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The influence of stereotypes on decisions to shoot

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Abstract

Using a videogame to simulate encounters with potentially hostile targets, three studies tested a model in which racial bias in shoot/don't-shoot decisions reflects accessibility of the stereotype linking Blacks to danger. Study 1 experimentally manipulated the race-danger association by asking participants to read newspaper stories about Black (vs. White) criminals. As predicted, exposure to stories concerning Black criminals increased bias in the decision to shoot. Studies 2 and 3 manipulated the number of White and Black targets with and without guns in the context of the videogame itself. As predicted, frequent presentation of stereotypic (vs. counterstereotypic) targets exacerbated bias (Study 2) and—consistent with our process account—rendered stereotypes more accessible (Study 3). Copyright © 2007 John Wiley & Sons, Ltd.

Social psychology has long been concerned with the idea that social categories like race, gender, and social class can influence people's interpretations of, and reactions to, ambiguous stimuli (Allport, 1954; Campbell, 1967; Duncan, 1976; Kunda & Sherman-Williams, 1993; Wittenbrink, Judd, & Park, 1997). In the domain of criminal justice, category-based judgments can have profound consequences through slow, deliberative judgments like those made by a jury (Eberhardt, Davies, Purdie-Vaughns, & Johnson, 2006; Sommers & Ellsworth, 2000) but also through the spontaneous, split-second reactions of a police officer (Correll, Park, Judd, & Wittenbrink, 2002; Correll, Park, Judd, Wittenbrink, Sadler & Keesee, 2007; Payne, 2001; Plant, Peruche, & Butz, 2005). In particular, research using computer simulations to investigate the influence of race on shoot/don't-shoot decisions demonstrates a pronounced bias to shoot Blacks. In our paradigm, participants perform a videogame task in which they encounter armed and unarmed targets who are either Black or White. Participants attempt to shoot armed targets and indicate *don't shoot* in response to unarmed targets. Though race is irrelevant to this task, participants are faster and more likely to shoot Black targets. They are also faster and more likely to indicate *don't shoot* for Whites. In essence, participants respond quickly and accurately when targets

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conform to cultural stereotypes (armed Blacks, unarmed Whites), but respond slowly and inaccurately when targets violate those stereotypes (unarmed Blacks, armed Whites).

To account for these effects, we have suggested that stereotypes systematically bias reactions to stimuli in the shoot/don't-shoot task. It is well established that priming a social category facilitates reactions to stimuli that are congruent with the category's stereotype relative to stimuli that are stereotype incongruent (Dovidio, Evans, & Tyler, 1986; Fazio, Jackson, Dunton, & Williams, 1995; Wittenbrink et al., 1997). Priming may also bias perception, such that ambiguous stimuli are interpreted in a manner consistent with the primed category (Devine, 1989; Gilbert & Hixon, 1991; Kunda & Sherman-Williams, 1993). In the present research, we examine the role of stereotypes in shaping responses to guns and non-gun objects in the context of a shoot/don't-shoot task. We are particularly concerned with one component of the stereotype about Blacks in the United States (where nearly all of this research has been conducted), namely, the idea of danger. Though cultural stereotypes about Blacks include a number of other concepts such as poverty and athleticism, danger figures prominently in the Black stereotype (Devine & Elliot, 1995; Wittenbrink et al., 1997), and perceptions of danger bear directly on the decision task in these studies, which involves the detection of a hostile target. To the extent that Black targets seem more dangerous than Whites, they should promote a tendency to shoot, facilitating correct responses for armed targets but inhibiting correct responses for unarmed targets. A core feature of our prediction, then, is that stereotypes linking Blacks to danger promote racial bias in the decision to shoot. Existing research provides some support for this hypothesis. First, participants who report greater awareness of stereotypes about aggression, violence, and danger show more extreme bias in our task (Correll et al., 2002, Study 3). Second, neuroscientific data suggest that target race affects threat perception, which in turn predicts the magnitude of bias in the decision to shoot. The P200 is a component of the event-related brain potential waveform that has been associated with orientation to evolutionarily significant stimuli, including threats (Carretie, Martin-Loeches, Hinojosa, & Mercado, 2001). Among White participants, P200's to Blacks are typically more pronounced than P200's to Whites (Ito & Urland, 2003) and this difference increases as a function of stereotype strength (Correll, Urland, & Ito, 2006). Critically, the magnitude of racial differentiation in the P200 predicts bias in the decision to shoot. Participants who demonstrate a strong P200 threat response to Black targets (relative to Whites) are especially quick to shoot armed Black targets and especially quick to choose *don't shoot* for unarmed Whites.

The current studies examine whether experimental manipulations designed to increase the accessibility of the Black-danger stereotype exacerbate bias in the decision to shoot. This research borrows from work on the malleability of implicit associations. For example, Blair, Ma, and Lenton (2001) asked participants to imagine stereotypic (or counterstereotypic) women and found that this manipulation increased (or decreased) gender bias on the implicit associations test (IAT; Greenwald, McGhee, & Schwartz, 1998). Similarly, Dasgupta and Asgari (2004), Dasgupta and Greenwald (2001), Karpinski and Hilton (2001), and Han, Olson, and Fazio (2006) manipulated exposure to information that reinforced (or undermined) common associations, including stereotypes, and showed that these manipulations affected performance on implicit measures. We employ similar manipulations to garner evidence that stereotypes about danger causally affect bias in the decision to shoot. Notably, given the public relevance of these effects, we employ manipulations with real-world analogs that may plausibly affect the accessibility of the stereotype of Blacks as dangerous: newspaper articles and base rates in the environment.

In Study 1, we expose participants to newspaper stories about violent criminals. Describing those criminals as Black (rather than White) should reinforce stereotypic associations between Blacks and danger and, accordingly, amplify the tendency to shoot Black (rather than White) targets. In Study 2, we manipulate the covariation between race and weapons in the context of the videogame task, such that in one condition Blacks are disproportionately likely to be armed and Whites are

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disproportionately likely to be unarmed. In another condition, these contingencies are reversed. Like the newspaper articles, covariation should affect bias in the decision to shoot (Study 2). Further, to the extent that bias is driven by stereotypes about danger, covariation should affect the accessibility of danger-relevant words. Study 3 provides initial evidence regarding the psychological mechanism that drives bias by examining accessibility of the danger stereotype as a function of manipulated covariation between race and weapons. An important feature of these three studies is that they include both stereotypic and counterstereotypic conditions. Accordingly, they allow us to make strong, statistically grounded comparisons between conditions and, so, evaluate the causal effects of our manipulations (Holland, 1986).

STUDY 1

The goal of Study 1 was to manipulate the accessibility of stereotypes linking Blacks to concepts of danger and crime. This study drew on research by Gilliam and Iyengar (2000), who asked participants to watch a television newscast, including a crime report. During the story, the suspect's image appeared. Some participants saw a Black suspect, and others saw a White suspect. This exposure affected self-reported attitudes toward Blacks and Whites in subsequent measures. In the current study, participants read a newspaper article about a series of armed robberies committed either by a pair of Black men or by a pair of White men. Although this manipulation has not been used in the study of implicit bias to date, it seems to have considerable ecological validity. The study tests whether an everyday behavior like reading a newspaper article can affect bias in the decision to shoot. We simply predicted that bias would be greater after reading about Black criminals than after reading about White criminals.

METHOD

Participants and Design

Seventy non-Black undergraduates in an introductory psychology class participated in this study for course credit. Participants were randomly assigned to read about either Black or White criminals. Afterward, participants performed the videogame task. The experiment involved a 2 (Article Condition: Black criminal vs. White criminal) $\times$ 2 (Target Race: Black vs. White) $\times$ 2 (Object Type: gun vs. no gun) mixed-model design, with repeated measures on the last two factors.

Materials

Newspaper Articles

We selected three articles describing strings of armed robberies. Two versions of each article were created. In the Black-criminal condition, the articles alleged that a pair of Black males between the ages of 20 and 35 committed the robberies. Each story included police sketches of the suspects. In the White-criminal condition, otherwise identical articles described the suspects as White males and included sketches of White suspects. Participants were randomly assigned to read a single article (i.e.,

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they did not read all three articles). We used multiple articles simply to increase generalizability, and the effect of the race manipulation did not depend on the particular article that participants read, $F(2, 64) = .60$, $p < .55$.

Videogame Task

The simulation was developed in PsyScope (Cohen, MacWhinney, Flatt, & Provost, 1993) (see Correll et al., 2002, for details). On each trial, a random number of backgrounds (0–3) appeared sequentially, each for a random duration (500–800 milliseconds). Subsequently, a final background appeared (e.g., a building), again for a random duration. This background was replaced by an image of a man embedded in that background (e.g., an armed White man standing near the building). From the player's perspective, the target seemed to 'pop up' in the scene. Players were instructed to respond as quickly as possible whenever a target appeared, pressing a button labeled *shoot* if the target was armed, and pressing a button labeled *don't shoot* if the target was unarmed. Critically, half of the targets (both armed and unarmed) were Black and half were White. Correct responses earned points, and errors resulted in penalties. Our original task required participants to respond within 850 milliseconds of target onset, a window that typically enables participants to respond correctly on the vast majority of trials, enabling us to examine bias in reaction times. Though we return to an analysis of reaction times in Studies 2 and 3, the focus of Study 1 was on error rates. Accordingly, participants were forced to respond within 730 milliseconds of target onset to avoid a penalty (see Correll et al., 2002). The game included 16 practice trials and 100 test trials.

Procedure

Participants were greeted by a White male experimenter and seated in cubicles. The experimenter introduced the study as a memory test. Participants were told that the experiment concerned differences in memory for television, radio, and newspaper stories, and that some of them would read an article, while others would watch a video or listen to an audio clip. In reality, all participants read newspaper articles. The ostensible video and radio conditions served to disguise the hypotheses. Participants were asked to read an article and remember as many details as possible because their recall would be tested after 20 minutes. After a 5-minute reading period, the experimenter removed the article and told participants that they would perform computer tasks until the memory test. He explained that the tasks were designed to be difficult and engaging in an effort to distract them, but that they should try to remember the article in spite of the interference. After a series of distracter tasks, the experimenter reminded participants about the ostensible focus of the study (i.e., memory for the story) and asked them to write a sentence or two about the article they had read. Next, participants played the videogame. Participants were then thanked and debriefed about the true nature of the study.

RESULTS AND DISCUSSION

Videogame Task

On average, participants responded incorrectly on 7.79% of trials and timed out on 7.74% of trials. Error rates were computed separately for each target type (see Figure 1). We submitted these data to a

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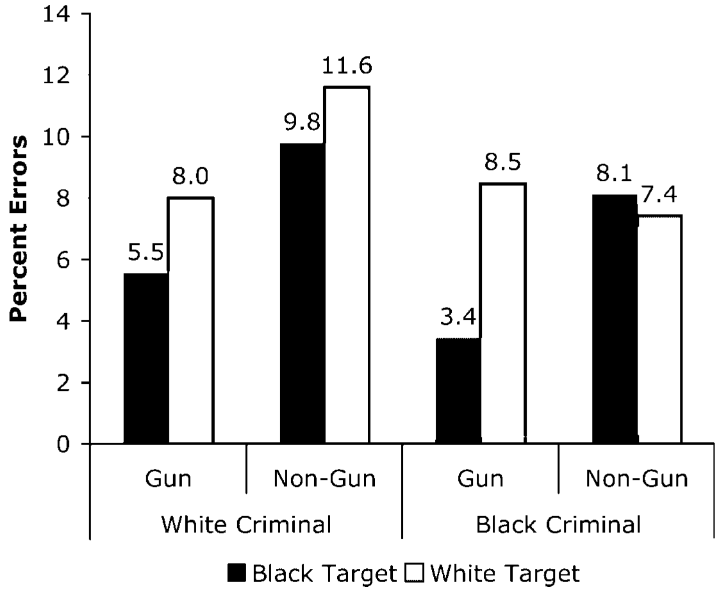

Figure 1. Frequency of errors as a function of Article Condition, Object Type, and Target Race, Study 1

signal detection theory (SDT) analysis. SDT is valuable in this effort because it disentangles two distinct factors, each of which can influence the pattern of errors. First, it provides a measure of the degree to which participants were able to differentiate armed targets from unarmed targets. In the present analysis, this sensitivity was gauged with the statistic, *d*'. Second, SDT estimates the degree to which participants favored a shoot response over a don't-shoot response—did they set a very low threshold to shoot (shooting often) or a very high threshold (shooting rarely)? Threshold was assessed with the statistic, *c*.[1] Our previous work suggests that participants set a lower (more lenient) threshold when targets are Black, rather than White, but that race does not affect participants' ability to differentiate armed and unarmed targets (Correll et al., 2002, 2006).

We calculated *c* twice for each participant: once for White targets and once for Black targets. The two values were submitted to a 2 (Article Condition: Black criminal vs. White criminal) × 2 (Target Race: Black vs. White) mixed-model analysis of variance (ANOVA). Consistent with previous work, participants set a more lenient criterion for Black targets ($M = -.21$) than for Whites ($M = -.04$), $F(1, 68) = 19.83$, $p < .0001$. This discrepancy, in essence, constitutes a measure of bias, which we would expect to depend on the nature of the article participants read. Indeed, Article Condition interacted with Target Race, $F(1, 68) = 6.71$, $p < .012$. To clarify this interaction, we tested the effect of Target Race separately in the Black criminal condition and the White criminal condition. Participants who read about a Black criminal set a lower criterion for Black ($M = -.22$) rather than White targets ($M = .05$), $F(1, 34) = 24.20$, $p < .0001$. By contrast, participants in the White criminal condition used essentially the same (and relatively low) criterion for both Black ($M = -.19$) and White targets ($M = -.12$), $F(1, 34) = 1.77$, $p < .19$. Examining the effect of Article Condition for the Black and White criteria, separately, we found that Article Condition had no impact on the criterion for Black targets, *F*(1,

[1] $c = -0.5 \times (zFA + zH)$; $d' = zH - zFA$. FA represents the proportion of false alarms (relative to correct rejections). *H* represents the proportion of hits (relative to misses). The *z* operator represents the translation of these proportions to *z*-scores. Both FA and *H* were assigned a minimum value of $1/2n$ (where n = the total number of valid responses on no-gun and gun trials, respectively) and a maximum of $1 - (1/2n)$, to eliminate infinite *z*-scores.

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68) = .19, $p < .66$, which was relatively low regardless of the nature of the article. But participants predictably lowered their criterion for White targets after reading about a White, rather than a Black, criminal, $F(1, 68) = 6.11$, $p < .016$.[2]

Study 1 demonstrated that reinforcing or undermining racial stereotypes that link Blacks to danger and crime can dramatically affect the magnitude of racial bias in the decision to shoot. Reading newspaper articles about violent criminals yields significantly greater bias when those criminals are described as Black rather than White. After reading the Black-criminal article, participants set a more lenient criterion for the decision to shoot Black (rather than White) targets. After reading the White-criminal article, participants showed no evidence of bias. This malleability in bias provides initial evidence that stereotype accessibility causally influences bias in the decision to shoot. In doing so, it also demonstrates that bias can be reduced and even eliminated by exposure to counterstereotypic information. (It is worth noting, however, that the manipulation attenuated bias by increasing participants' tendency to shoot White targets, not by decreasing the tendency to shoot Blacks.) The naturally occurring analog of this manipulation is quite clear. Exposure to news stories that pair Blacks with violent crime may enhance racial bias in this domain. Study 2 attempted to replicate this pattern of effects using an entirely different manipulation. Specifically, we created virtual environments in which the prevalence of armed Blacks and armed Whites vary.

As noted above, researchers have demonstrated malleability in implicit measures by exposing participants to a series of stereotypic (vs. counterstereotypic) exemplars (e.g., Dasgupta & Asgari, 2004, Study 1). Examining bias in a shoot/don't-shoot task, Plant, Peruche, and Butz (2005) similarly suggest that the prevalence of stereotype-congruent targets matters. In Plant's studies, practice reduced bias when race was unrelated to the presence/absence of a weapon (i.e., is, when race and weapons were uncorrelated, Studies 1 and 2). Based on this evidence, the authors argued that participants had learned that race was non-diagnostic. Indeed, in a separate study, when Black targets were disproportionately likely to be armed, the authors found that practice failed to reduce bias (Study 3). Though Plant's work focused on training, it clearly suggests that associations between race and danger may contribute to the maintenance of bias. Because these studies did not actually manipulate the race–weapon association, however, they provide only indirect evidence about the causal impact of race–weapon covariation on bias (Holland, 1986). Further, because Plant and her colleagues were chiefly concerned with training (not stereotypes), the studies included no measures of stereotype activation[3] and thus cannot address stereotype accessibility as the possible mechanism through which greater bias is produced. We therefore attempted to conceptually replicate Study 1 and build on Plant's work by experimentally manipulating the prevalence of stereotypic vs. counterstereotypic targets and examining the effect of this manipulation on both bias in the decision to shoot (Study 2) and stereotype accessibility (Study 3).

[2]Though less central to our hypothesis, we also calculated estimates of sensitivity, using d', which quantifies a participant's ability to distinguish between armed and unarmed targets. These estimates were also submitted to a 2 (Article Condition: Black criminal vs. White criminal) × 2 (Target Race: Black vs. White) mixed-model ANOVA. Consistent with our previous work, we found no significant differences, though Target Race, $F(1, 68) = 2.92$, $p = .092$ (White greater than Black), and Article Condition, $F(1, 68) = 3.42$, $p = .069$ (Black criminal greater than White criminal), had marginal effects on average sensitivity. Importantly, there was no evidence of a Target Race × Article Condition interaction $F(1, 68) = .01$, $p = .92$.We also conducted analyses of bias in latencies to test the possibility that condition differences in the errors reflected a speed-accuracy trade-off. Reaction times from correct responses were log transformed and averaged within target type. A bias index was calculated as the degree to which participants were faster for stereotype-congruent targets (Armed-Black and Unarmed-White) than for stereotype-incongruent targets (Armed-White and Unarmed-Black) (see Studies 2 and 3). Though evident on average, $F(1, 68) = 39.19$, $p < .001$, bias did not depend on Article Condition, $F(1, 68) = .43$, $p = .51$. This null result suggests that the error analysis does not stem from a speed-accuracy trade-off.

[3]Plant et al. (2005, Study 4) did measure the activation of racial categories (e.g., *Black* and *White*) using a word stem completion task. Note however, that activation of a category is not equivalent to the activation of stereotype content (e.g., *danger* and *violence*), which is the focus of Study 3 in the current paper. That is, it is very different to ask whether the category "Black" has been activated, than to ask whether specific stereotypic contents of the category Black have been activated (the mechanism through which we argue bias in this task is produced).

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STUDY 2

Methods

Participants and Design

Ninety-four non-Black undergraduates participated in this study for course credit. Two were excluded: one made unreasonable estimates on questionnaire measures (his inclusion does not change the significance of the effects), and one was interrupted by a fire alarm and could not finish the videogame task. The remaining 92 participants (58% female, average age 20.4) were randomly assigned to condition.

The design involved a single between-subjects factor, Covariation Condition, with three levels: stereotype congruent (SC), control, and stereotype incongruent (SI). Within each condition, participants played the videogame twice, yielding a within-subject factor (Round of Play) with two levels: Round 1 versus 2. In each round, the videogame involved a 2×2 design, with Target Race (Black vs. White) and Object Type (gun vs. non-gun) as repeated factors.

Materials

The original simulation (Correll et al., 2002) consisted of 80 trials, evenly divided between four target types: armed/Black, armed/White, unarmed/Black, unarmed/White. The covariation between Target Race and Object Type was therefore zero. In Study 2, we manipulated this covariation. In the SC condition, Blacks were particularly likely to have guns, and Whites were particularly likely to have non-guns (see Figure 2). The game included 20 armed Black targets, 12 armed Whites, 12 unarmed Blacks, and 20 unarmed Whites. We simply eliminated eight randomly selected targets from the

Figure 2. Subset of targets in the Stereotype Congruent Covariation condition, in which armed Blacks outnumber armed Whites and unarmed Whites outnumber unarmed Blacks

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original pool of 20 for each of the two underrepresented target types, creating a 64-trial game in which Target Race and Object Type were correlated ($r = .25$). Similarly, we created an SI condition by dropping eight targets from the armed-Black and unarmed-White cells. In the incongruent condition, Whites were more likely to be armed, and Blacks were more likely to be unarmed ($r = -.25$). A no-covariation control condition was also included. To hold constant the number of trials, we excluded four targets from each target type, randomly selecting half of the eight targets that we dropped from the underrepresented cells in the SC and SI games. Otherwise, these games were identical to the game used in previous research. In Round 1, each participant played the game appropriate to his or her condition. In Round 2, participants in all conditions played the original 80-trial game in which race and object were uncorrelated. That is, we manipulated Covariation condition with different games in Round 1 but measured the effect of this manipulation with a common game in Round 2 in which race and object were uncorrelated. In Study 2, we reverted to the standard response window (850 milliseconds), enabling us to examine variability in reaction times.

Procedure

Participants were greeted by a White male experimenter (different from the Experimenter in Study 1) and assigned to cubicles. The experimenter described the study as an investigation of vigilance and told participants they would perform the task twice. After Round 1, participants made paper-and-pencil estimates of the frequency of armed Blacks, unarmed Blacks, armed Whites and unarmed Whites in the game. These estimates were collected to determine whether participants could detect the association between race and weapon in each condition. Participants then played a second (uncorrelated) game. Participants then repeated the frequency estimates, but were asked to base their responses on the second game only. Finally, participants were thanked and debriefed.

RESULTS AND DISCUSSION

Perceived Associations

We began by analyzing participants' frequency estimates. On occasion, these estimates failed to sum to 100. These responses were weighted (divided by their sum, then multiplied by 100) to create percentages. We formed an index of *perceived association* by summing the estimates for stereotype-congruent targets (armed Blacks and unarmed Whites) and subtracting the sum of the stereotype-incongruent targets (unarmed Blacks and armed Whites). This index represents the within-subject Target Race × Object Type interaction. The greater the index, the more frequently participants believed they saw gun-wielding Blacks and unarmed Whites relative to unarmed Blacks and armed Whites. In all analyses of Studies 2 and 3, we assess condition effects through analysis of variance specifying the linear contrast (SI = −1; control = 0; SC = +1) and the residual or quadratic contrast (SI = +1; control = −2; SC = +1). Our hypothesis concerns the linear effect of condition. Based on our symmetrical manipulation of covariation, we expected no deviation from linearity (i.e., the control condition was expected to fall roughly at the average of the SC and SI conditions, resulting in a non-significant test of the quadratic effect).

After Round 1, perceived stereotypic associations depended on the linear contrast, $F(1, 89) = 6.35$, $p < .014$, suggesting that participants were sensitive to covariation between race and object in the game (see Table 1). The residual contrast was not significant, $F(1, 89) = 1.69$, $p < .20$, yielding no evidence

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Table 1. Means (and standard deviations) for frequency estimate index of perceived covariation and bias, by condition and round of play (Study 2)

	Condition		
	Stereotype Congruent ($n=32$)	Control ($n=32$)	Stereotype Incongruent ($n=28$)
Correct estimates of covariation			
Round 1	25	0	−25
Round 2	0	0	0
Perceived stereotypic association			
Round 1	12.97_a (22.04)**	$1.56_{a,b}$ (16.29)	$.80_b$ (17.04)
Round 2	-3.87_a (17.04)	-1.56_a (14.39)	1.18_a (10.87)
Mean latency bias and mean (and standard deviation) of bias in log latencies			
Round 1	28.79 milliseconds $.049_a$ (.067)**	15.84 milliseconds $.028_a$ (.059)**	13.08 milliseconds $.023_a$ (.087)
Round 2	30.51 milliseconds $.052_a$ (.056)**	20.42 milliseconds $.035_{a,b}$ (.043)**	13.25 milliseconds $.024_b$ (.050)*

Test of mean = 0: $^{**}p < .01$; $^{*}p < .05$; Within each row, means that do not share a common subscript differ at $p < .05$.

of deviation from linearity. Thus, participants correctly perceived the strongest association between Blacks and weapons in the SC condition, and the weakest association in the SI condition. For Round 2, where no differences existed in the actual frequency of armed and unarmed Blacks and Whites, no condition differences emerged in participants' estimates of these frequencies (linear: $F(1, 89) = 1.82$, $p < .18$; residual: $F(1, 89) = .005$, $p < .95$). Because the second game was identical across conditions, and because participants were instructed to base their estimates on only that game, this null result suggests that participants correctly recognized the lack of covariation.

Bias in the Decision to Shoot

The purpose of Round 1 was to inculcate different associations between race and object by manipulating covariation. We hypothesized that bias in Round 2 would reflect condition differences with SC participants showing more bias than SI participants. We computed a measure of bias by averaging the log-transformed latencies from correct trials[4] in the videogame (see Correll et al., 2002). Bias reflects the Target Race × Object Type within-participants interaction in Round 2. Analyzing bias as a function of Covariation Condition, we observed significant bias on average, $F(1, 89) = 44.22$, $p < .0001$, and—as predicted—a linear condition effect, $F(1, 89) = 4.67$, $p < .033$. Bias was higher in the SC condition than in the SI condition (see Table 1, Figure 3). The residual contrast was not significant, $F(1, 89) = .07$, $p < .79$. When Blacks (rather than Whites) were associated with guns in Round 1, participants showed more pronounced anti-Black bias in Round 2. These condition differences emerged even though Target Race and Object Type were uncorrelated in Round 2.

Supplemental analyses showed a weak linear effect of condition in Round 1, $F(1, 89) = 2.13$, $p < .15$, but no residual effect, $F(1, 89) = .24$, $p < .63$, and no change in bias from Round 1 to Round 2 (on average or for any particular condition, F's $< .26$). Finally, it is interesting to note the general prevalence of bias in these data, which was significant in both rounds for the SC and control conditions

[4]Errors accounted for 3.13% of trials.

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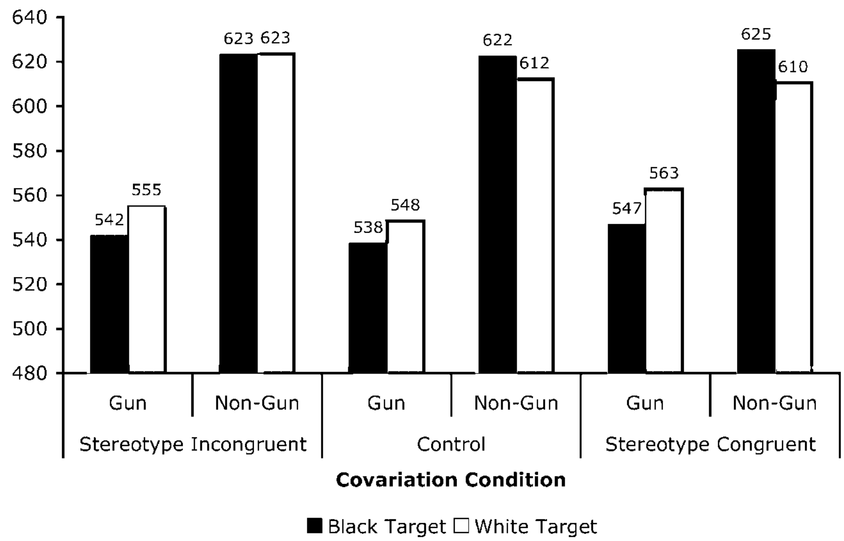

Figure 3. Latencies for correct shoot/don't-shoot decisions as a function of Target Race, Object Type, and Covariation Condition, Round 2, Study 2

and even Round 2 in the SI condition (although, consistent with expectations, it was weakest in that cell).[5]

Study 2 showed that exposure to stereotypic (vs. counterstereotypic) targets in a shoot/don't-shoot simulation increases the magnitude of racial bias. Just as reading about a pair of violent Black criminals exacerbated bias in Study 1, repeated exposure to stereotype-congruent targets led participants to shoot armed Blacks more quickly than armed Whites, but to choose *don't shoot* more quickly for unarmed Whites than unarmed Blacks. By the same logic, of course, we might argue that exposure to stereotype-incongruent targets decreased bias. In either case, these data echo Study 1: manipulations designed to increase the accessibility of the Black-danger association exacerbate bias in the decision to shoot. In Study 3, we tested the mechanism which, according to our hypothesis, should drive these effects. We attempted to show that exposure to stereotype-relevant information in the simulation affects a direct measure of stereotype accessibility.

STUDY 3

Study 3 examined the impact of the covariation manipulation on stereotype accessibility. To this end, we employed a modified version of the Extrinsic Affective Simon Task (EAST; De Houwer, 2003). The EAST serves as an implicit measure of stereotypic associations, much like the IAT. Similar to the IAT, on some trials of this task, participants classified male names (e.g., Tyrone, Peter) as either *African American* (Button A) or *Caucasian*[6] (Button B). These names always appeared in a white font against a black screen. On other trials, participants classified a different set of words according to their color.

[5]As in Study 1, to address the possibility that our primary condition differences reflect a speed-accuracy trade-off, we conducted parallel analyses of bias in error rates. On average, bias was evident, $F(1, 89) = 4.58$, $p = .035$, but neither the linear nor residual contrasts were significant, F's $< .8$, $p > .35$, offering no evidence of a trade-off.
[6]We avoided the word 'White' to minimize confusion with the white font used on these trials.

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These words appeared in a blue-green font, but some were predominantly blue and others predominantly green. Participants indicated the dominant color, Blue (Button A) or Green (Button B). Words in blue thus required the same response as a Black name (Button A), whereas words in green required the same response as a White name (Button B). Critically, some of these color words were related to danger. That is, where the IAT might have required participants to classify words as *dangerous* versus *not dangerous*, the EAST simply requires participants to indicate the color in which the words appear. Because people automatically process the meaning of words (rather than just their color; Stroop, 1935), stereotypes may facilitate classification when danger words appear in blue (requiring the Black-name button), but inhibit classification when they appear in green (requiring the White-name button). If stereotypes about dangerous Blacks are particularly salient for some people, this pattern of facilitation should be especially strong. We predicted, therefore that covariation of targets in the simulation would influence performance on the EAST.

METHOD

Participants and Design

Seventy-nine non-Black undergraduates participated in this study for course credit or $10. Four participants were excluded. Two had participated in an earlier study using the shoot/don't-shoot task. Another was colorblind and unable to distinguish between the green/blue words in the EAST. A final participant in the control condition completed fewer than 50% of the color classifications correctly. The resulting facilitation score, based on relatively few trials, was 3.3 standard deviations below the condition mean. The remaining 75 participants (49% female, average age 19.53) were randomly assigned to condition.

Identical to Study 2, the design involved a single between-subject factor, Covariation Condition, with three levels: SC, control, and SI. Participants first performed the condition-appropriate simulation (to inculcate stereotypic associations) and then performed the EAST. The EAST yielded two critical latency averages, one from trials on which danger-related words required the same response as Black names (congruent trials), and one on which danger words required the White-name response (incongruent trials). The difference between these averages constitutes facilitation or stereotype activation. The study accordingly followed a 3 (Covariation Condition) $\times$ 2 (congruent vs. incongruent trial) mixed-model design, with repeated measures on the last factor.

Materials

We developed the EAST using PsyScope (Cohen et al., 1993) following De Houwer's (2003) specifications. Participants responded with a button box. For some, the right-hand button was used to indicate an African American name and the left-hand button was used to indicate a Caucasian name (buttons were labeled accordingly). For the remainder, instructions and labels were reversed. For all participants, the green-colored right-hand button was used to indicate a green word, and the blue-colored left-hand button was used to indicate a blue word. Participants performed the EAST in three blocks. The first consisted of 20 name classifications (Black names: *Damon, Darius, Isaiah, Jamal, Leon, Leroy, Marcus, Marquis, Terrence, Tyrone*; Caucasian names: *Andrew, Brandon, Brian, Chad, Jason, Kyle, Matthew, Peter, Scott, Timothy*). The second block consisted of 20 color classifications. Eight words related to danger or violence (*attack, criminal, danger, hate, threat,*

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violence, war, weapon) were presented along with 12 filler items, some positive in valence, some negative (e.g., *flower, rainbow, sunshine, cockroach, disaster, filth*). The third block of 100 trials intermingled the two tasks. The first 20 trials served as practice, during which participants could adjust to the dual-task requirements. The remaining 80 trials constituted the test block in which the 20 color words each appeared twice (once in blue, once in green), and each of the 20 names also appeared twice (always in white).

Procedure

Participants were greeted by a White female experimenter and assigned to cubicles. The experimenter described the study as an investigation of vigilance and told participants that after playing the videogame, they would perform a word-classification task. Participants played one of the three games followed by the EAST. Participants were then thanked and debriefed.

RESULTS AND DISCUSSION

We based our analysis of the EAST on De Houwer (2003). Latencies less than 300 milliseconds or greater than 3000 milliseconds were replaced with these minimum and maximum values, respectively. Latencies for correct responses were then log transformed. Based on trials involving danger-related words, we computed two averages: one for congruent responses (which used the Black-name button) and one for incongruent responses (which used the White-name button). We computed stereotype accessibility by subtracting the congruent average ($M = 615.69$ milliseconds) from the incongruent average ($M = 624.38$ milliseconds).

The goal of this study was to examine variation in stereotype accessibility as a function of the covariation manipulation. As predicted, analysis revealed a linear effect of Condition, $F(1, 72) = 4.62$, $p < .035$, such that stereotype accessibility was greater in the SC condition than in the SI condition (see Figure 4). The test of the residual (quadratic) term was non-significant, $F(1, 72) = .00$, $p < .96$. As predicted, covariation that reinforced stereotypes evoked stronger, more pronounced associations between Blacks and danger in the EAST. Indeed, participants in the SC condition showed significant stereotype activation, responding more quickly to danger words when using the Black-name button than the White-name button, $t(25) = 2.22$, $p < .036$. By contrast, participants in the SI condition showed a non-significant tendency to respond more quickly to danger words when using the White button rather than the Black button, $t(23) = -.97$, $p < .34$. Between the two experimental conditions, participants in the control condition showed a non-significant pattern of anti-Black stereotyping, $t(24) = .35$, $p < .73$. We suspect that the relatively weak simple effects in the control condition stem from the subtlety of the EAST, which relies on Stroop-like effects to induce interference (as compared to the IAT's explicit categorizations). However, our primary hypothesis involved the capacity of Covariation to moderate this interference pattern—a prediction that found clear support in these data.

We conducted additional analyses on the filler words from the EAST. One might argue that the preponderance of armed Blacks and unarmed Whites in the SC (compared to the SI) condition fostered negative evaluations of Blacks. If so, the effects observed in Studies 2 and 3 may stem from implicit *prejudice* rather than danger-specific stereotyping, *per se*. To assess prejudice, a measure of evaluation (similar to the measure of stereotyping) was derived from the positively and negatively valenced words in the EAST. This index reflects the degree to which participants classified positive words more quickly using the White (rather than the Black) button, but classified negative words (excluding the danger

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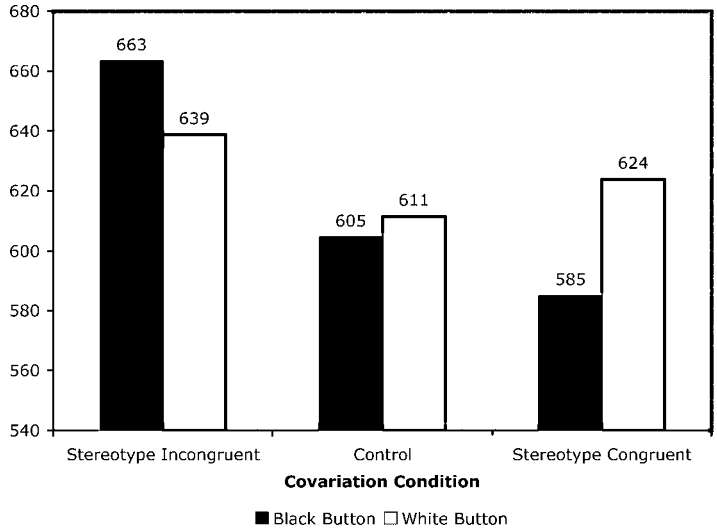

Figure 4. Facilitation of responses to danger words by Black versus White button in EAST as a function of Covariation Condition, Study 3

words) more quickly using the Black (rather than the White) button (i.e., the interaction of valence and race, $F(1, 72) = .23$, $p < .63$). Covariation did not affect this measure of prejudice (linear: $F(1, 72) = 1.85$, $p < .18$; residual: $F(1, 72) = .49$, $p < .49$), arguing against a prejudice-based account for these results. In essence, these data offer some evidence of a dissociation, such that covariation of the targets is not activating negative evaluations of Blacks in general—instead it uniquely affects the accessibility of the danger component of the Black stereotype.[7]

GENERAL DISCUSSION

By exposing participants to stereotypic and counterstereotypic information, we sought to test the implications of a theoretical model, which suggests that race-based associations between Blacks and danger promote bias in the decision to shoot. Moreover, we made use of manipulations with real-world analogs: news stories pairing Blacks (vs. Whites) with violent crimes, and simulated environments in which Blacks (vs. Whites) were disproportionately likely to be hostile. In Study 1, participants read newspaper articles about Black or White criminals. As predicted, reading about Black criminals dramatically increased the participants' tendency to make a stereotypic pattern of errors (shooting unarmed Blacks, failing to shoot armed Whites). That is, when information reinforced (rather than undermined) the stereotypic link between Blacks and danger, bias in shoot/don't-shoot errors increased. In Study 2, we manipulated the covariation between race and weapons in the videogame, varying the number of Blacks and Whites who were holding guns versus non-gun objects. Similar to Study 1, participants exposed to a stereotype-congruent pattern of covariation (in which Blacks were associated with weapons) showed greater bias than those exposed to a stereotype-incongruent pattern. This difference emerged even though participants were assessed on a simulation in which Target Race

[7]As in Round 1 of Study 2, there was a weak linear effect of Covariation on bias in the shoot/don't-shoot task, $F(1, 72) = 2.43$, $p = .12$, and no residual, $F(1, 72) = .08$, $p = .78$.

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and Object Type were unrelated. Finally, Study 3 examined a possible mechanism through which these effects might be produced and showed that stereotypic-congruent (vs. incongruent) covariation increased the association between Blacks and danger. Thus, exposure to stereotypic information temporarily affected stereotype accessibility (Study 3) and increased the magnitude of bias (Studies 1 and 2), supporting the prediction that stereotypes promote bias in the decision to shoot.

Arguably, we have focused on undesirable effects of stereotyping by attempting to link variability in danger-based associations with racial bias in the decision to shoot. However, these data can also be seen in a more positive light. They offer some evidence that counterstereotypic information can reduce (Study 2) or even eliminate (Study 1) racial bias, at least on a temporary basis. At the same time, it is noteworthy that, over and above the manipulations in these studies, we observed a clear predisposition to shoot Black targets more readily than Whites. Study 2's control condition demonstrated significant anti-Black bias, and even the counterstereotypic conditions in Studies 1 and 2 in which Whites were associated with guns showed no tendency toward an anti-*White* bias. The persistence of this bias suggests that transitory exposure to counterstereotypic information (including our manipulations) does not necessarily overwhelm the accumulated store of stereotypic beliefs and knowledge (i.e., more chronic associations) that may typically drive bias in the decision to shoot. Given the pervasive association between Blacks and violence in American culture (Devine & Elliot, 1995; Gerbner, Gross, Morgan, & Signorielli, 1986), such a persistent bias may not be surprising, but it is nonetheless both striking and disconcerting.

Our hypothesis suggests that participants in the shoot/don't-shoot task perform two parallel sets of processing operations. As they attempt to identify and react appropriately to the object in the target's hand (a task-relevant process), they quickly and inadvertently process information about his race (a task-irrelevant process) (Ito & Urland, 2003). To the extent that a racial category is strongly associated with danger, this irrelevant information may bias the ultimate response. Stereotypes that stem from a race-danger association may therefore drive bias in the decision to shoot. The current research tests this hypothesis by experimentally manipulating exposure to stereotypic information. Our findings are consistent with past work, which has examined some aspects of stereotyping and bias using correlational data. Individual differences in (a) awareness of cultural stereotypes and (b) brain activity differentiating White and Black targets have been shown to covary with bias (Correll et al., 2002, 2006). And work testing the boundary conditions of training effects shows that bias does not diminish when Black targets are disproportionately likely to be armed (Plant et al., 2005). But, critically, previous work has not experimentally manipulated stereotype-relevant information. Such manipulations are necessary if we are to make causal inferences. By demonstrating the impact of these manipulations, both on bias and on stereotype accessibility, the current research provides the first evidence from an experimental paradigm that stereotypes drive bias in the decision to shoot.

Situated at the intersection of sociocultural phenomena (i.e., racial stereotypes, officer-involved shootings) and basic cognitive processes (i.e., the use of stored associations in resolving ambiguous situations), research on the decision to shoot represents an opportunity for the scientific exploration of an important real-world phenomenon. This work may help social scientists identify conditions in which bias is likely to be problematic and, ultimately, ameliorate the undesirable effects of racial stereotyping.

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