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RACE, POWER, AND REFLEXIVE GAZE FOLLOWING

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Observing shifts in others' eye gaze causes perceivers to shift their own attention in the same direction, and such gaze following has been regarded as reflexive. We hypothesized that effects of social hierarchy on reflexive gaze following are driven largely by power asymmetries. We used a standard gaze-cuing paradigm with 100 and 300 ms stimulus onset asynchronies. In Study 1, we compared gazers with a historically privileged social identity (European American/"White") to gazers with a historically underprivileged social identity (African American/"Black"). White gazers elicited gaze following from both White and Black perceivers, whereas Black gazers only elicited gaze following from Black perceivers. In Study 2, we examined the role of perceiver power in these effects by experimentally manipulating felt power. White gazers elicited gaze following from both high-power and low-power White perceivers whereas Black gazers only elicited gaze following from low-power White perceivers. These results suggest that felt power may play a key role in stratified and interracial gaze following.

Keywords: social perception, attention, gaze cuing, racial bias

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Attention is automatically oriented to a variety of visual cues, including changes to luminance and texture, as well as to the abrupt onset of new stimuli (e.g., Muller & Rabbitt, 1989; see Yantis & Jonides, 1990). Yet few cues can reflexively direct attention to a *different* location, and of these eye gaze appears to be the most robust (see Frischen, Bayliss, & Tipper, 2007). On exposure to others' eye movement, people immediately and reflexively shift their attention in the same direction (e.g., Driver et al., 1999; Friesen & Kingstone, 1998; Hood, Willen, & Driver, 1998; Langton & Bruce, 1999). Gaze-following effects emerge early in infancy, in other primates, and even when contrary to perceivers' explicit goals (e.g., Deaner & Platt, 2003; Driver et al., 1999; Farroni, Massaccesi, Pividori, & Johnson, 2004). Many theorists regard gaze following as a reflexive, hard-wired mechanism that facilitates attention to adaptively important stimuli (Langton, Watt, & Bruce, 2000) and promotes theory of mind (Baron-Cohen, 1995). Yet as opposed to other cues that direct attention, such as arrows and changes in luminance, gaze cues are inherently social. Hence, while reflexive gaze cuing is immune to variables that disrupt other attentional cues (cf. Frischen et al., 2007), it may be contingent on the social value of gaze (cf. Bayliss & Tipper, 2006; Wilkowski, Robinson, & Friesen, 2009).

Consistent with the social nature of gaze cuing, research has documented that gaze cuing depends on gazers' social identities (Chen & Zhao, 2015; Ciardo, Marino, Actis-Grosso, Rosssetti, & Ricciardelli, 2014; Dalmaso, Pavan, Castelli, & Galvano, 2012; Pavan, Dalmaso, Galfano, & Castelli, 2011), social status (Dalmaso, Galfano, Coricelli, Castelli, 2014; Shepherd, Deaner, & Platt, 2006), and facial dominance (Jones et al., 2010; Ohlsen, van Zoest, & van Vugt, 2013). Social characteristics of gazers clearly influence perceivers' gaze-following tendencies, with much of the relevant evidence pointing to the important role of hierarchical relations. Perceivers are especially likely to follow the gaze of individuals who: are known to have high status or dominance rank (Dalmaso et al., 2014; Dalmaso et al., 2012; Shepherd et al., 2006), have high-status or high-power social identities (Ciardo et al., 2014; Pavan et al., 2011), or have facial features associated with dominance (Jones et al., 2010; Ohlsen et al., 2013).

Gazers' hierarchical position does not, however, exert a uniform influence on reflexive gaze following. Low-ranking monkey gazers, for example, *do* elicit reflexive gaze following from other low-ranking monkeys but do not elicit reflexive gaze following from higher-ranking monkeys (Shepherd et al., 2006). Of special interest, a similar pattern emerges in humans with respect to gazers' *social* identities. Gazers with low-status social identities do elicit reflexive gaze following from perceivers who have low-status social identities (African-Italian or older adult) but do not elicit reflexive gaze following from perceivers who have high-status social identities (Caucasian-Italian or young adult; Ciardo et al., 2014; Pavan et al., 2011). These findings indicate that people with high-status identities elicit robust gaze following but people with low-status identities only elicit gaze following from perceivers with low-status identities. These latter studies define status with respect to social-group membership whereas others define it by individual power and status, which is notable given that the influence of social-group status on cognition can be weaker than the influence of individual power, at least with respect to gaze behavior (e.g., Dovidio, Ellyson, Keating, Heltman, & Brown, 1988). In the current work, we examine the role of individual power on the relationship between social-group hierarchy and gaze following.

SOCIAL-GROUP HIERARCHIES AND GAZE FOLLOWING: RACE AND POWER

All primate species and human cultures include some form of *hierarchy*, characterized as the unequal distribution of power and status (see Fragale, Overbeck, & Neale, 2011). Hierarchical rankings are easily learned and processed (Zitek & Tiedens, 2012), enabling perceivers to selectively comply with the desires of people who have *status* (others' respect and admiration) and *power* (control of valuable resources and thus, human outcomes). Because power and status play a key role in social influence (French & Raven, 1959), those at the top of the hierarchy benefit from an advantage in their ability to influence others' beliefs and behaviors whereas those at the bottom of the hierarchy encounter large obstacles in their ability to effect change.

Inequality in social influence has unfortunate consequences among humans, for whom membership in social groups helps to determine position in cultural hierarchies. In North America (and Europe), White people have had privileged social status and have been afforded more power relative to other ethnicities (Sidanius, Levin, Liu, & Pratto, 2000). Although most North American and European nations have eliminated laws that formalize the oppression of non-White minorities, White people still occupy the vast majority of powerful positions in these countries, earn far more money than others for equivalent work, and have access to better health care, housing, and education (Baldi & McBrier, 1997; Calvert Investments, 2010; Harrison, Law, & Phillips, 2005; Ondrich, Ross, & Yinger, 2003; Smedley, Stith, & Nelson, 2003). It is clear that despite many advances, White people have a privileged position in the social hierarchy relative to non-White minorities, including Black people.

Such inequity is mirrored in asymmetrical gaze following effects. Specifically, in several European studies, White gazers elicited uniform gaze following from White and Black perceivers but Black gazers only elicited gaze following from Black perceivers (Pavan et al., 2011). This pattern may have downstream consequences for racial inequity, and its causes therefore seem important to understand. For example, asymmetric gaze following may help ensure that those events attended to by White people are attended to by all and that events attended to by Black people are not attended to by those higher in the hierarchy. Asymmetric gaze following might therefore contribute to a Western under-acknowledgement of events important to Black people. Similarly, asymmetric gaze following reproduces historical patterns of perspective taking in the space of a social interaction, limiting the extent to which White perceivers understand and build affiliation with Black gazers (e.g., Charman et al., 2001; Lee, Eskritt, Symons, & Muir, 1998).

We propose that this pattern of asymmetric gaze following is driven by White perceivers' felt power. This hypothesis might seem obvious, given that prior research has demonstrated that primates (Shepherd et al., 2006) and humans (e.g., Dalmaso et al., 2012) fail to follow the gaze of lower-status individuals. However, status and power at the group level refers to an aggregate or average among members of that group, whereas status and power at the individual level must obviously refer to that individual. This distinction is important, as the relative power of one's social group need not translate into felt power at the individual level. Accordingly, it is possible that race-based asymmetries in gaze following are caused instead by a different mechanism, such as White persons' avoidance of eye contact with Black persons (e.g., Kawakami et al., 2014). We thus examine the role of felt power in White Americans' race-biased gaze following.

POWER ASYMMETRIES IN GAZE FOLLOWING: FUNCTION

The gaze-following bias exhibited by White persons is in keeping with other social-cognitive biases presumably based on power inequities. Such power inequities are especially problematic for low-power perceivers, whose access to resources are often controlled by others and who may therefore pay special attention to people with equal or higher position in the social hierarchy (Ratcliff, Hugenberg, Shriver, & Bernstein, 2011). For example, power is associated with an attentional asymmetry in which people attend more to higher-power than lower-power individuals (Dovidio & Ellyson, 1985; Galinsky, Magee, Inesi, & Gruenfeld, 2006; Neuberg & Fiske, 1987; see Fiske, 2010), whether power is defined by social group membership or individuated characteristics (Dovidio et al., 1988).

A similar asymmetry in gaze following may reflect an adaptive cost-benefit tradeoff. That is, gaze following overrides task-relevant attention (e.g., Friesen, Ristic, & Kingstone, 2004) and can thus be costly for perceivers. These costs must be managed against the benefits of gaze following, and this cost-benefit analysis favors power asymmetry in two ways. First, the costs of gaze following would be limited by power asymmetries, in that gaze following would occur less frequently (for all but the lowest-power perceivers). Second, the benefits of gaze following would be maximized by power asymmetries, in that perceivers would preferentially follow the gaze of those persons whose (anticipated) behavior is most likely to impact one's own resources. This pattern of gaze following would thus enable perceivers to anticipate the thoughts and actions of those people whose actions are most likely to impact them. Moreover, to the extent gaze following builds affiliation it should be especially beneficial for perceivers to direct gaze following at persons whose friendship might promote advantages (via resource control or social capital). In short, power asymmetry should reduce the costs and increase the benefits of gaze following.

Important for the current work, this type of functional tradeoff in gaze following could have practical consequences for modern race relations. A sense of felt power derived from White identity may activate a functional pattern of asymmetrical gaze following. If so, Black gazers should elicit gaze following from White perceivers who feel relatively impotent but not from White perceivers who feel relatively powerful. We conducted two studies to test our hypothesis regarding the relationship between social identity and gaze following. In Study 1, we first sought to replicate an effect in America that was originally reported in Italy (Pavan et al., 2011): White gazers elicited robust gaze following from both Black perceivers and White perceivers whereas Black gazers only elicited gaze following from Black perceivers. In Study 2, we experimentally manipulated felt power to test the hypothesis that power accounts for White perceivers' racial selectivity in gaze following. We predicted that White gazers would elicit robust gaze following from both high-power and low-power White perceivers but that Black gazers would only elicit gaze following from low-power White perceivers.

STUDY 1

We examined reflexive gaze following using a well-established gaze-cuing paradigm in which participants fixate on a centrally located face and then attempt to identify a letter that appears to the right or left of the face. In this paradigm, the key variable is whether the central face shifts eye gaze toward or away from the letter (which typically appears less than 500 ms after a shift in eye gaze). Evidence for gaze following is indicated by faster response times (RTs) to identify the letter on valid (eye gaze shifts toward the letter location) compared to invalid (eye gaze shifts away from the letter location) trials. By comparing gaze-valid to gaze-invalid RTs, stimulus features unrelated to eye gaze are controlled. Accordingly, gaze following can be isolated. Some authors report only facilitation scores (invalid RT – valid RT) but we here report RTs for both valid and invalid trials, and statistically compare those.

METHOD

Participants and Design

Twenty-six White undergraduate students (15 women) and 17 Black undergraduate students (12 women) at a private university in the northeastern United States participated in exchange for monetary reimbursement.[1] This study was not originally designed as a replication (data collection was complete before publication of Pavan et al., 2011). The sample size was planned in consideration of the practical constraint involving a limited population of Black students. We aimed for a sample that included 20 Black student participants and a corresponding (but not matched) sample of White students. Our stop rule was the conclusion of the academic year. A 2 (participant race: Black, White) × 2 (stimulus race: Black, White) × 2 (gaze validity: valid, invalid) × 3 [Stimulus Onset Asynchrony (SOA): 100 ms,

1. Three participants whose demographic information (e.g., race) was not recorded completed the study but were not included in data analysis.

300 ms, 1200 ms] factorial design was employed with repeated measures on the last three factors.

Materials

Ten pictures each of neutral White and Black men were culled from several sources (Beaupré & Hess, 2005; Chiao & Ambady, 2001; Tottenham, Borsheid, Ellertsen, Marcus, & Nelson, 2002). For each face, left- and right-averted gaze images were created in Adobe Photoshop. Each image was converted to grayscale, placed on a white background, cropped to display only the head region, and adjusted to 2.3 × 3.14 inches.

Procedure

After informed consent, participants began a gaze-cuing task modeled after previous studies (Driver et al., 1999; Mathews, Fox, Yiend, & Calder, 2003). In each trial, an asterisk appeared in the center of the screen for 675 ms and was immediately replaced by a direct-gaze image for 900 ms. This image was then replaced by a corresponding averted-gaze image and 100 ms, 300 ms, or 1200 ms later a large letter (L or T) appeared to the left or the right of the face. SOAs of 100 ms and 300 ms reliably produce gaze cuing whereas such effects are less likely at 1200 ms (see Frischen et al., 2007), which was included to support the cover story and limit participants' ability to predict SOA. Analyses thus focus on 100 ms and 300 ms SOAs. Regardless of SOA, averted gaze was directed toward the letter (valid) as often as away from the letter (invalid). Participants were instructed to identify the letter as quickly and accurately as possible by pressing the "h" key with their right index finger or the space bar with their right thumb. To accommodate counterbalancing of gaze direction, letter position (left or right), gaze validity, and SOA, each face was presented 12 times, resulting in a total of 240 trials. On completion of this task, participants were debriefed, thanked, and compensated.

RESULTS

Analytic Strategy and Predictions

Incorrect responses and latencies greater than 1200 ms or less than 100 ms were removed (4.0% of responses; Mathews et al., 2003). Response times were log-transformed and analyses were conducted on these log-transformed values (raw reaction times are presented here for conceptual ease). SOAs of 100 ms and 300 ms reliably produce gaze cuing whereas such effects can sometimes be reversed at 1200 ms (see Frischen et al., 2007), though as noted above, we included a 1200 ms SOA to support the cover story and limit participants' ability to predict SOA. Analyses thus focus on 100 ms and 300 ms SOAs. We expected an initial ANOVA to reveal a three-way interaction among participant race, stimulus race, and gaze validity. We planned follow-up ANOVAs to examine responses to White gazers separately from responses to Black gazers. With White gazers, we expected a main effect of gaze validity in the absence of an interaction between gaze validity and participant race (hence, all participants were expected to reflexively follow the gaze of White gazers). With Black gazers, we expected participant race to interact with gaze validity. Specifically, we expected only Black participants to exhibit significant gaze following to Black gazers.

Primary Analyses: Reflexive Gaze-Cuing

An initial ANOVA revealed no significant effects involving gender so this factor was omitted from subsequent analyses. A 2 (participant race: White, Black) × 2 (stimulus race: White, Black) × 2 (gaze validity: valid, invalid) × 2 (SOA: 100 ms, 300 ms) mixed-model ANOVA with repeated measures on the last three factors was conducted on reaction times. A main effect of gaze validity replicated prior research in demonstrating faster responses on valid ($M = 533$ ms) than invalid trials ($M = 543$ ms), $F(1, 41) = 15.51$, $p < .001$, $\eta^2_{partial} = .27$. A main effect of SOA replicated prior research in demonstrating slower responses at 100 ms ($M = 551$ ms) than at 300 ms ($M = 524$ ms), $F(1, 41) = 56.69$, $p < .001$, $\eta^2_{partial} = .58$. Critically, and consistent with the primary hypothesis, these effects were qualified by the predicted three-way interaction among participant race, stimulus race, and gaze validity, $F(1, 41) = 4.18$, $p = .047$, $\eta^2_{partial} = .09$ (Figure 1). The main effect of participant race was not significant nor were any other interactions involving race (all ps> .10).

To interpret the three-way interaction, we conducted separate ANOVAs on responses to Black gazers and responses to White gazers. For White gazers, a main effect of gaze validity revealed that participants responded faster to valid than invalid trials, $F(1, 41) = 9.55$, $p = .004$, $\eta^2_{partial} = .19$. This gaze-cuing effect was not significantly larger for White than Black participants, as the interaction between gaze validity and participant race did not approach significance, $F(1, 41) = .16$, $p = .69$, $\eta^2_{partial} = .004$. As shown in Figure 1, response times were faster to gaze-valid than gaze-invalid trials for White participants, $F(1, 25) = 5.49$, $p = .03$, $\eta^2_{partial} = .18$, and for Black participants, $F(1, 16) = 8.28$, $p = .01$, $\eta^2_{partial} = .34$. Conversely, gaze following to Black gazers was limited to Black perceivers. Main effects of gaze validity, $F(1, 41) = 6.85$, $p = .01$, $\eta^2_{partial} = .14$, and SOA, $F(1, 41) = 37.95$, $p < .001$, $\eta^2_{partial} = .48$, were qualified by a gaze validity by participant race interaction, $F(1, 41) = 6.35$, $p = .02$, $\eta^2_{partial} = .13$. As illustrated in Figure 1, Black participants responded faster on valid than invalid trials for Black faces, $F(1, 41) = 31.62$, $p < .001$, $\eta^2_{partial} =.66$, but White participants did not, $F(1, 41) = .004$, $p = .95$, $\eta^2_{partial} < .001$. Thus, only Black Americans exhibited gaze following to Black faces.[2]

2. A corresponding ANOVA on error rates suggested that the key reaction time findings were not the result of a speed-accuracy tradeoff. Specifically, the three-way interaction among participant race, target race, and gaze validity did not approach significance, $F(1, 41) < .0001$, $p = .995$. More detailed error rate analyses are reported in the Supplementary Materials.

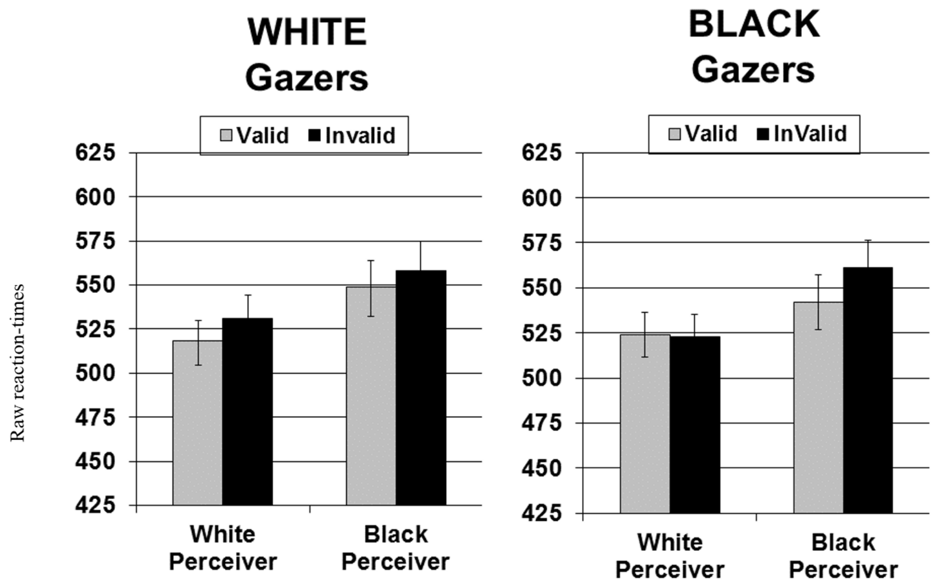

FIGURE 1. Study 1 reaction times on correct responses as a function of gazer race, gaze validity, and participant race. Error bars represent standard error.

Exploratory Analysis: Controlled Gaze Following

When gaze shifts precede the target cue by at least 700 ms, people can intentionally shift their attention back to the initial fixation or even in the reverse direction (Driver et al., 1999). Our hypotheses were thus limited to the 100 ms and 300 ms SOAs but for exploratory purposes, we examined responses at 1200 ms SOAs. Thus, we conducted a 2 (participant race) × 2 (stimulus race) × 2 (gaze validity) mixed-model ANOVA on response times, with repeated measures on the last two factors. Although responses on valid trials (513 ms) were slightly faster than responses on invalid trials (517 ms), the main effect of validity failed to reach significance, $F(1, 41) = .97$, $p = .33$, $r_{pb} = .15$.[3] This finding is consistent with prior work (Driver et al., 1999). The participant race by stimulus race by gaze validity interaction—which was significant at short SOAs—did not approach significance at 1200 ms SOAs, $F(1, 41) = .001$, $p = .98$, $r_{pb} = .004$. No other effects emerged, *p*s > .2 (see Table 1). This analysis suggests that the significant role of race in gaze following is restricted to SOAs for which reflexive gaze-cuing effects are typically observed (e.g., Driver et al., 1999).

3. As with shorter SOAs, the three-way interaction did not approach significance for error rates, $F(1, 41) = .35$, $p = .55$. Detailed error analyses are reported in the Supplementary Materials.

TABLE 1. Response Time Means in Milliseconds (Standard Deviations in Parentheses) By Study and Independent Variables

	Black Valid Gaze	Black Invalid Gaze	White Valid Gaze	White Invalid Gaze
Study 1				
Black Participants				
100 ms SOA	555 (52)	572 (62)	561 (57)	573 (64)
300 ms SOA	529 (61)	549 (62)	537 (69)	542 (60)
1200 ms SOA	538 (70)	528 (51)	521 (65)	523 (59)
White Participants				
100 ms SOA	533 (69)	534 (74)	534 (65)	548 (87)
300 ms SOA	515 (75)	512 (62)	501 (66)	513 (66)
1200 ms SOA	504 (78)	510 (74)	500 (68)	510 (71)
Study 2				
Low-Power Participants	477 (81)	498 (81)	494 (87)	504 (87)
High-Power Participants	518 (94)	517 (95)	521 (94)	537 (99)

Note. Please see text for inferential statistics. In Study 2, all participants were White and SOAs were set to 300 ms.

DISCUSSION

In replication of Pavan and colleagues' (2011) research in Italy, the results of Study 1 demonstrate an asymmetrical pattern of reflexive gaze following in the United States. White faces evoked robust gaze following that did not depend upon perceiver race yet Black faces only evoked reflexive gaze following from Black perceivers.

STUDY 2

The primary purpose of the second study was to directly test the influence of White perceivers' sense of power on gaze following to White and Black faces. We focused on White perceivers for several reasons. First, White perceivers of Black faces exhibit a gaze-following pattern that departs from the uniform gaze following exhibited in other circumstances and is thus the phenomenon that demands explanation. Black participants responses were more typical of classic and prior research on gaze following (see Frischen et al., 2007). Second, American history includes oppression by White Americans of Black Americans, such as laws which explicitly exclude the perspectives of Black Americans. The absence of cross-race gaze following among White perceivers may thus be problematic for American race relations, so it seemed important to identify mechanisms which might disrupt White Americans' race-biased gaze following. We expected that White gazers would elicit reflexive gaze following from both high-power and low-power White perceivers but that Black gazers would elicit reflexive gaze following from low-power White perceivers only.

METHOD

Participants and Design

Ninety-two Caucasian individuals (69 women, 23 men) at a private university in the western United States participated in exchange for partial course credit or money.[4] A 2 (power) × 2 (stimulus race) × 2 (gaze validity) factorial design was employed, with repeated measures on the two latter factors. The medium-to-large effect sizes in Study 1 informed our goal of 100 Caucasian participants to be recruited by end of the academic year.

Materials

Stimulus Images. We created a new stimulus set in an effort to address a possible alternative explanation for the results of Study 1. Although Black faces are often perceived as more threatening than White faces (e.g., Donders, Correll, & Wittenbrink, 2008), the average features of White faces are more dominant and threatening than those of Black faces (e.g., Zebrowitz, Kikuchi, & Fellous, 2010) and gaze following is typically stronger to faces high in featural dominance (Jones et al., 2010). To rule out the possibility that hierarchical gaze following simply reflects facial dominance, in Study 2 we generated White faces and Black faces that were equivalent in facial dominance (see Footnote 5 for post-hoc analyses on Study 1 faces).[5]

To create faces, we used commercial software (FaceGen) that artificially generates faces on the basis of empirically derived relationships in facial structure. These empirical relationships were (a) derived from hundreds of three-dimensional face scans of people varying in age, race, gender, and attractiveness and (b) represented by FaceGen in multidimensional probability distributions. FaceGen users are presented with a "default" face which inhabits a particular location in this multidimensional probability distribution. Users then use controls to adjust a large number of facial features. Most relevant to the current investigation, it is possible to create faces that vary in race typicality (e.g., White or Black) and gender typicality (male or female), the latter of which is sometimes regarded as equivalent to facial dominance (e.g., Jones et al., 2010). We made use of the "random" feature in FaceGen, by which FaceGen generates faces that vary randomly on many parameters. Importantly, this feature allows users to *prevent* certain parameters

4. Study 2 was designed to explore whether felt power could explain why White perceivers failed to follow the gaze of Black individuals. Yet to comply with internal review board policies, recruitment for Study 2 was not limited to White participants. Although our hypothesis and analyses were specific to White participants, 5 Black participants, 8 Asian participants, 9 Latino(a) participants, and 10 mixed-race participants also completed the study. Additionally, following data collection, we identified one participant who participated twice, and we excluded their second session data. Two additional participants had created the materials for this study as research assistants and were then excluded. We excluded these three participants, leaving 92 participants' data for analysis.

5. FaceGen (see Study 2) was used to confirm that Study 1 faces did not systematically differ on facial dominance, operationalized (as in Jones et al., 2010) with facial masculinity. FaceGen uses a multidimensional face-shape model to estimate facial masculinity, outputting values between 0 (feminine) to 80 (masculine). With this metric, Study 1 White faces (M = 33.8) were not significantly different from Black faces (M = 36.4), $t(18) = 1.18$, $p = .25$.

TABLE 2. Pretest for FaceGen Faces Used in Study 2

	Facial Dominance	Facial Maturity	Race Category	Race Continuous
White Faces	3.93 (.82)	4.31 (.47)	1.98 (.06)	6.36 (.58)
Black Faces	3.98 (.74)	4.28 (.53)	1.01 (.03)	1.61 (.46)
T-test of difference	$t(36) = -.18$, $p = .86$	$t(36) = .15$, $p = .88$	$t(15) = 57.46$, $p < .001$	$t(15) = 23.91$, $p < .001$

Note. For rows denoted by "White Faces" and "Black Faces", means are presented with standard deviation in parentheses.

from varying randomly—for example, to create a large number of White faces, we locked race in the "White" range of the race parameter. Using this procedure, we created 120 male faces, half of which were Black and half of which were White.

Of these 120 faces, 13 appeared unusual to the experimenters and were excluded. We ran several pretests on the remaining 107 facial images (including 54 Black faces). To reduce social desirability concerns, participants rated only White faces (participant $N = 18$) or only Black faces ($N = 20$). Participants rated each face on dominance (1, not at all dominant, to 7, extremely dominant) and facial maturity (1, baby-faced, to 7, mature-faced). Participants rated all faces on one dimension before rating all faces on the second dimension (dimension order was counterbalanced). Finally, in another condition ($N = 16$), participants rated all 107 faces on (a) whether the face was Black ("1") or White ("2") and (b) the extent to which the face belonged to a person who was "definitely Black" (1) to "definitely White" (7) with the first question always preceding the second.

We selected a set of 16 faces so that the White faces and Black faces were roughly equal in average rated dominance and maturity (see Table 2). A full spectrum of facial dominance was represented and the faces were unambiguously members of the intended racial category.

Power Manipulation. Power was manipulated by modifying a previously used procedure (Galinsky, Gruenfeld, & Magee, 2003; Smith & Trope, 2006) to induce feelings of high or low power. Participants were randomly assigned to imagine and write either about an experience when they had power over others or when others had power over them. Participants were given one minute to plan their responses and then three minutes to write.

Procedure

Participants were told that they were participating in a study of visual imagery and attention. Following informed consent and the power manipulation, participants began a gaze-cuing task that was identical to Study 1 but with several important modifications. First, because results did not significantly differ between 100 ms and 300 ms SOAs in Study 1, only 300 ms SOAs were used in Study 2. Second, as described above the 16 faces used in this study were new. To accommodate counterbalancing of gaze direction (left or right) and letter position (left or right), each face was presented four times, resulting in a total of 64 trials. On completion of this task, participants completed a brief demographics questionnaire, and were debriefed, thanked, and compensated.

RESULTS AND DISCUSSION

Analytic Strategy

As in Study 1, incorrect responses and latencies greater than 1200 ms or less than 100 ms were removed (6.1% of responses) and analyses were conducted on log-transformed reaction times (raw reaction times reported here). We expected an initial ANOVA to reveal a three-way interaction among gaze validity, gazer race, and participant power. As in Study 1, we planned to conduct subsequent ANOVAs in which responses to Black gazers were analyzed separately from responses to White gazers. With White gazers, we expected a main effect of gaze validity in the absence of an interaction between gaze validity and participant power. Just as both White and Black participants in Study 1 exhibited gaze following to White faces, we expected both high-power and low-power White participants to exhibit gaze following to White faces in Study 2. With Black gazers, however, we expected participant power to interact with gaze validity such that only low-power participants exhibit gaze following.

Primary Analyses: Reflexive Gaze Cuing

A 2 (power condition) × 2 (stimulus race) × 2 (gaze validity) mixed-model ANOVA with repeated measures on the last two factors was conducted on reaction times. A main effect of race reflected faster responses to Black faces (M = 502 ms) than to White faces (M = 514 ms), $F(1, 90) = 14.99$, $p < .001$, $\eta^2_{\text{partial}} = .14$. As in Study 1, participants exhibited faster responses on valid (M = 503 ms) than invalid trials (M = 514 ms), $F(1, 33) = 7.78$, $p = .006$, $\eta^2_{\text{partial}} = .08$. The only other significant effect to emerge was the predicted three-way interaction between power condition, stimulus race, and gaze validity, $F(1, 90) = 4.46$, $p = .04$, $\eta^2_{\text{partial}} = .05$ (Figure 2).

To examine the nature of the three-way interaction more closely, we conducted separate ANOVAs on responses to White gazers and responses to Black gazers. For White gazers, a main effect of gaze validity revealed that participants responded faster to valid than invalid trials, $F(1, 90) = 4.80$, $p = .03$, $\eta^2_{\text{partial}} = .05$. This gaze-cuing effect was not significantly larger for powerful than powerless participants, as the interaction between gaze validity and participant power failed to approach significance, $F(1, 90) = .37$, $p = .54$, $\eta^2_{\text{partial}} = .004$. Conversely, gaze following to Black gazers was limited to powerless perceivers. A marginal main effect of gaze validity, $F(1, 90) = 3.42$, $p = .07$, $\eta^2_{\text{partial}} = .03$, was qualified by a gaze validity by participant power interaction, $F(1, 90) = 5.08$, $p = .03$, $\eta^2_{\text{partial}} =.05$. Low-power White participants responded faster on valid than invalid trials for Black faces, $F(1, 90)$

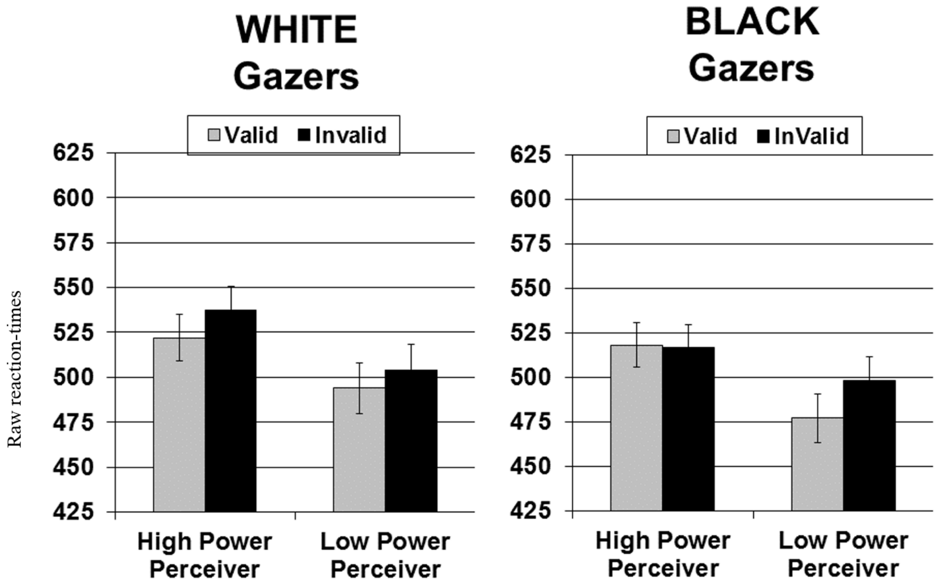

FIGURE 2. Study 2 reaction times on correct responses as a function of gazer race, gaze validity, and participant power. Error bars indicate standard errors.

= 7.84, p = .008, η^2_{partial} =.16, but high-power White participants did not, $F(1, 90)$ = .09, p = .77, η^2_{partial} = .002.[6]

In any set of studies, sampling error alone may introduce inconsistencies between studies (Stanley & Spence, 2014), or even consistencies, so caution should always be exercised when considering similarities and differences between studies. Nonetheless, high-power White perceivers in Study 2 behaved very similarly to White perceivers in Study 1, and to White perceivers in other research (e.g., Pavan et al., 2011). Hence, across the two studies reported here, White perceivers failed to exhibit gaze following to Black gazers *unless* they were reminded of a time when they had low power.

GENERAL DISCUSSION

Gaze following appears to be crucial to normal social development and arguably functions to direct perceivers to adaptively relevant stimuli. The current results replicate prior work in that gaze following was stratified by social identity. Gazers with a White racial identity elicited robust gaze following whereas perceivers with a Black racial identity only elicited gaze following from perceivers with

6. A corresponding ANOVA on error rates suggested that the key reaction time findings were not the result of a speed-accuracy tradeoff. Specifically, the three-way interaction among participant race, target race, and gaze validity did not approach significance, $F(1, 90) = .003$, $p = .96$. More detailed error rate analyses are reported in the Supplementary Materials.

Black racial identities. We also identified a psychological mechanism which may help to explain this asymmetric pattern of reflexive gaze following among White perceivers: felt power. Because status and power are conflated (see Fiske, 2010; Magee & Galinsky, 2008), perceivers with high-status (White) racial identities are often high-power perceivers. Indeed, when we experimentally reduced the felt power of perceivers who held a historically higher-status (White) racial identity, they *did* reflexively follow the gaze of faces with historically lower-status (Black) racial identities.

Despite historical advances in racial equality, White Americans maintain a privileged position (on average) in the social hierarchy relative to Black Americans (e.g., Baldi & McBrier, 1997; Calvert Investments, 2010). The evidence we report above is consistent with the idea that such racial inequity is reflected in asymmetric gaze following. Specifically, the Western cultural pattern of racial stratification was observed in elemental social interaction, such that White perceivers did not follow the eye-gaze of Black persons' faces whereas Black perceivers did follow the eye-gaze of White persons' faces. To the extent that gaze following helps perceivers understand gazers and build affiliation through shared attention (e.g., Charman et al., 2001; Lee et al., 1998), racially asymmetric gaze following might be an obstacle for equitable perspective taking in interracial relations, and such asymmetry may be traced to White persons' felt power.

LIMITATIONS AND FUTURE DIRECTIONS

Several limitations prevent us from drawing broader conclusions. First, we used a traditional gaze-cueing paradigm in which the primary outcome was response time. This measure is thought to capture *covert orienting*, in which visual mechanisms orient to sensory input even in the absence of observable head or eye movements (Frischen et al., 2007). Such covert orienting helps shape downstream attention and prioritizes information for further processing. Although covert and overt orienting are clearly related it is equally clear that they are not identical systems (Posner, 1980). Accordingly, our conclusions about the role of power in race-related gaze following is limited to covert attention. Eye-tracking technology has also been used to measure automatic influences of others' eye-gaze on overt attention, and there is evidence that White perceivers exhibit stronger overt gaze following for White than Black faces (Dalmaso, Galfano, & Castelli, 2015). These findings suggest that the covert orienting responses observed by us and Pavan and colleagues (2011) may extend to volitional eye movements. We believe the relationship between these two methods is a fruitful area for future research. For example, recent evidence suggests that people have more difficulty exerting "top-down" (instruction-driven) control over covert (vs. overt) attention in real social contexts (Kuhn, Teszka, Tenaw, & Kingstone, 2016), leaving open the possibility that attempts to appear non-racist would influence eye movements but not covert attention in gaze cueing. More generally, the relationship between covert and overt orienting remains a matter of inquiry (for a review, see Smith & Schenk, 2012), and race-based gaze following might provide an especially interesting context in which to examine this relationship.

A second limitation is that we focused on White perceivers in Study 2. We focused on White perceivers because they exhibited the unique gaze-following pattern in Study 1 and because it is these perceivers whose racial biases have been oppressive throughout American history. In Study 2, we found that a low-power prime (vs. a high-power prime) caused these perceivers to exhibit robust gaze following to both White and Black faces. We expected this effect to emerge on the basis of prior gaze-following studies which demonstrate that humans and other primates follow the gaze of higher-status but not lower-status individuals (Dalmaso et al., 2012; Shepherd et al., 2006). An alternative is possible, however. Specifically, in research on attitudes, participants from higher-status racial groups exhibit more of an in-group bias than do participants from lower-status social groups (e.g., Axt, Ebersole, & Nosek, 2014). Accordingly, it is possible that a heightened sense of power among perceivers in Study 2 caused them to exhibit more in-group bias in gaze following. Notably, this alternative explanation does not qualify an important conclusion from our research: our findings suggest that White perceivers' felt power is the (or "a") mechanism which explains asymmetry in race-based gaze following. Nonetheless, it will be important for future research to distinguish between these two explanations.

RELATED PHENOMENA AND MECHANISMS

The data reported here suggests that power appears to play an important role in race-based gaze following. The observed results are consistent with recent evidence in similar domains. For example, in one recent study, performance on a motor task was shaped by task instructions presented (in the participant's presence) to a partner but only when that partner did not have a lower-status ethnic identity than the participant (Aquino et al., 2015). In other research, felt power caused decrements to participants' ability to identify facial emotion, to see themselves from another person's perspective (Galinsky et al., 2006), and to exhibit motor resonance with another person (Hogeveen, Iznlicht, & Obhi, 2014). Collectively, these studies suggest that subtle reminders of another person's attention, emotions, and motor intentions tend to elicit those same states in a perceiver, but not when that perceiver experiences power, including power defined by the social status of one's ethnic identity. Nonetheless, it remains for future research to determine if the relationship between individual power and racial identity influences not only gaze following but also motor resonance and emotion perception.

A variety of mechanisms may contribute to the predicted effects by which high-power White perceivers exhibited gaze following only to White faces and low-power perceivers exhibited gaze following to both White and Black faces. First, initial attention to faces appears to be important for reflexive gaze-following effects (Itier, Villate, & Ryan, 2007). Unattended faces do not evoke gaze following so it is possible that high-power White perceivers do not attend to the faces (or eyes) of members of relatively low-power social groups (cf. Dovidio & Ellyson, 1985), in this case Black Americans. A second mechanism involved in gaze following is theory of mind—(young) children and (autistic) adults who lack the ability to identify eye gaze as an indicator of psychological attention also fail to exhibit gaze following (Frischen et al., 2007). In other words, when people are regarded as objects rather than agents, gaze following does not occur. Low-level perceptions of agency may thus be a precursor to the stratified effects we observed—such an explanation would be consistent with work demonstrating that high-power individuals objectify low-power individuals (Gruenfeld, Inesi, Magee, & Galinsky, 2008) and fail to take their perspective (Galinsky et al., 2006).

A third account is of perceptual selectivity. In some circumstances, power facilitates the ability of perceivers to selectively focus on task-relevant visual cues (Guinote, 2007a). Here, gaze was irrelevant to the appearance of a letter in that it was as likely to be directed toward as away from the letter. Because gaze is an irrelevant cue in this paradigm, it could be argued that high-power individuals shouldn't exhibit gaze following at all. This conclusion would be inconsistent with theories of power that focus on perceptual selectivity, but we believe that this conclusion is faulty and does not apply to the situated focus theory of power (STFP; Guinote, 2007b). First, reflexive gaze cuing is thought to occur independently of executive function whereas the SFTP applies to perceptual tasks which require executive function to focus attention. Second, perceptual applications of the SFTP have generally been examined with respect to non-social objects. The gaze-following task included centrally presented faces belonging, at times, to people whose social identity might indicate relatively high position in a hierarchy. It is unclear what the SFTP would predict in this circumstance.

SUMMARY AND CONCLUSION

In Western culture at least, Black persons have historically been denied the power and status privileges afforded to their White counterparts. Although civil rights movements have removed many roadblocks to equality in social hierarchy, race-based stratification still exists and appears to play a role in otherwise reflexive information processing that occurs early in visual perception. In an interracial context, at least, gaze following is stratified.

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SUPPLEMENTAL MATERIALS

STUDY 1: ERROR RATES

Our primary hypotheses regarded response times, as in prior research on gaze cuing (see Frischen et al., 2007; see main text). However, we also analyzed error rates. A 2 (Participant race) × 2 (Gazer race) × 2 (Gaze validity) × 2 (SOA) ANOVA with repeated measures on the last three factors revealed a significant effect of validity, such that participants committed fewer errors when gaze was valid (M = 2.7%) than when it was invalid (M = 3.5%), $F(1, 41) = 4.87$, $p = .03$, $\eta^2_{partial} = .11$, consistent with gaze cuing. Additionally, Black participants committed fewer errors (M = 2.1%) than White participants (M = 3.7%), $F(1, 41) = 5.38$, $p = .03$, $\eta^2_{partial} = .12$. This main effect of participant race was qualified by a significant interaction with gazer race, $F(1, 41) = 5.69$, $p = .02$, $\eta^2_{partial} = .12$. Specifically, Black participants had significantly fewer errors on trials with Black gazers (M = 1.6%) than on trials with White gazers (M = 2.7%), $F(1, 16) = 5.94$, $p = .03$, $\eta^2_{partial} = .27$. Conversely, White participants had fewer errors on trials with White gazers (M = 3.2%) than on trials with Black gazers (M = 4.1%), though this trend was not significant, $F(1, 25) = 2.31$, $p = .14$, $\eta^2_{partial} = .08$. Finally, a three-way interaction emerged involving gaze validity, SOA, and participant race, $F(1, 41) = 7.32$, $p = .01$, $\eta^2_{partial} = .15$. It was only at 100 ms SOAs that Black participants committed fewer errors on valid (M = 1.3%) than invalid (M = 2.9%) trials, $t(16) = 2.87$, $p = .01$ (Ms = 2.2% vs. 2.1%, respectively, at 300 ms SOAs, $p = .79$). Conversely, it was only at 300 ms SOAs that White participants committed fewer errors on valid (M = 2.6%) than invalid (M = 4.5%) trials, $t(25) = 2.21$, $p = .04$ (Ms = 3.9% and 3.6%, respectively, at 100 ms SOAs, $p = .71$). No significant effects emerged in a separate analysis on trials with 1200 ms SOAs, ps > .12.

STUDY 2: ERROR RATES

No significant effects emerged in a 2 (Power condition) × 2 (Gazer race) × 2 (Gaze validity) ANOVA with repeated measures on the last two factors, ps > .12