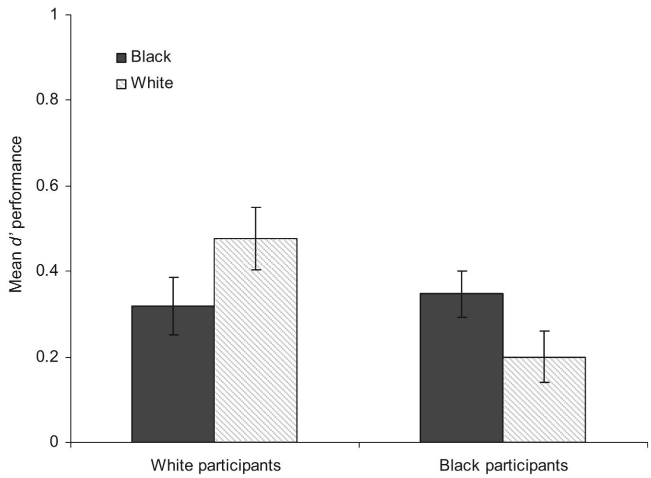


*Figure 4.* Study 3: White and Black participants' mean $d'$ performance for in-group and out-group labeled faces (collapsed across whether the face was ambiguous or prototypical). Error bars denote standard errors.

and 0.47) and Black ($M$s = 0.36 and 0.22, $SD$s = 0.48 and 0.52) participants, these differences did not reach significance ($p$s > .11). It should also be noted that these patterns were not significantly different from the patterns observed for actual White and Black faces. Thus, ambiguous faces paired with in-group or out-group cues elicited effects that paralleled those of actual in-group and out-group faces, though the effect for ambiguous faces was nonsignificantly weaker than the effect for prototypical faces.

These findings are consistent with our hypotheses: When racial ambiguity was removed via labels, all individuals (ambiguous or prototypical) were remembered at a rate consistent with the provided category label. In other words, when racially ambiguous faces were labeled with the same race as the perceiver, these faces were remembered well, and overexclusion was greatly reduced or eliminated.

## Study 4

Study 1 established the extension of the own-race bias to racially ambiguous faces. Study 2 demonstrated that inclusion motives may play an important role in memory for racially ambiguous faces. And the results of Study 3 suggested that racial ambiguity is a necessary precondition for motivation to influence memory. In Study 4, we turned our attention to understanding how inclusion motives impact memory. Specifically, we expected that increasing inclusion motivation would increase the cognitive association between racially ambiguous faces and the in-group. To the extent that this association is strengthened, perceivers' should exhibit improved memory for racially ambiguous faces.

We examined the association between racial ambiguity and the in-group or out-group with a modified version of the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998). Although the IAT is typically used as an implicit measure of attitudes, it has been used in other domains such as stereotyping (Amodio & Devine, 2006; Blair, Ma, & Lenton, 2001; Dasgupta & Asgari, 2004; Nosek, Banaji, & Greenwald, 2002; Rudman, Ashmore, & Gary, 2001; Rudman & Glick, 2001; Rudman, Greenwald, & McGhee, 2001; Rudman & Lee, 2002), self-esteem (Bosson, Swann, & Pennebaker, 2000; Dijksterhuis, 2004; Greenwald & Farnham, 2000) and the self-concept (Dal Cin, Gibson, Zanna, Shumate, & Fong, 2007; Devos & Banaji, 2005; Haines & Kray, 2005; Nosek et al., 2002; Perugini, 2005; Swanson, Rudman, & Greenwald, 2001). An IAT was used instead of self-report for several reasons. First, a task in which participants subjectively categorize racial faces as in-group or out-group is clearly a task with considerable impression management concerns. IATs are more resistant to social desirability than are most self-report measures (see Nosek, Greenwald, & Banaji, 2007). Second, because participants are given only several seconds to encode each face in the recognition task, it was important to use a task that captured in-group–out-group distinctions within that same time frame. Responses on IATs generally occur on the scale of milliseconds, whereas deliberative self-report responses may take much longer. Finally, IATs may more directly capture simple associations (ambiguous = out-group) than do self-report measures which presumably use a greater number of higher order cognitive processes.

The IAT used here was very similar to the We–They IAT used in a recent study (Devos & Banaji, 2005), and captures the extent to which participants construe people (e.g., White or racially ambiguous) as belonging to their in-group or the out-group. When highly associated concepts, categories, and attributes share the same response key, participants tend to classify them quickly and easily, whereas when weakly associated concepts, categories, and attributes share the same response key participants tend to classify them more slowly and with greater difficulty. Thus, we expected that participants with a default exclusionary motivational set would strongly associate White with "Us" and non-White with "Them"; this same pattern should be significantly weaker among participants with increased inclusion motives. It is important that all of the non-White targets in this ambiguous-face IAT were ambiguous faces; therefore, this IAT was designed to measure the extent to which individuals associate ambiguous faces with the in-group or out-group.

In summary, we predicted that an increase in inclusion motivation would strengthen the association between racially ambiguous faces and the in-group, as assessed via an IAT. Moreover, we expected this strengthened association to coincide with an improvement in memory for racially ambiguous faces. Overall, the influence of changes to inclusion motivation on memory for racially ambiguous faces should be mediated by cognitive associations between ambiguous faces and the in-group.

### *Method*

#### *Participants and Design*

Fifty-eight undergraduates were recruited in exchange for partial course credit or payment. On the basis of an a priori exclusion criterion (see Study 1), only participants who did not express suspicion about the stimuli were included in analyses. Additionally, 3 participants did not understand the instructions for the IAT, and these participants were removed from analyses. Thus, data from a total of 11 participants were eliminated. The final sample included 47 White participants (27 women, 20 men).

This study had a 3 (race of target: Black, White, ambiguous) × 2 (motivation condition: inclusion, accuracy) mixed-model design with repeated measures on the first factor. There were two dependent measures: recognition memory (as measured by $d'$) and IAT score.

## Materials

*Face photographs.* The same subset of photos used in Studies 1 and 2 were used in this study, totaling 20 racially ambiguous, 20 prototypically Black, and 20 prototypically White photographs.

*Ambiguous IAT.* Participants completed a modified version of an IAT, in which they categorized White and ambiguous faces as White or non-White and stimulus words (e.g., we, our, they, their) as "Us" or "Them" words. Stimuli included 10 White male faces and 10 ambiguous male faces and 8 Us–Them words. Critical trials included congruent blocks in which White–Us and non-White–Them shared sides, and incongruent blocks in which non-White–Us and White–Them shared sides. The order of these critical blocks and response key mappings were counterbalanced between subjects.

For each task, stimuli appeared one at a time in the center of the computer screen, and participants used the *E* key and *I* key on the computer keyboard to classify items as quickly and accurately as possible into the corresponding categories identified on the left or right side of the screen. All faces had neutral expressions and were pretested for their depicted race. The White faces were categorized as White by raters 100% of the time, and the ambiguous faces were rated as ambiguous in racial group membership (e.g., across raters they were categorized as 50% White and 50% Black). All pictures were placed against a standardized grey background and resized to 300 × 450 pixels.

*Manipulation check.* Participants completed an item measuring their willingness to comply with the inclusion motivation manipulation. The item asked about the extent to which they "tried hard not to exclude biracial Black/White individuals from my in-group" in the study on a scale ranging from *strongly disagree* (1) to *strongly agree* (5).

## Procedure

The details of this study mirror Study 2, in which participants were given one of two sets of instructions to evoke either an inclusion motivation or a general accuracy motivation. Following informed consent procedures, participants completed the face recognition task (used in Studies 1–3) and the ambiguous IAT. The IAT was programmed in Direct RT and then inserted into a combined program with the recognition task using MediaLab software. As in Study 1, the face recognition task comprised two phases: learning and recognition. The face recognition task and the ambiguous IAT were completed in a counterbalanced order across participants.

# Results and Discussion

## Manipulation Check

Those in the inclusion motivation condition ($M = 4.04$, $SD = 0.96$) indicated that they tried to avoid excluding racially ambiguous individuals more than those in the accuracy motivation condition ($M = 3.22$, $SD = 1.04$), $t(45) = -2.83$, $p = .007$, $r = .39$.

## Ambiguous IAT

We calculated IAT scores based on the *D* scoring algorithm recommended by Greenwald, Nosek, and Banaji (2003). Response latencies were calculated from the onset of the trial until a correct response was made, and latencies less than 400 ms or greater than 10,000 ms were removed. A positive *D* score indicates a stronger association between ambiguous faces and the out-group, whereas a negative *D* score indicates a stronger association between ambiguous faces and the in-group (relative to White faces). Consistent with hypotheses, IAT scores were higher in the accuracy motivation condition ($M = 0.66$, $SD = 0.25$) than in the inclusion motivation condition ($M = 0.46$, $SD = 0.40$), as indicated by a two-tailed independent groups *t* test, $t(45) = 2.03$ $p = .049$, $r = .29$. Thus, ambiguous faces (relative to White faces) were associated more with the in-group and less with the out-group (lower IAT scores) as a consequence of inclusion motivation.

## Memory

As before, $d'$ was calculated based on hits and false alarms. No differences were obtained as a function of participant gender or gender of the photograph, so analyses collapsed across these variables. The mean $d'$ data were subjected to a 3 (target race: Black, White, ambiguous) × 2 (motivation condition: inclusion, accuracy) mixed-model ANOVA. White participants recognized White faces ($M = 0.48$, $SD = 0.46$) better than both ambiguous and Black faces (*M*s = .27 and .32, respectively; *SD*s = .45), $F(2, 90) = 3.28$, $p = .042$, $\eta^2 = .07$. Most important, however, this effect was qualified by the predicted target race by motivation interaction, $F(2, 90) = 3.22$, $p = .044$, $\eta^2 = .07$. To examine the extent to which this interaction replicated the pattern described in Study 2, we conducted a series of a priori contrasts.

First, memory for ambiguous faces was higher in the inclusion motivation condition ($M = .41$, $SD = .40$) than the accuracy motivation condition ($M = 0.13$, $SD = 0.47$), $t(90) = 2.30$, $p = .01$, $r = .24$. In contrast, memory for White faces and Black faces in the inclusion motivation condition (*M*s = 0.40 and 0.37, respectively; *SD*s = 0.45 and 0.48, respectively) did not differ from memory in the accuracy motivation condition (*M*s = 0.56 and 0.28, respectively; *SD*s = 0.46 and 0.42, respectively; $ps > .10$).

Second, in the accuracy motivation condition, memory for White faces ($M = 0.56$, $SD = 0.46$) was higher than memory for ambiguous faces ($M = 0.13$, $SD = 0.47$), $t(90) = 3.49$, $p < .001$, $r = .35$, but not in the inclusion motivation condition (*M*s = 0.40 and 0.41, respectively; *SD*s = 0.45 and 0.40, respectively), $t(90) = -0.05$, $p = .48$, $r = .01$. Finally, the accuracy motivation condition replicated the results of the previous studies. Memory was better for White faces as compared with Black faces, $t(90) = 2.30$, $p = .01$, $r = .24$, and as compared with ambiguous faces (see above). Memory for ambiguous faces did not differ significantly from recognition for Black faces, $t(90) = -1.19$, $p = .12$, $r = .12$.

## Mediation of Memory for Racially Ambiguous Faces

As compared with participants in a control group, those who were motivated to not exclude racially ambiguous people exhibited (a) increased associations between racial ambiguity and the in-group and (b) better memory for racially ambiguous faces. To determine if cognitive associations between racially ambiguous faces and the in-group can account for the relationship between motivation and memory for racially ambiguous faces, we conducted mediational analyses. Because the motivation manipulation did not predict memory changes for the White or Black faces, a mediation test would not be appropriate in those cases (see Baron & Kenny, 1986; additionally, IAT scores were not significantly correlated with memory for White faces or Black faces, *p*s $> .13$); thus, we only performed the mediational analysis on memory for ambiguous faces.

To examine the first steps of mediation, we entered a dummy variable coded for condition (accuracy motivation = 0) into two regression equations: one predicting IAT scores and one predicting memory for ambiguous faces. The motivation manipulation significantly predicted both IAT scores ($B = -0.20$, $p = .049$) and memory for ambiguous faces ($B = 0.28$, $p = .035$; see Figure 5). When IAT scores and the motivation manipulation variable were simultaneously entered into the regression, IAT scores negatively and significantly predicted memory for ambiguous faces ($B = -0.38$, $p = .046$). Thus, increasing memory for racially ambiguous faces was predicted by more negative IAT scores, that is, increasing associations between racial ambiguity and the in-group. Finally, the effect of the motivation manipulation on memory dropped to below significant when IAT scores were simultaneously entered (from $B = 0.28$, $p = .035$ to $B = 0.20$, $p = .13$). Because the traditional Sobel test is known to have low power (see Efron & Tibshirani, 1993; Preacher & Hayes, 2004; Shrout & Bolger, 2002), a bias-corrected bootstrap mediation model was used to assess the indirect effect. This bootstrap analysis yielded a 95% confidence interval, which did not include 0 (.0057, .2235). We can therefore conclude that the relationship between the motivation manipulation and memory for ambiguous faces was mediated by cognitive associations between racially ambiguous individuals and the in-group.

In summary, the results of Study 4 replicated those of Study 2 and additionally suggest that (a) misremembering of racially ambiguous faces is due to the weak association between racially ambiguous individuals and the in-group and (b) motivation to be inclusive alleviates this misremembering through increasing associations between ambiguous individuals and the in-group.

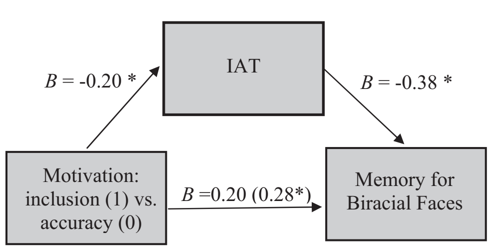


*Figure 5.* Study 4: Mediation of the relationship between motivated inclusion and memory for ambiguous faces. *Note: B* indicates the unstandardized beta weight associated with the effect. The parenthetical number indicates beta before including ambiguous Implicit Association Test (IAT) score. More negative IAT scores indicate a greater association between ambiguous faces and the in-group. Asterisks indicate a significant difference from 0. $^{*} p < .05$.

## General Discussion

The results of four experiments suggest that White and Black perceivers misremember racially ambiguous individuals because they are not motivated to include these individuals in the in-group. Ambiguous faces were remembered more poorly than prototypical, in-group faces. Group-level inclusion motives appear to play an important role in memory for ambiguous faces: The experimental increase of inclusion motives was associated with the elimination of ambiguous-face memory decrements. Inclusion motives appear to influence memory by changing group-level cognitive associations: Inclusion motives increased the likelihood that ambiguous faces would be associated with the in-group and only as a consequence of this effect was memory for ambiguous faces improved. Finally, ambiguity played an important role in these memory effects, as is often the case with motivational influences on cognitive processing.

### *On Negotiating Boundaries*

Although there are important implications of these findings for the role of motivation in social memory (see below), such implications should be considered in light of increasingly common racial ambiguities. For our ancient ancestors, race was fairly simple. Most or all of the people they interacted with had similar facial features and skin color; it was quite rare to encounter an individual that we might consider today as a member of a different race (Cosmides, Tooby, & Kurzban, 2003). Group membership, on the other hand, has (debatably) always played an important role in our social lives (cf., Baumeister & Leary, 1995; Cosmides et al., 2003). Consequently, many cognitive processes, including those contributing to memory, depend largely on group membership. Because race has historically been an excellent visual marker of group membership, it contributes heavily to social–cognitive processing. Indeed, our more recent ancestors used categorical conceptions of race to create social castes and systems of slavery and to assign rights. Today, cognitive processes are altered by race in domains as diverse as perception, attitudes, beliefs, and memory.

With the growing biracial population, it has become increasingly important to understand how racial ambiguity is perceived and treated. Because they straddle the boundaries of several categories, biracial and multiracial people are often not seen as belonging to any particular group. Society's rigid formulation of what defines a race (see Kelley & Root, 2003; Shih & Sanchez, 2005; Wardle, 1999), a lack of institutional acknowledgement of multiracial identity (Brown & Douglas, 2003; Kelley & Root, 2003), and even social psychology's approach to studying race-related phenomena all reflect how multiracial individuals are often left out simply because they do not fit well into precise categories, check boxes, or models. The research presented here suggests that those who do not fit the typical racial schema may often not be included into the in-group and thus may be frequently misremembered like other out-group members.

Although some scholars might point to racial history and the one-drop rule to explain the current findings, our interpretation is that both the one-drop rule and memory for racially ambiguous faces are motivated. The racially ambiguous faces used here were extensively pretested to ensure that they were not simply categorized as Black. As such, expansive memory deficits for these faces could not simply be the result of Black categorization. Instead, motivational sets seemed to play an important role. Experimental manipulations designed to increase inclusion motives completely eliminated ambiguous-race memory deficits. Moreover, the effects of motivation on memory for ambiguous faces could be attributed to associating ambiguous faces with the in-group. Note that ambiguous faces were not categorized as Black but were associated with an out-group; hence, they were excluded from the in-group rather than miscategorized, and it was this lack of inclusion that impaired memory. Whereas exclusion motives were once satisfied via the one-drop rule, it may now be the case that such motives are satisfied with less conscious processes, such as implicit associations with the out-group and misremembering.

### *Ambiguity and In-Group Memory*

Earlier we argued that the traditional emphasis on unambiguous and easily identifiable group identities, including race, obscured the role of motivational factors in social memory. Indeed, the results of four studies suggest that when targets' racial identities are ambiguous, social motives may exert a considerable influence on who is and is not remembered. For example, the experimental increase of inclusion motives eliminated the own-race memory bias for racially ambiguous faces. Given these findings, social memory researchers should be cautioned to consider the first stage in any in-group memory bias: identification of the target's group membership. Given the perceptual ambiguity in occupational, political, religious, and other social category memberships, it may be the case that group ambiguity is not the exception so much as the rule.

One issue worth highlighting is the distinction between identification of race as opposed to group membership. Here, we found that White perceivers did not identify ambiguous faces as Black but did associate such faces with the out-group. Elsewhere, it has been argued that humans are biologically prepared to treat in-group and out-group members differently, not to treat same-race and other-race individuals differently (e.g., Cosmides et al., 2003). This evolutionary perspective is consistent with the fact that memory deficits for ambiguous-race faces owed more to their out-group association (Study 4) than their perceptual properties (Study 3 and pretests). Again, the current findings highlight the importance of considering race in its broader context as a means for group distinction.

With regard to the role of group ambiguity in memory for people, the inclusion motives we examined here may be particularly relevant for memory biases and perhaps cognitive biases more generally, as elucidated in the next section.

### *The Motivation to Include*

In the current research, we highlighted the idea of inclusion (and exclusion) motives. Indeed, over the last decade a large number of studies have examined the cognitive, affective, and behavioral consequences of inclusion and exclusion (cf., Williams, Forgas, & von Hippel, 2005). A great deal is now known about the feelings associated with inclusion and exclusion as well as what exclusion causes people to do. And there is research on the antecedents of inclusion and exclusion, such as rejection sensitivity (e.g., Downey & Feldman, 1996). Yet most of what is known regards the included or excluded individual; there is much less known about the antecedents or consequences of the act of exclusion itself.

The studies described here suggest an important role for inclusion and exclusion in basic cognitive processes. In particular, the acts of including and excluding may be particularly relevant for interrace and intergroup phenomena, in which inclusion and exclusion are necessary for defining who is in-group and who is out-group. Building on the idea of in-group overexclusion, we demonstrated that the own-race bias could be applied to ambiguous (biracial) group members via a lack of inclusion motives. Hence, individuals who straddle the boundaries of two groups are not likely to activate (in perceivers) inclusion motives and corresponding cognitive processes. More broadly, the results of the current studies build on existing theory (Castano et al., 2002; Leyens & Yzerbyt, 1992) to suggest that motivation plays an important role in determining who can enjoy the benefits of in-group identity. Given the important role of group membership in perception, attitudes, beliefs, and behavior, it seems important to conduct further research on the role of inclusion and exclusion motives in intergroup perception and behavior.

### *White and Black Perceivers*

Overall, the effects observed in these studies were stronger for White than Black participants, although the two groups exhibited similar patterns of memory. This small inconsistency may be attributed to the tendency for relatively low-status groups (i.e., stigmatized groups often subject to stereotyped judgments and discrimination) to be more inclusive with regard to fringe members. Indeed, reductions in status appear to be associated with less category-based processing of out-group members (Goodwin, Gubin, Fiske, & Yzerbyt, 2000) and less implicit prejudice toward out-group members (Richeson & Ambady, 2003). It is therefore reasonable that by virtue of their relatively lower status, Black perceivers are more likely to include racially ambiguous individuals. They may be somewhat willing to accept racially ambiguous individuals as in-group members (where in-group is broader than race).

### *Methodological Considerations*

In line with previous studies focusing on racially ambiguous targets, we chose to use computer-generated faces in our experiments. The use of a computer program, such as FaceGen, to create facial stimuli allows for fine-tuned control. In trade, a measure of ecological validity is lost; generated or morphed faces may not accurately represent the full range of phenotypic appearance found in biracial faces. That said, technological innovations over the past 5 years have reduced this concern. FaceGen faces have recently been used in a number of psychological studies exploring face perception and social cognition. Of particular interest, recent functional magnetic resonance imaging (fMRI) studies have demonstrated that neural responses to computer-generated faces and real faces are indistinguishable, even on tasks designed to measure fundamental human aspects of social cognition. Amygdala responses to untrustworthy and trustworthy faces (Todorov, Baron, & Oosterhof, 2008) are nearly identical for real and computer-generated faces as are responses in neural networks associated with theory of mind and empathy (Schulte-Ruther, Markowitsch, Fink, & Piefke, 2007).

In addition, to ensure that the FaceGen stimuli were being perceived similarly to real faces, we conducted a number of pilot studies to confirm various human qualities such as attractiveness and prototypicality. We also excluded those participants who thought the faces looked computer generated. Thus, we have taken a number steps to maximize the validity of the faces we used. It is nonetheless possible that judgments and memory for real faces differ slightly from memory for computer-generated faces (Bailenson, Beall, Blascovich, & Rex, 2004). Bailenson et al. (2004), for example, examined recognition differences between computer-generated and real faces, observing minor differences in recognition (7%). As such, future research may explore differences between real and computer-generated racially ambiguous faces.

Although we have argued that motivational factors play an important role in memory for racially ambiguous faces, other processes may also play a role. Certainly, experience is thought to play a cardinal role in the own-race bias, although it has received mixed support (see Meissner & Brigham, 2001). A lack of familiarity with ambiguous-race individuals could explain poor performance on these faces, but it does not explain how those motivated to be more inclusive of biracial individuals or those who viewed faces labeled as in-group members exhibited better memory for racially ambiguous individuals (see also Footnote 1). If experience were the most important factor influencing memory, participants would remember biracial faces poorly regardless of motivational set or racial labels. In this sense, experience may be a moderator of the observed effects but by itself cannot account for the pattern of findings observed in these four studies.

It is also important to note that some of the current results could be explained by a cognitive explanation as opposed to the motivational explanation we have provided. For example, those targets that are simply not sufficiently prototypical of the in-group may not be included into the in-group by default. As such, poor memory for ambiguous individuals may not necessarily result from a perceiver's lack of motivation to include, but from the fact that ambiguous targets do not achieve a baseline level of prototypicality to be included into the in-group. Although certainly a plausible alternative, a truly nonbiased decision criterion would result in ambiguous targets being included half of the time and excluded half of the time. Thus, it appears that at the very least people have strict criteria for inclusion into the in-group, perhaps biased toward exclusion, and subsequently need sufficient motivation to override this bias.

The present work is situated within the historical and racial context of the United States and only examines the memory for Black, White, and racially ambiguous Black–White individuals; however, the general intergroup processes observed here should extend to other cultural contexts. Indeed, Castano et al. (2002) as well as Corneille, Huart, Béquart, and Brédart (2004) have demonstrated overexclusion or accentuation effects in non-American countries. The results of this type of work can provide important insight into a world that will experience increasing racial intermixing in years to come. As with any social research program conducted within a single country, however, the history of the country should be considered while interpreting results (as we have done here). It is worth considering how the histories of race relations in other countries might play a major or minor role in race-based studies run there.

In particular, findings may vary depending on an individual country's historical treatment of race or reliance on ethnic categorizations. Although cultures that share one-drop traditions for defining racial out-groups may be more likely to exhibit similar memory effects, the generalizability of our findings may more specifically relate to the tendency to essentialize race. For example, biracial individuals who hold a less essentialist view of race tend to remember faces of multiple races quite well presumably because of an expanded or fluid notion of the in-group (Pauker & Ambady, in press). Thus, participants' beliefs about the essential nature of race may moderate how group boundaries are constructed and maintained. For example, one might ask about the pattern of results that might occur in a country where notions of race are rather fluid (e.g., Brazil; Sansone, 2003) or whether priming individuals with a fixed versus fluid notion of race could influence both in-group–out-group boundaries and memory of ambiguous individuals.

## *Conclusions*

The present studies highlight the complicated processes involved in social memory, focusing on the role that motivational factors may play in the own-race bias. Exploring social psychological questions outside the realm of traditionally defined racial categories helps solidify our theoretical understanding of social–cognitive processing. Moreover, exploring such questions outside the norms of rigid racial categories contributes to understanding the full scope of our increasingly multicultural social world. Perhaps most important, the current research has direct implications for the existence in our collective memory of a large group of individuals—those with a multiracial identity.

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