Economic scarcity alters the perception of race

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When the economy declines, racial minorities are hit the hardest. Although existing explanations for this effect focus on institutional causes, recent psychological findings suggest that scarcity may also alter perceptions of race in ways that exacerbate discrimination. We tested the hypothesis that economic resource scarcity causes decision makers to perceive African Americans as "Blacker" and that this visual distortion elicits disparities in the allocation of resources. Studies 1 and 2 demonstrated that scarcity altered perceptions of race, lowering subjects' psychophysical threshold for seeing a mixed-race face as "Black" as opposed to "White." In studies 3 and 4, scarcity led subjects to visualize African American faces as darker and more "stereotypically Black," compared with a control condition. When presented to naïve subjects, face representations produced under scarcity elicited smaller allocations than control-condition representations. Together, these findings introduce a novel perceptual account for the proliferation of racial disparities under economic scarcity.

prejudice | inequality | face processing

When the economy declines, racial minorities are hit the hardest. Although socioeconomic and health disparities typically exist between White and racial minority Americans (1, 2), these disparities tend to expand dramatically during economic crises. For example, during the economic recession of 2007–2009, median household wealth decreased by 16% for White Americans, whereas it decreased by 53% for African Americans (3). These widening disparities are often described in policy circles as an amplification of existing structural and institutional inequalities (4). For example, because of societal disparities in education and income, racial minorities are more likely than majority White Americans to be employed in blue-collar industries—the very industries most vulnerable to economic duress (5, 6). By this account, increased disparities during recession reflect longstanding and unyielding societal structures.

However, experimental social psychology research suggests that these scarcity effects are not solely a consequence of institutional and societal structures. Indeed, scarce conditions may also influence how one perceives and acts toward others, in ways that change according to one's particular social goals. In research on arbitrarily defined social groups (in which structural factors were held constant) scarcity and resource competition fostered distrust and antipathy and promoted discriminatory resource allocations between groups (7–9). Other research has shown that scarcity leads perceivers to devalue another person's worth and deservingness to justify withholding resources from them (10, 11). These findings suggest that economic scarcity changes the way individuals respond to members of other social groups in a manner that facilitates discrimination, beyond the effect of societal structures.

How might scarcity effects on social perception contribute to widening racial disparities during economic recession? Prior research has shown that scarcity increases decisions to exclude biracial individuals from the White majority group (12, 13), perhaps to preserve resources. However, mounting evidence suggests that even perceptions of race are malleable and that biases in race perception have implications for the expression of prejudice. That is, although race is often regarded as fixed and veridically perceived (14), representations of a person's race or ethnicity can shift as a function of the perceiver's social goals and motivations (15–19). For example, in prior work we found that greater antiegalitarian motives related to the visual perception of African American faces as "Blacker" (20). Such perceptual shifts are consequential: discrimination against African Americans is magnified for those viewed as more prototypically "Black" (i.e., as having darker skin tone and more Afrocentric features) (21), such that they are more likely to be socially excluded, shot when unarmed in a police training task, and sentenced to death after a guilty verdict (22–24). Given these effects, we proposed that economic scarcity may lead perceivers to distort their visual representations of African Americans, seeing them as "Blacker," which in turn facilitates economic discrimination against them. This hypothesis, which proposes that scarcity shifts the perceptual processing of race (beyond mere shifts in category membership), represents an especially pernicious process through which economic factors promote discrimination. In the studies described herein, we used a psychophysics approach to examine perceptual thresholds and representations of race to rigorously probe the effect of perceived economic scarcity on the visual processing of race.

In an initial test, we examined the relationship between beliefs about economic competition and visual representations of race. Seventy American subjects, none of whom were Black, were recruited for a study on "their ability to determine a person's racial identity" (*Methods*). First, subjects completed a questionnaire containing items assessing their concerns about zero-sum economic competition between Black and White Americans (e.g., "*When Blacks make economic gains, Whites lose out economically*") embedded among other items irrelevant to issues of race. Next, subjects completed a race identification task in which they viewed, in fully randomized order, a series of 110 morphed faces ranging in appearance from 100% Black to 100% White at 10% increments (Fig. 1*A*), classifying each face as "White" or "Black" (Fig. 1*B*). Our interest was in whether belief in zero-sum competition would be associated with the tendency to perceive mixed-race faces as "Blacker" than their objective appearance.

Significance

Racial disparities on socioeconomic indices expand dramatically during economic recession. Although prior explanations for this phenomenon have focused on institutional causes, our research reveals that perceived scarcity influences people's visual representations of race in a way that may promote discrimination. Across four studies, scarce conditions led perceivers to view Black people as "darker" and "more stereotypically Black" in appearance, relative to control conditions, and this shift in perception under scarcity was sufficient to elicit reduced resource allocations to African American recipients. These findings introduce a "motivated perception" account for the proliferation of racial and ethnic discrimination during times of economic duress.

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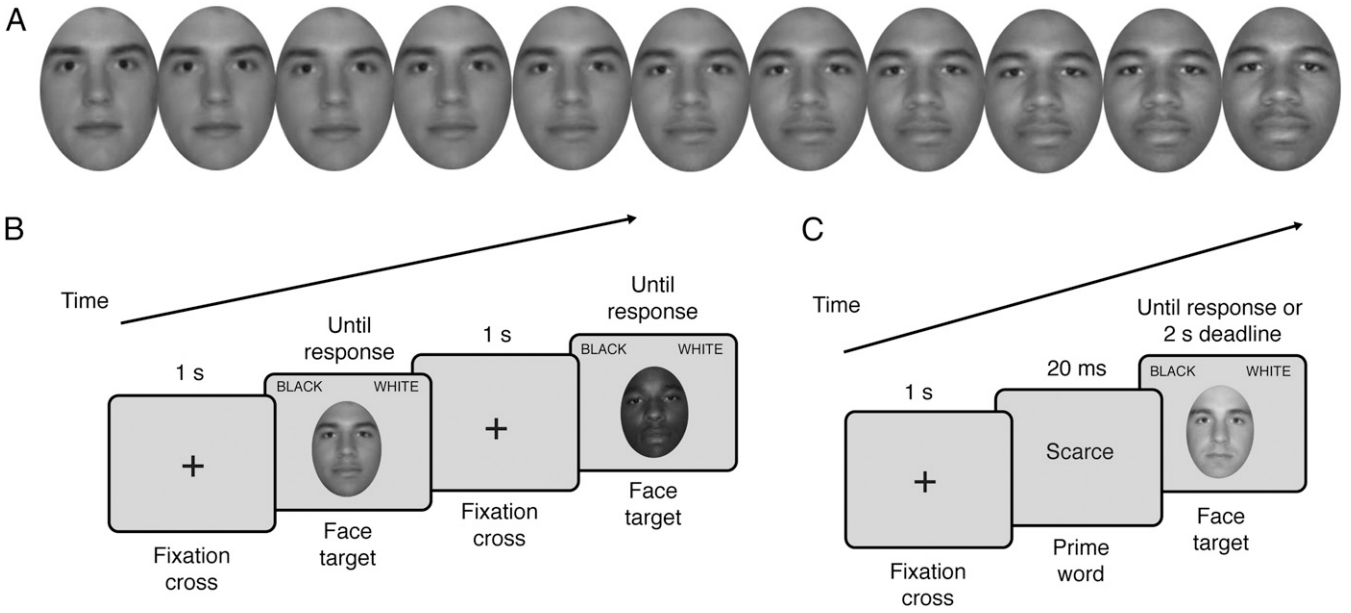

Fig. 1. Study 1 and 2 tasks. (*A*) Sample morph continuum of faces ranging from 0 to 100% Black in 10% increments. (*B*) Sample trials of the study 1 task. On each trial, subjects classified the face as "Black" or "White ($n = 70$). (*C*) Sample trial of the study 2 task. On each trial, a prime word (negative, neutral, or scarcity-related) was followed by a face, which was classified by subjects as "Black" or "White."

To obtain a precise index of perceptual bias, subjects' responses were fit to a cumulative normal curve, permitting computation of each subject's point of subjective equality (PSE)—the point at which a face was equally likely to be categorized as Black or White (*Methods*). A PSE of 0.5 indicates that a face was perceived in accordance with its objective racial content, with 50% Black/50% White morphs being viewed as Black (vs. White) 50% of the time. A PSE below 0.5 indicates that faces were viewed as Black even though they contained less than 50% Black face content. In study 1, subjects' mean PSE score was 0.47 (SD 0.09), significantly lower than 0.5 [$t(69) = -2.71$, $P < 0.01$], indicating that, on average, faces were viewed as Black if they contained 47% or more Black face content. More importantly, lower PSE scores were predicted by subjects' zero-sum beliefs about competition between Blacks and Whites: those with stronger zero-sum beliefs perceived mixed-race faces as "Blacker" than their objective Black face content [$r(70) = -0.28$, $P = 0.02$].

Although study 1 provided initial support for our hypothesis using an individual differences approach, the observed effect of zero-sum belief is likely associated with related individual difference constructs, such as subjects' racial attitudes and social dominance orientation. To test the causal effects of scarcity directly, we conducted a subsequent experiment in which perceptions of scarcity were manipulated. In study 2, 63 subjects completed a race identification task similar to that of study 1, but faces ranged from 100% Black to 100% White at 25% increments. Scarcity was manipulated nonconsciously, with subjects randomly assigned to one of three priming conditions. During the race identification task, word primes representing either scarcity (e.g., *scarce*), neutral concepts (e.g., *fluffy*), or negative concepts unrelated to scarcity (e.g., *brutal*) were presented for 20 ms before each face onset (Fig. 1*C*). We tested the effect of these prime conditions on subjects' tendency to perceive mixed-race faces as "Black."

Subjects' mean PSE score was 0.40 (SD 0.09), significantly lower than objective equality (0.50) [$t(62) = -9.33$, $P < 0.001$], indicating that, on average, faces were viewed as Black if they contained as little as 40% Black face content. More importantly, ANOVA indicated a significant effect of priming condition on PSE [$F(2,60) = 4.70$, $P = 0.01$], such that scarcity-primed subjects perceived mixed-race faces as significantly "Blacker" ($M_{PSE} = 0.35$, SD 0.09) than subjects primed with neutral ($M_{PSE} = 0.41$, SD 0.07; $P = 0.02$) or unrelated negative words ($M_{PSE} = 0.43$, SD 0.08; $P < 0.01$) (Fig. 2). Importantly, negative words did not significantly differ from neutral words ($P = 0.89$). These results demonstrated that scarcity, but not general negativity, shifted subjects' perceptual threshold for race.

Together, studies 1 and 2 supported the notion that economic scarcity induces people to see mixed-race faces as "Blacker" than their objective racial content. To further probe whether scarcity alters one's internal mental representation of race, we conducted a third experiment assessing whether people spontaneously imagine Black people as appearing "Blacker" when resources are perceived to be scarce.

In study 3, 62 subjects were recruited to play a money allocation game in which they were (ostensibly) randomly chosen to be either an allocator or recipient of funds. All subjects were

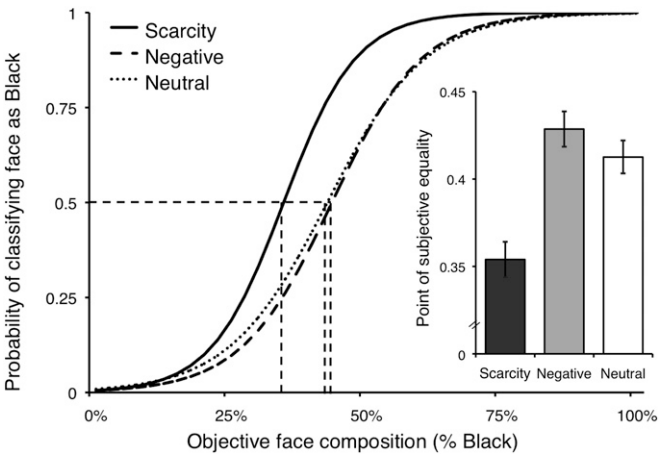

Fig. 2. Study 2 results ($n = 63$). PSE scores were significantly lower for subjects in the scarcity condition than those in the negative and neutral conditions. Error bars represent between-subject ±1 SE.

assigned the role of allocator. Subjects then learned they would be given an endowment of money from which to allocate to their partner (the recipient) and that the endowment size would be determined randomly. All subjects were assigned to allocate $10. In the scarcity condition, this amount was presented as $10 out of a possible $100 (a small portion of the total funds); in the control condition it was presented as $10 out of a possible $10 (the maximum portion of the total funds). Pretests confirmed that this manipulation, which varied subjects' potential allocation amount, was successful in creating the perception of resource scarcity (*Methods*).

While waiting for their partner (the recipient) to come online, subjects were asked to complete "an unrelated task to pretest stimuli for a future face perception study." In fact, this "pretest" was a reverse correlation image classification procedure designed to assess subjects' internal visual representations of faces (15, 25). In the task, subjects viewed a series of face pairs depicted as degraded images. In reality, the stimuli used in each trial constituted the same base face overlaid with different patterns of sinusoidal noise to create variation in physiognomy and skin tone (Fig. 3*A*). Subjects' task on each of 400 trials was to indicate which face of the pair was "Black" (Fig. 3*B*). These selections revealed subjects' mental representations of a Black person, as probed by the subtle distortions created by the different patterns of visual noise on each trial. Thus, images selected as "Black" on each trial were averaged for each subject and then averaged within condition, rendering two composite face images: one representing a Black person under manipulated scarcity, and the other representing a Black person in the control condition (Fig. 4*A*) (*Methods*).

Next we presented these composite images to a new sample of 31 subjects, naïve to the conditions under which the faces were created. These subjects were asked to judge the images objectively in terms of their skin tone (from "Extremely light" to "Extremely dark") and Black stereotypicality (from "Not at all stereotypical" to "Extremely stereotypical") along 100-point scales. The task was described as a study on the perception of degraded images. As expected, the composite face produced under scarcity was judged as significantly darker [M =71.81, SD 17.31; $t(28) = 4.98$, $P < 0.001$] and more stereotypically Black [$M = 72.16$, SD 25.04; $t(28) = 4.67$, $P < 0.001$] than the composite produced in the control condition (M = 52.58, SD 19.23, and M = 50.26, SD = 22.82, respectively; Fig. 4*B*). This effect was stark, with the clear majority of subjects rating the scarcity face as darker (81%) and more stereotypically Black (77%). Interestingly, however, an objective analysis of image luminance of the individual classification images created in study 3 did not reveal an effect of condition; mean grayscale pixel intensity (from 0 = Black to 255 = White) did not differ between faces created in the scarcity ($M = 127.63$, SD 5.93) and control conditions [$M = 129.04$, SD 7.18; $F(1,61) = 0.72$, $P = 0.40$], suggesting that the difference in reported skin tone may reflect the particular patterns of contrast represented in resultant facial features.

These results demonstrated that, compared with a control condition, perceived scarcity elicited internal mental representations of Black people as "Blacker"—a distortion that, given past research (21–24), should facilitate discrimination.

In a final experiment, we tested whether the manipulated effect of scarcity on Black face representations would elicit disparities in resource allocation. In study 4, conducted in a public community setting, 59 subjects were told that "people often make important decisions about others based on very little information" and that we were interested in how a person's deservingness can be discerned from appearance alone. Subjects viewed the scarcity and control faces created in study 3, side by side, and indicated how they would divide $15 (in whole dollars) between them. Concepts related to scarcity, the economy, or race were not mentioned. Supporting our prediction, subjects allocated significantly less money to the person depicted by the face visualized under scarcity in study 3 (M = $7.16, SD $0.94) than the control face [M = $7.84, SD $0.94; $t(58) = 2.77$, $P < 0.01$] (Fig. 5*A*). Although the dollar amounts offered to each recipient revealed that most subjects attempted to be egalitarian, when faced with a decision point, subjects consistently allocated against the Black face created under scarcity (Fig. 5*B*). In this way, subtle perceptual effects can have significant consequences. Importantly, because these face representations reflected the experimental manipulation of scarcity, this pattern revealed a causal process whereby scarcity led subjects to view Black faces as "Blacker," which in turn led to a disparity in money allocation (i.e., an experimental test of mediation).

Together, our results provide strong converging evidence for the role of perceptual bias as a mechanism through which economic scarcity enhances discrimination and contributes to racial disparities. Studies 1 and 2 demonstrated that perceptions of scarcity, whether based on one's economic beliefs or manipulated nonconsciously, increased subjects' tendency to view mixed-race faces as "Blacker." Studies 3 and 4 revealed that when resources were framed as scarce (versus neutral), decision makers' mental image of African American faces became "Blacker," and this perceptual shift was sufficient to cause a disparity in the allocation of resources. These findings demonstrate that socioeconomic context can shape perceptions of minority racial group members, and this process may contribute to the widening of racial disparities during economic stress.

It is well known that the fabric of society begins to fray under conditions of economic scarcity (3, 26). Our findings suggest a motivated perception account for this effect that may complement prior structural explanations. Classic research on intergroup relations has established that competition over resources incites strong motivations to favor the ingroup while derogating

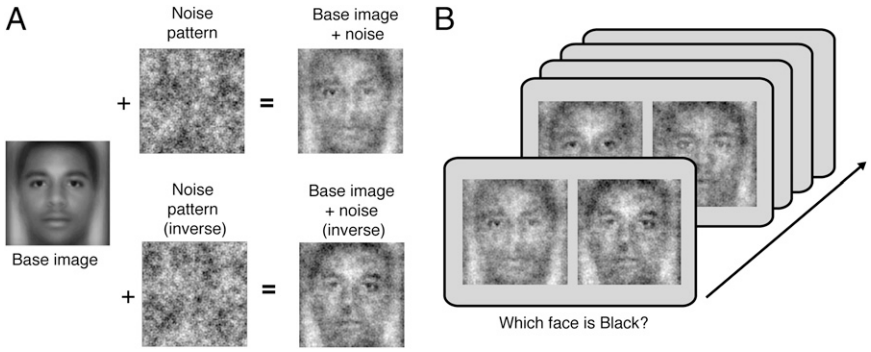

Fig. 3. Study 3 task. (*A*) Patterns of sinusoidal noise and their inverse were added to a single base face (morph of 100 White and 100 Black faces) to create pairs of unique stimuli. (*B*) Subjects viewed 400 face pairs and, for each pair, indicated which of the two faces was Black.

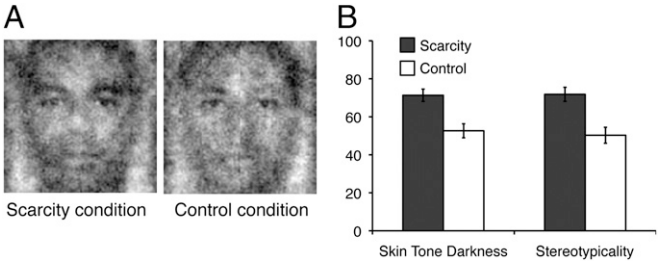

Fig. 4. Study 3 results (n = 62). (*A*) Composite image results of face representations created in scarcity and control conditions. (*B*) Ratings by independent judges (n = 31) indicated the face created under scarcity was darker and more stereotypically Black than the control face. Error bars represent within-subject ±1 SE.

outgroups (7, 8). Although we did not manipulate motivation directly, our results are consistent with this account, such that scarcity motivates perceivers to exaggerate the Afrocentric appearance of an African American face, which in turn supports the goal of distributing resources in favor of one's own group.

It is notable that scarcity may be threatening to a perceiver and that the observed effects of scarcity on race perception may have involved a form of threat processing. Indeed, classic research shows that economic competition between groups can lead an individual to perceive outgroup members as more threatening, which in turn evokes prejudice and discrimination (7, 8). More recent research has shown that perceived threats to the self (e.g., vulnerability to personal harm) induced subjects to judge a range of ambiguous social stimuli (e.g., voices, point-light walkers, and biracial faces) as more likely to be African American than European American (27). Although the theoretical question guiding our research concerned effects of scarcity in the context of economic disparities, findings such as these suggest that threat processing might constitute a key process through which situation-based scarcity influences the perceptual processing of race. The results of study 2 indicate that domain-general threat concepts did not bias race perception (relative to neutral concepts), yet it remains possible that, within the context of scarcity, threat may drive this effect.

Our findings also dovetail with recent evidence that scarcity is cognitively taxing (28–30) and thus may undermine an individual's ability to regulate unintended prejudices. Despite egalitarian beliefs, most Americans possess implicit negative associations with minority groups that are kept in check through effortful cognitive control (31, 32). An impairment of control under scarcity could further compound the effects observed in the present research by impairing a perceiver's ability to control the expression of bias in behavior. It is notable, however, that the effects of scarcity on race perception in the present research occurred implicitly (i.e., through nonconscious priming in study 2 and a very subtle between-subjects manipulation of scarcity in study 3), and thus it is unlikely that the observed effects were driven by changes in cognitive control. Nevertheless, cognitive impairment under scarcity could combine with the observed shift in race perception to create a potent impetus for behaviors that bolster existing racial and ethnic disparities.

Our main finding—that scarcity alters the visual perception of African Americans in a way that promotes disparities—issues a new challenge to efforts aimed at reducing discrimination. Although scarcity has been shown to affect explicit decisions about an individuals' group membership (12, 13), our finding that scarcity-elicited perceptual biases operate implicitly suggests that such biases are particularly resistant to detection and, consequently, regulation. These findings point to the need for a new class of proactive intervention strategies that prevent perceptual biases from forming in the first place, as well as stronger institutional protections that prevent the prejudices evoked by perceptual biases from influencing behavior.

In the wake of the 2008 global recession, research on scarcity has taken on renewed urgency, and recent findings confirm that the destabilizing effects of scarcity on society are much more pervasive, and thus pernicious, than the immediate concerns of financial markets. Our research offers a unique psychological perspective to the growing contemporary discourse on the effects of scarcity and income inequality. By showing that scarcity effects on racial disparities operate, at least in part, through malleable perceptions of race, our results reveal new opportunities for changing intergroup perceptions and reducing disparities that are often thought to be products of an unyielding societal structure.

Methods

Study 1 (Self-Reported Scarcity and Race Threshold). Seventy subjects from Amazon's Mechanical Turk (mean age 34 y, SD 14; 49 female and 21 male; 53 White, 6 Asian, 4 Latino, 3 non-Black multiracial, and 1 Native American) received $0.25 to answer demographic questionnaires and to identify a series of faces as Black or White.

On items embedded within the larger demographic questionnaire, subjects reported their endorsement of six zero-sum beliefs regarding the distribution of resources between Black and White Americans ("*When Blacks make economic gains, Whites lose out economically*"; "*Allowing Blacks to decide on political issues means that Whites have less say in how the country is run*"; "*Many Blacks have been trying to get ahead economically at the expense of Whites*"; "*More Blacks in positions of power means fewer opportunities for Whites*"; "*More good jobs for Blacks means fewer good jobs for Whites*"; "*The more Blacks in America, the harder it is for Whites to get ahead*"; α = 0.92; based on ref. 33).

In the race identification task, subjects were told they would see a series of faces and that although some faces were of mixed-race heritage, they should use the racial label (Black or White) they felt most closely reflected the person's race. To create each stimulus face, we combined two unique "parent" faces from a large subset of Black and White faces from the Eberhardt Laboratory Face Database (14) and varied the degree to which each parent was represented using morphing software (Morph Age Express 4.1, Creaceed Software, 2011). Selected faces were male, had neutral expressions, and were matched for facial structure and facial hair. Face images were created to represent each of 11 subcategories ranging from 100% Black to 0% Black (i.e., 100% White) at 10% increments of racial ambiguity (e.g., 100% Black, 90% Black ... 0% Black; Fig. 1*A*). We created the 100% and 0% faces by morphing two Black and two White parent faces, respectively. This procedure yielded 110 faces (10 per subcategory). Final images were presented on a gray background and were cropped and resized so that the 293 × 400 pixel oval images excluded hairstyles, necks, and ears.

Subjects viewed these 110 stimulus faces in a randomized, sequential order and were instructed to categorize each face as Black or White as quickly as possible by pressing the "q" or "p" keys with their index fingers (Fig. 1*B*). Race/key assignment was counterbalanced across subjects to control for handedness, and subjects were randomly assigned to report demographic

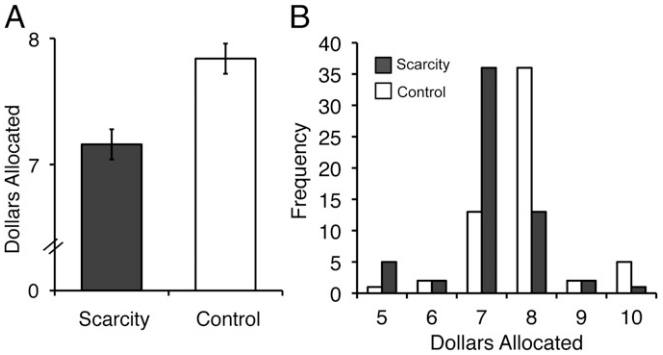

Fig. 5. Study 4 results (n = 59). (*A*) A second independent sample allocated fewer resources to the face created in the scarcity vs. control condition. Error bars represent within-subject ± 1 SE. (*B*) Although allocations centered around $7/$8 divisions, the majority of subjects allocated less money to the Black face created under scarcity.

information before or after completing the face categorization task. Neither handedness nor question order affected the results, thus these factors were excluded from the main analysis.

Subjects' PSE was calculated for individual subjects using the glmfit, linspace, and glmval Matlab functions listed below. We first regressed subjects' categorization choices (y; values 0 or 1) onto the objective Black race content (values 0–1 in increments of 0.1) using glmfit (step 1). We then created a linearly spaced vector (xx) of 100 points from 0 to 1 using linspace (step 2) and generated predicted values (yfit) from that vector and our model using glmval (step 3). We then determined PSE by finding the predicted value (yfit) closest to 0.5 (step 4) and finding the place on the *x* axis (xx) that corresponded to that point (step 5). Conceptually, this is equivalent to plotting yfit against xx and determining where on the *x* axis the resulting curve crosses 0.5 on the *y* axis.

1) [b,dev,stats] = glmfit(x,y,'binomial','link','logit');
2) xx = (linspace(0,1))';
3) yfit = glmval(b,xx,'logit');
4) [val,ind] = min(abs(yfit-.5));
5) PSE = xx(ind);

Study 2 (Scarcity Priming and Race Threshold). Sixty-three undergraduate students (mean age 19 y, SD 1.42; 44 female, 19 male; 45 White, 16 Asian, 2 Latino) completed a computerized face categorization task in exchange for course credit (three additional students were excluded after reporting awareness of the primes during funneled debriefing). As in study 1, subjects viewed faces ranging from 100% Black to 100% White, but in 25% increments, and classified them as either "White" or "Black," ostensibly to assist in developing stimuli for a future study. Unbeknownst to subjects, a word prime, which manipulated the concept of scarcity, was presented for 20 ms before the appearance of each face. The face then remained onscreen until the participant's response, within a 2,000-ms deadline (Fig. 1*C*). Primes were either scarcity-related words (scarce, resource, sparse, limited), neutral words (fluffy, appetite, scenic, antique), or negative words that were unrelated to scarcity (brutal, confront, odious, fragile). Words were chosen because of their equivalent length and frequency in the English language.

As in study 1, we computed subjects' PSE. Five subjects had "perfectly separated" choice sets (e.g., the observed probability of categorizing a face as Black when a face was >50% Black was exactly 1, and the observed probability of categorizing a face as White when a face was <50% Black was also exactly 1), and the iteration limit was reached when fitting their data to a logistic model; therefore, we assigned these subjects β-values that resulted in a sharp vertical curve crossing the *y* axis at 50%. Importantly, this did not change subjects' PSE values but avoided extreme β-estimates. Results held when these subjects were excluded from analyses.

Study 3 (Scarcity Context on Race Representations). Study 3 comprised two parts with two separate samples of subjects: (*i*): generation of Black face representations in a scarce vs. control resource context, and (*ii*) ratings of those representations.

Part one. Sixty-two subjects were recruited through Amazon's Mechanical Turk (mean age 36 y, SD 9; 31 female and 31 male; all identified as White) and paid $0.25 to play a game investigating how people allocate different amounts of money.

Scarcity manipulation. Subjects were told that the computer would randomly assign them to one of two possible roles: if selected to play the "Allocator," they would divide money between themselves and a partner; if selected to play the "Recipient," they would receive the amount allocated to them. However, all subjects were assigned to be "Allocators." The computer then ostensibly randomly assigned subjects an amount of money to distribute. In the scarcity condition, subjects were told they could receive up to $100. In the control condition, subjects were told they could receive up to $10. In both conditions, the computer assigned them to allocate $10. That is, subjects in the scarcity condition believed they had a small amount of possible funds ($10 out of $100), whereas subjects in the control condition believed they had the maximum amount of possible funds ($10 out of $10).

Pretests of the scarcity manipulation. To establish the validity of this manipulation, we pretested it with two sets of independent subjects (one college group and one online community group). In the first pretest, we recruited 143 subjects from Amazon's Mechanical Turk (mean age 34 y, SD 12; 69 female and 74 male; 113 White, 14 Asian, 10 Black, 4 Hispanic, 1 American Indian, 1 Pacific Islander) and paid them $0.25 for their participation. Subjects were told they would play an allocation game and were randomly assigned to either the scarcity or control condition, as in study 3. Subjects were then asked, "*How limited did you feel the amount of money you have to give to others is?*" and reported their responses on a 100-point scale from 0 (*very limited)* to 100 (*not at all limited*). Supporting the validity of this manipulation, subjects in the scarcity condition (n = 73) rated their resources as more limited (M = 39.32, SD 35.56) than subjects in the control condition [n = 70; M = 62.27, SD 37.40; $t(141) = 3.76$, $P < 0.001$]. In a second pretest, we recruited 36 undergraduate subjects (mean age 19 y, SD 1; 26 female and 10 male; all identified as White) to participate in exchange for course credit. Subjects were again assigned to either the scarcity or control condition and asked to indicate how limited they felt their funds were, on a scale of 1 (*very limited*) to 11 (*very abundant*). Supporting the validity of this manipulation, subjects in the scarcity condition (n = 18) rated their resources as more limited (M = 3.58, SD 1.82) than subjects in the control condition [n = 17; M = 4.89, SD 1.81; $t(34) = -2.20$, $P < 0.04$]. Importantly, this second pretest allowed us to conclude that our effects were not driven by the perception that resources were abundant in the control condition, as subjects in the control condition rated the $10 as significantly lower than the midpoint of the scale (6) [$t(17) = -2.60$, $P < 0.02$].

Face generation task. While ostensibly waiting for their partner to come online, subjects were asked to "pretest stimuli" for a future face perception study. They were told they would be "viewing pairs of faces and identifying which of the two faces is Black." They were instructed, "if unsure, please choose the face that looks *most* Black." In fact, this "pretest" was our primary measure—a reverse correlation image classification task designed to assess subjects' mental representations of Black faces (15, 25). On each trial, subjects viewed two faces, side by side. The images in each face pair consisted of the same base face, a morph of 100 White and 100 Black faces, with a unique quasi-random sinusoidal noise pattern added to one image and subtracted from the other image (Fig. 3*A*). Subjects saw 400 image pairs and were asked to indicate which one was Black (Fig. 3*B*). The noise patterns from selected trials were averaged for each subject and then averaged again by condition. This average noise pattern was then recombined with the base face to create a single composite from each condition (i.e., a "scarcity face" and "control face") (Fig. 4*A*).

Part two. Thirty-one subjects from Amazon's Mechanical Turk (mean age 30 y, SD 10; 19 female and 12 male; 26 White, 2 Asian, 3 Hispanic, 1 Pacific Islander) were paid $0.20 for their participation.

Subjects viewed the faces created in part 1 and rated each on skin darkness (from "Extremely light" to "Extremely dark") and Black stereotypicality (from "Not at all stereotypical" to "Extremely stereotypical") along 100-point scales. Importantly, the concepts of scarcity, abundance, and resources were never mentioned in the procedure.

Pixel intensity analysis. To quantitatively test differences in darkness between the scarcity and control representations, we extracted the mean pixel intensity for each of the 62 individual classification images. Regions of the image outside the face, including the hair, were masked and excluded from analysis, leaving an oval consisting of 125,508 pixels. The mean pixel intensities were then compared by condition.

Study 4 (Race Representations on Discrimination). Fifty-nine White community members (mean age 23 y, SD 5; 26 female and 33 male) were approached at random in a popular city park. After agreeing to participate, they were shown images of the two Black faces created in study 3 and asked how they would they divide $15 between two people (in full dollars).

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