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Category Salience and Racial Bias in Weapon Identification: A Diffusion Modeling Approach

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Stereotypes linking Black Americans with guns can have life-altering outcomes, making it important to identify factors that shape such weapon identification biases and how they do so. We report 6 experiments that provide a mechanistic account of how category salience affects weapon identification bias elicited by male faces varying in race (Black, White) and age (men, boys). Behavioral analyses of error rates and response latencies revealed that, when race was salient, faces of Black versus White males (regardless of age) facilitated the classification of objects as guns versus tools. When a category other than race was salient, racial bias in behavior was reduced, though not eliminated. In Experiments 1–4, racial bias was weaker when participants attended to a social category besides race (i.e., age). In Experiments 5 and 6, racial bias was weaker when participants attended to an applicable, yet nonsubstantive category (i.e., the color of a dot on the face). Across experiments, process analyses using diffusion models revealed that, when race was salient, seeing Black versus White male faces led to an initial bias to favor the "gun" response. When a category besides race (i.e., age, dot color) was salient, racial bias in the relative start point was reduced, though not eliminated. These results suggest that the magnitude of racial bias in weapon identification may differ depending on what social category is salient. The collective findings also highlight the utility of diffusion modeling for elucidating how category salience shapes processes underlying racial biases in behavior.

Keywords: diffusion decision model, intergroup bias, social categorization, stereotyping, weapon identification task

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Black Americans are stereotyped as hostile, aggressive, and prone to violence (Devine, 1989). These associations can alter the fundamental underpinnings of social cognition—from early aspects of attention and memory to downstream judgments and behavior (see Kawakami, Amodio, & Hugenberg, 2017, for a review). Faces of Black people, for example, garner visual attention (Trawalter, Todd, Baird, & Richeson, 2008) in the same way that threat-eliciting entities (e.g., snakes) often do (Lipp & Derakshan, 2005). Black men are more likely than White men to be misremembered and misidentified as angry and aggressive (Duncan, 1976; Hugenberg & Bodenhausen, 2003). Conversely, racially ambiguous people are more likely to be categorized as Black than as White when expressing hostility (Hugenberg & Bodenhausen, 2004). Of particular relevance for the current work is

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evidence that innocuous objects (e.g., tools, toys) are more likely to be mistaken as guns—a weapon identification bias—in the presence of Black versus White people (e.g., Amodio et al., 2004; Payne, 2001, 2005; Todd, Thiem, & Neel, 2016).

Such racial biases are not always uniformly distributed across group members; rather, people with different combinations of identities are often treated in qualitatively different ways (Kang & Bodenhausen, 2015). Age is one identity dimension that, when the focus of attention, may shape the magnitude of racial bias. Young children, for example, are viewed as innocent and typically elicit benevolence (McDougall, 1908), suggesting that youth may temper some of the biases commonly evoked by Black adults. Accumulating research paints a decidedly different picture (e.g., Goff, Jackson, Di Leone, Culotta, & DiTomasso, 2014; Perszyk, Lei, Bodenhausen, Richeson, & Waxman, 2019; Rattan, Levine, Dweck, & Eberhardt, 2012). In one study (Todd, Thiem, et al., 2016), White students completed a weapon identification task (WIT; Payne, 2001) in which they classified objects as guns or tools after viewing faces of ~25-year-old Black and White men and ~5-year-old Black and White boys. Tools were mistaken for guns more often after Black versus White face primes, the typical weapon identification bias effect (Payne, 2001). Importantly, the racial bias evoked by Black versus White boys mirrored that evoked by Black versus White men (see also Thiem, Neel, Simpson, & Todd, 2019; Todd, Simpson, Thiem, & Neel, 2016).

One explanation for why youth failed to reduce racial bias is because race "won" the competition among the concurrently activated social categories (e.g., race, age, gender; Freeman & Ambady, 2011). Insofar as merely thinking about weapons is sufficient to direct attention to faces of Black versus White people (e.g., Eberhardt, Goff, Purdie, & Davies, 2004), decision-making contexts that entail classifying objects as guns versus innocuous objects may increase the extent to which race, relative to other social categories, is the focus of attention. If so, contexts that more explicitly direct attention to age or some other applicable category besides race might alter the weapon identification biases commonly evoked by Black versus White men and boys.

Here, we examine whether and how category salience shapes weapon identification bias elicited by male faces varying in race (Black vs. White) and age (adult vs. child). We report six experiments that address several questions: First, are racial biases evoked by Black versus White males weaker when attending to a social category besides race (i.e., age)? Second, are racial biases weaker when attending to a nonsubstantive category (i.e., the color of a dot on the face)? Finally, what cognitive processes underlie category salience effects on weapon identification bias? We answer these questions using a cognitive modeling approach that illuminates how race biases decision-making and how category salience shapes the expression of these racial biases.

Category Salience and Racial Bias

Race is among the first identity dimensions people process when encountering others (Ito & Urland, 2003); however, categorization by race—and the concomitant activation of racial stereotypes—is not inevitable (Kurzban, Tooby, & Cosmides, 2001). All people belong to multiple social categories, and racial bias may be weaker as the salience of identity dimensions other than race increases. We use the term *salience* to refer to features of stimuli that "draw, grab, or hold attention relative to alternative features" (Higgins, 1996, p. 135). Accordingly, factors that direct attention more toward a target category (e.g., race) relative to other applicable categories (e.g., age) should increase *category salience* of the target category. In one study of category salience effects on racial bias (Macrae, Bodenhausen, & Milne, 1995), participants watched a video depicting an Asian woman either eating a bowl of noodles, making race salient, or applying makeup, making gender salient. Afterward, they completed a lexical-decision task as a measure of stereotype activation. Activation of racial stereotypes was weaker when gender was salient than when race was salient.

Similarly, Jones and Fazio (2010) had participants complete a WIT with younger and older Black and White men as face primes. During the task, some participants kept track of how many Black men and White men they saw, making race salient; other participants kept track of how many younger men and older men they saw, making age salient. Misidentification of tools as guns occurred more often after Black versus White face primes of both ages; however, this pattern of bias was only evident when race was salient. When age was salient, racial bias was negligible (see Gawronski, Cunningham, LeBel, & Deutsch, 2010; Mitchell, Nosek, & Banaji, 2003, for similar findings), suggesting that weapon identification bias can be weakened, and potentially eliminated, when attending to social categories besides race.

Other work suggests that racial bias may also be weaker, though not eliminated, when attending to nonsubstantive categories. Ito and Tomelleri (2017) had participants complete a variant of the WIT that entailed classifying entities as guns or insects following facial images of Black and White men (see Judd, Blair, & Chapleau, 2004). Some of the facial images had a dot superimposed on them; others did not. After each trial, participants indicated either the race of the face prime, making race salient, or whether a dot was present on the face, making a nonsubstantive category (i.e., dot presence) salient. The usual pattern of weapon identification bias (i.e., stronger associations linking Black vs. White men with guns) was evident when race was salient; however, this bias was substantially weaker when attending to the dot.

A common explanation for these and related findings (e.g., Macrae, Bodenhausen, Milne, Thorn, & Castelli, 1997; Quadflieg et al., 2011; Wheeler & Fiske, 2005) is that focusing on the dot decreases semantic processing of the face primes as people, reducing activation of racial stereotypes when encountering group members. Because the dot appeared equally often on the faces of Black men and White men, however, dot presence may have served as a novel, cross-cutting category that applied equally to both racial groups (Deschamps & Doise, 1978; Klauer, Hölzenbein, Calanchini, & Sherman, 2014). According to this alternative, cross-cutting category account, focusing on the dot should weaken the racial categorization—stereotype activation link only when it provides information about an identity dimension that unites members from different racial groups (see also Kurzban et al., 2001). The semantic processing account, by contrast, predicts that focusing on the dot should weaken the racial categorization—stereotype activation link even when it is perfectly confounded with race and thus communicates no additional identity information.

The findings reviewed here suggest that racial biases toward Black versus White men may be weaker when attending to an applicable social category besides race (e.g., age) or to a nonsubstantive category (e.g., dot presence) than when attending to race.

This prior work leaves several questions unanswered, however: First, is racial bias toward young Black versus White *boys* also weaker when attending to a social category besides race? Second, is racial bias weaker when attending to a nonsubstantive category that is perfectly confounded with race, thus precluding reliance on a cross-cutting categorical cue? In addressing these questions, we aimed to move beyond the question of *whether* category salience alters weapon identification decisions by testing a mechanistic account of *how* category salience shapes the process(es) underlying these decisions. To do so, we modeled decisions and decision times using the diffusion decision model.

Modeling Processes Underlying Weapon Identification Bias

The diffusion decision model (DDM; Ratcliff, 1978; Ratcliff, Smith, Brown, & McKoon, 2016) is a sequential sampling model used to explain the process(es) underlying behavior in two-choice decision tasks like the WIT by simultaneously modeling both decisions and decision speed. Specifically, the DDM decomposes decisions into four components: relative start point (β), threshold separation (α), drift rate (δ), and nondecision time (τ). See Table 1 for parameter descriptions and Figure 1 for an illustration of the diffusion decision process.

According to the model, people make decisions by accumulating evidence supporting one option or the other until reaching a set threshold (α), at which point they render a decision. In the WIT, participants see a face prime before each target object appears. This prime can shift participants' relative start point (β) to initially favor choosing gun or tool. The evidence accumulation process starts when the target object appears. Participants then repeatedly sample the image for evidence about the object's identity until they hit the "gun" or the "tool" threshold. The average strength of the evidence accumulated is reflected by the drift rate (δ), with more positive or more negative values indicating stronger evidence extracted in support of the gun decision or the tool decision, respectively.

Why use the DDM to investigate processes underlying weapon identification? Although prior work has used cognitive modeling (e.g., process dissociation; Jacoby, 1991) to understand these decisions (e.g., Amodio et al., 2004; Payne, 2001, 2005; Todd, Thiem, et al., 2016), process dissociation and other multinomial approaches (e.g., Conrey, Sherman, Gawronski, Hugenberg, & Groom, 2005) only consider decisions (i.e., error rates). These

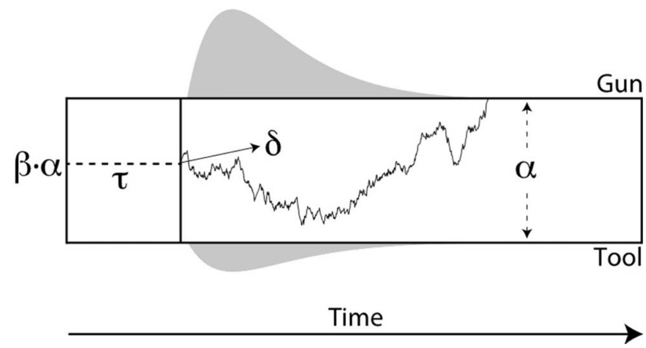

Figure 1. An illustration of the diffusion decision process. People start with a bias to choose gun or tool, as indicated by the relative start point, β. They then accumulate information (as illustrated by the jagged line) in favor of one of the options, with average strength δ. The distance between thresholds, α, indicates the amount of information needed to make a decision. Finally, the length of nondecision processes is indicated by τ. The hypothetical distributions (in gray) above and below the decision space indicate that the model predicts response time distributions for each option.

techniques overlook the precise way in which a factor like race affects decisions because they do not account for the speed of those decisions (e.g., Pleskac, Cesario, & Johnson, 2018). The DDM, by contrast, acknowledges that decision-making unfolds over time by modeling both the decision and decision speed. Thus, DDM analyses can disentangle initial biases to favor a particular response before the target object even appears from biases that emerge while accumulating visual evidence and making a final decision, providing insight into *how* racial bias emerges.

How might the prime images affect the weapon identification process as reflected in the DDM parameters? Behavioral data indicating that guns (tools) are identified more quickly and accurately after seeing faces of Black (White) men and boys are consistent with two possible explanations. One possibility is that stereotypic associations between Black males and guns produce an initial bias to favor the "gun" response, as indicated by the relative start point (β). When targets are categorized by race, these associations become active and shift the starting point of the decision process to favor the stereotype-consistent response.

Another possibility is that race is accumulated as evidence for the "gun" response, as indicated by the drift rate (δ). On this explanation, a target's race does not create an initial bias to choose

Table 1
Parameters of the Diffusion Decision Model in the Weapon Identification Task

Parameter	Interpretation
Relative start point (β)	Initial bias to identify the object as a *gun* or a *tool* at the start of the evidence accumulation process, with $0 < \beta < 1$. Values above .50 indicate a bias to identify the object as a *gun*; values below .50 indicate a bias to identify the object as a *tool*.
Threshold separation (α)	Amount of evidence required to make a decision, with $0 < \alpha$. Hitting a threshold triggers a decision to choose *gun* or *tool*.
Drift rate (δ)	Average quality of information extracted from a stimulus at each unit of time, with $-\infty < \delta < \infty$. Higher absolute values indicate stronger evidence. Positive values indicate evidence to choose *gun*; negative values indicate evidence to choose *tool*.
Nondecision time (τ)	Length of all response components (encoding time, motor response time, and other unknown contaminants) unrelated to decision-making, with $0 < \tau$. Measured in milliseconds.

"gun;" rather, race is integrated with the object to alter the stream of information that is gathered. That is, race information may change how the object is interpreted. DDM analyses of similar tasks testing the role of race in shooting decisions (e.g., first-person shooter task [FPST]; Correll, Park, Judd, & Wittenbrink, 2002) support the latter hypothesis: Race information is accumulated as evidence for the "shoot" response (Correll, Wittenbrink, Crawford, & Sadler, 2015; Johnson, Cesario, & Pleskac, 2018; Pleskac et al., 2018).

Although the FPST and the WIT are similar in many ways, a key difference lies in their presentation of race and target object information. In the FPST, participants view a background scene (e.g., a neighborhood) in which people of different races (e.g., Black, White) suddenly appear holding different objects (e.g., guns, cellphones). Participants' goal is to "shoot" armed targets and to "not shoot" unarmed targets. Thus, race information appears *simultaneously* with the target object in this task. The WIT, by contrast, is a sequential priming task in which face primes of different races (e.g., Black, White) and target objects (e.g., guns, tools) appear in quick succession. Participants' goal is to identify the objects as "guns" or "tools." Thus, in the WIT, race information appears and disappears *before* the target object appears. Because the relative start point captures bias in the evidence accumulation process before any information about the target object is available, we predicted that seeing images of Black versus White men and boys would create an initial bias to favor the "gun" over the "tool" response rather than alter evidence accumulation. We reasoned that the disappearance of the race prime before the target object appears should limit whether race can be used as evidence.

More relevant to our central question, however, is whether these initial biases due to race primes are only evident under certain conditions of category salience. Given prior findings that racial bias in weapon identification is weaker when age or a nonsubstantive category is salient (Ito & Tomelleri, 2017; Jones & Fazio, 2010), we expect that making categories besides race salient will alter the effect of race primes on the relative start point. We reasoned that the activation of another social category such as age should dampen the activation of race as a relevant category, and thus correlates of race (including the association between Black males and guns) should be dampened as well. Accordingly, when an applicable category besides race is salient, the effect of race primes on these initial biases should decrease.

Finally, race primes and category salience may determine how much evidence is gathered before making a decision, as indexed by the threshold separation (α). Although we did not make predictions about this parameter, we explore this possibility in each experiment and in a *Combined Process Analysis* of data from all experiments. By examining which parameters respond to category salience, race primes, and age primes, the current work provides insight into *how* these factors shape weapon identification decisions.

Overview of Experiments

We report six experiments that investigate whether and how increasing the salience of an applicable target category besides race affects racial biases in the weapon identification task (WIT; Payne, 2001). Our first two experiments used two different manipulations of category salience—an initial face categorization task (Experiment 1) and grouping face stimuli in the WIT by social category (Experiment 2)—to direct attention to either the race or the age of facial images that served as primes in the WIT.

Our next two experiments addressed alternative explanations for the effects observed in the first two experiments. Experiment 3 was identical to Experiment 1, except it included an additional control condition in which participants were exposed to the faces of Black and White men and boys in a way that neither race nor age was made salient prior to the WIT. Inclusion of this condition, in which participants classified the faces based on which side of the screen they appeared, afforded a test of whether race salience increases racial bias, age salience decreases racial bias, or both. Experiment 4 was similar to Experiment 3 in that it also included an additional control condition in which neither race nor age was made salient. In this condition, participants completed the WIT without completing another task beforehand. Another important element of Experiment 4 entailed using different sets of faces in the face categorization task and in the WIT, which addressed an alternative explanation of the findings based on the theory of event coding (Hommel, Müsseler, Aschersleben, & Prinz, 2001).

Our final two experiments examined whether racial bias is also weaker when attending to a nonsubstantive category. We created a nonsubstantive category by placing one of two different colored dots (green or orange) on the facial images (Quadflieg et al., 2011). Participants in both experiments classified faces of Black and White men and boys either by race, as before, or by dot color, after which they completed the WIT. In Experiment 5, race and dot color were orthogonal, and thus dot color served as a cross-cutting category (Deschamps & Doise, 1978; Klauer et al., 2014) that was equally applicable to members of both racial groups. In Experiment 6, race and dot color were perfectly confounded; that is, all faces of one race bore one color dot (e.g., green), and all faces of the other race bore the other color dot (e.g., orange).

Although our primary focus was on the decision process reflected by the DDM parameters, we also report behavioral analyses on decisions (i.e., error rates) and response times for correct decisions to facilitate comparison with prior work. For each experiment, we first report analyses assessing behavioral biases in weapon identification based on race primes, age primes, and category salience. We then report DDM analyses examining how these factors affect weapon identification. Finally, we report a *Combined Process Analysis* with data from all six experiments to determine the impact of these factors on all DDM parameters.

A meta-analysis of published WIT experiments estimated a large average effect size for the Race Prime × Target Object interaction indicative of racial bias ($\eta_p^2 = .20$), with no evidence of publication bias (Rivers, 2017). Because our experiments included between-subjects manipulations of category salience, and because higher-order interactions are typically smaller than lower-order interactions, we aimed to collect enough data to ensure 80% power to detect a medium-sized effect ($\eta_p^2 = .06$) in each experiment. Based on an a priori power analysis (Faul, Erdfelder, Lang, & Buchner, 2007), we selected target sample sizes of at least 128 participants in Experiments 1, 2, 5, and 6 (two between-subjects conditions), and at least 159 participants in Experiments 3 and 4 (three between-subjects conditions). A sensitivity analysis (Faul et al., 2007) indicated that these sample sizes afforded >95% power to detect the three-way interaction ($\eta_p^2 = .12$) reported in Jones and Fazio (2010, Experiment 1), which was conceptually similar to the

Category Salience × Race Prime × Target Object interactions in the behavioral analyses reported below. Data were collected until these target samples were reached or, in cases of participant overscheduling, surpassed. For each experiment, we report all data exclusions,[1] manipulations, and measures.

Experiment 1

Experiment 1 was our initial investigation of whether and how category salience shapes weapon identification bias. Participants first completed a face categorization task that directed their attention either to the race or to the age of facial images of Black and White men and boys. Afterward, they completed a WIT in which they classified objects as guns or tools following brief presentations of the same facial images from the face categorization task. This experiment had three aims: First, we tested whether racial bias in weapon identification generalizes across target age in behavioral analyses of error rates and correct response times, as has been observed elsewhere (e.g., Todd, Thiem, et al., 2016). Second, we conducted DDM analyses to determine whether any observed racial bias was driven by an initial bias to favor the "gun" decision, a difference in the rate of evidence accumulation, or a difference in the decision threshold, when primed with Black versus White male faces. Third, we explored whether these patterns of racial bias in the behavioral and process analyses differed based on whether race or age was more salient.

Method

Participants. Undergraduates ($N = 147$), none of whom identified as Black, participated for course credit. We decided a priori to exclude data from participants who performed at or below chance on the WIT (errors on ≥50% of trials), which indicates inattention or confusion about instructions. Data were excluded from one participant with below-chance performance. We also excluded data from three participants who experienced a computer error that caused the WIT to abort early. The final sample comprised 143 participants (95 women, 46 men, two unreported; 129 White, eight Asian, four Latinx, one reporting two or more [non-Black] races/ethnicities, one unreported). A sensitivity analysis (Faul et al., 2007) indicated that this sample size afforded 80% power to detect a medium-sized effect ($\eta_p^2 = .054$) for the predicted Category Salience × Race Prime × Target Object interaction on the error rates and correct response times.

Procedure. In this and all subsequent experiments, participants arrived at the lab in groups of up to six. They were greeted by an experimenter and led to an individual computer workstation where they completed all experimental tasks.

Participants first completed a face categorization task in which they viewed photos of 12 (~25-year-old) men (six White, six Black) taken from the Chicago Face Database (Ma, Correll, & Wittenbrink, 2015) and 12 (~5-year-old) boys (six White, six Black) taken from the Child Affective Facial Expression set (LoBue & Thrasher, 2015). These photos have been used in prior research (Todd, Simpson, et al., 2016; Todd, Thiem, et al., 2016) and were selected based on the following criteria: The faces had to be unambiguous with respect to membership in the race and age categories[2] under investigation, have a neutral expression, and have no idiosyncrasies (e.g., scars). Participants were randomly assigned to one of two category salience conditions: In the *race-salient* condition, participants classified the photos by race (Black vs. White) by pressing one of two response keys. In the *age-salient* condition, participants classified the photos by age (adult vs. child). Each photo appeared individually in the middle of the screen and remained on screen until participants responded.

Next, participants completed a WIT (Payne, 2001) in which two images appeared in quick succession. Participants were instructed to ignore the first image (the face prime) and to classify the second image (the target object) as quickly and accurately as possible by pressing one of two response keys. Face primes were the same 24 facial images used in the face categorization task. Target objects were six gun images and six tool images taken from Payne (2001). Each trial began with a fixation cross (500 ms), followed by a face prime (200 ms), a target object (200 ms), and a pattern mask (on screen until participants responded). If participants did not respond within 500 ms, a message ("Please respond faster!") appeared for 1 s. Each of the 24 face primes was paired once with each of the 12 target objects, resulting in 288 randomly ordered experimental trials. Eight practice trials preceded the experimental trials.

Results

Analysis plan. Prior to all analyses here and in the subsequent experiments, we excluded trials with latencies <100 ms and >1500 ms.[3] Trials with errors were also excluded prior to response time analyses. In the main text, we report the results most pertinent to hypotheses involving category salience and racial bias. In the online supplemental materials, we report analyses of age bias, preliminary analyses involving participant gender, full ANOVA tables (Tables S1–S6 in the online supplemental materials), and descriptive statistics for all experimental conditions (Tables S7–S9 in the online supplemental materials).

Behavioral analyses.

Error rates. A 2 (Category Salience) × 2 (Age Prime) × 2 (Race Prime) × 2 (Target Object) mixed analysis of variance (ANOVA) on the error rates yielded the predicted Category Salience × Race Prime × Target Object interaction, $F(1, 141) = 25.21$, $p < .001$, $\eta_p^2 = .152$, 90% CI [.071, .241]. The four-way interaction was not significant, $F(1, 141) < 0.01$, $p = .967$, $\eta_p^2 < .001$, indicating that the effect of category salience on racial bias did not vary across age prime. To better understand the three-way interaction, we conducted separate 2 (Race Prime) × 2 (Target Object) ANOVAs in each category salience condition (see Figure 2).

The Race Prime × Target Object interaction indicative of racial bias was significant when race was salient, $F(1, 73) = 57.84$, $p <$

[1] Across experiments, retaining the excluded data produced nearly identical results. In no case did a previously significant effect involving racial bias become nonsignificant (or vice versa).

[2] Pilot testing by Todd, Thiem, et al. (2016, online supplemental materials) indicated that the Black men and Black boys were identified as "Black" and that the White men and White boys were identified as "White" in 98% of cases. Additionally, ratings of perceived age indicated that the young boys ($M_{\text{Black boys}} = 5.28$ years; $M_{\text{White boys}} = 5.24$ years) were viewed as considerably younger than the men ($M_{\text{Black men}} = 23.67$ years; $M_{\text{White men}} = 27.29$ years).

[3] This trimming procedure resulted in the exclusion of no more than 8% of trials in any experiment (Experiment 1: 4.5%, Experiment 2: 5.7%, Experiment 3: 5.3%, Experiment 4: 5.3%, Experiment 5: 8.0%, Experiment 6: 7.7%).

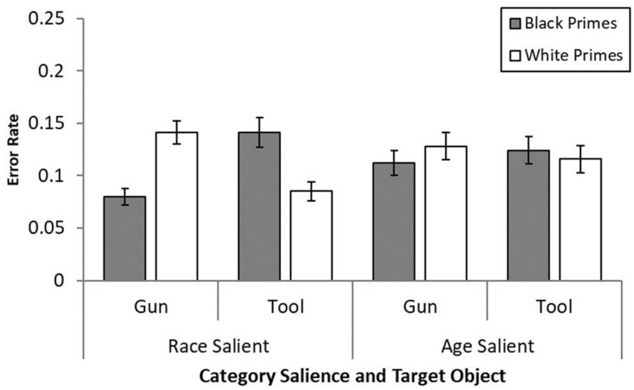

Figure 2. Error rates by race prime, target object, and category salience; error bars are standard errors (Experiment 1).

.001, $\eta_p^2 = .442$, 90% CI [.298, .548]. Guns were misidentified as tools less often after Black primes ($M = 8.0\%$, $SD = 7.0$) versus White primes ($M = 14.1\%$, $SD = 9.2$), $F(1, 73) = 41.17$, $p < .001$, $\eta_p^2 = .361$, 90% CI [.216, .476], whereas tools were misidentified as guns more often after Black primes ($M = 14.1\%$, $SD = 12.2$) versus White primes ($M = 8.5\%$, $SD = 7.4$), $F(1, 73) = 46.89$, $p < .001$, $\eta_p^2 = .391$, 90% CI [.245, .503]. The Race Prime × Target Object interaction was also significant when age was salient, but it was considerably smaller, $F(1, 68) = 6.09$, $p = .016$, $\eta_p^2 = .082$, 90% CI [.008, .197]. Guns were misidentified as tools less often after Black primes ($M = 11.2\%$, $SD = 9.7$) versus White primes ($M = 12.8\%$, $SD = 10.5$), $F(1, 68) = 6.11$, $p = .016$, $\eta_p^2 = .082$, 90% CI [.009, .197], whereas the misidentification of tools as guns after Black primes ($M = 12.4\%$, $SD = 10.7$) and White primes ($M = 11.6\%$, $SD = 10.9$) did not significantly differ, $F(1, 68) = 1.27$, $p = .263$, $\eta_p^2 = .018$.

Approaching the three-way interaction differently, we examined the effect of category salience on racial bias separately on gun trials and tool trials. To do so, we created an index of racial bias for each object as follows: guns (White prime trials minus Black prime trials) and tools (Black prime trials minus White prime trials). Higher scores on these indices indicate that guns were misidentified as tools less often, whereas tools were misidentified as guns more often, after Black primes versus White primes. These analyses indicated that racial bias was weaker on both gun trials, $F(1, 141) = 15.17$, $p < .001$, $\eta^2 = .097$, 90% CI [.033, .179], and tool trials, $F(1, 141) = 19.54$, $p < .001$, $\eta^2 = .122$, 90% CI [.049, .207], when age was salient than when race was salient.

Correct response times. An identical 2 (Category Salience) × 2 (Age Prime) × 2 (Race Prime) × 2 (Target Object) ANOVA on the correct response times yielded the predicted Category Salience × Race Prime × Target Object interaction, $F(1, 141) = 22.80$, $p < .001$, $\eta_p^2 = .139$, 90% CI [.061, .227], which did not vary by Age Prime, $F(1, 141) = 0.33$, $p = .566$, $\eta_p^2 = .002$. We decomposed the three-way interaction by conducting separate 2 (Race Prime) × 2 (Target Object) ANOVAs in each category salience condition (see Figure 3).

Racial bias emerged when race was salient—Race Prime × Target Object interaction, $F(1, 73) = 55.34$, $p < .001$, $\eta_p^2 = .431$, 90% CI [.286, .538]. Guns were identified more quickly after Black primes ($M = 258$ ms, $SD = 49$) versus White primes ($M = 279$ ms, $SD = 47$), $F(1, 73) = 31.05$, $p < .001$, $\eta_p^2 = .298$, 90% CI [.158, .420], whereas tools were identified more slowly after Black primes ($M = 307$ ms, $SD = 50$) versus White primes ($M = 293$ ms, $SD = 47$), $F(1, 73) = 31.98$, $p < .001$, $\eta_p^2 = .305$, 90% CI [.163, .426]. When age was salient, in contrast, the Race Prime × Target Object interaction was not significant, $F(1, 68) = 0.51$, $p = .478$, $\eta_p^2 = .007$.

Approaching the three-way interaction differently, we again examined the effect of category salience on racial bias separately on gun trials and tool trials by creating an index of racial bias for each object: guns (White prime trials minus Black prime trials) and tools (Black prime trials minus White prime trials). Higher scores on these indices indicate that guns were identified more quickly, whereas tools were identified more slowly, after Black primes versus White primes. These analyses indicated that racial bias was weaker on both gun trials, $F(1, 141) = 18.37$, $p < .001$, $\eta^2 = .115$, 90% CI [.045, .200], and tool trials, $F(1, 141) = 9.38$, $p = .003$, $\eta^2 = .062$, 90% CI [.013, .135], when age was salient than when race was salient.

Process analyses. We next conducted DDM analyses to understand how the various manipulations shaped the decision process and led to the observed behavioral biases. For all DDM analyses, we report the most credible value and the 95% highest density interval (95% HDI) to describe the posterior distribution of the parameters (see the online supplemental materials for more details). To test for differences across conditions, we computed the difference between conditions and examined whether the 95% HDI contained a null value of 0. If the 95% HDI did not include 0, we concluded that the difference is credible. When presenting differences between conditions, we report both the most credible estimate of the raw difference, the effect size of that difference transformed to Cohen's *d*, and the 95% HDI around Cohen's *d*. Effect sizes were calculated by standardizing the raw difference by the group-level parameter variability. For example, if the effect of interest is the difference between Black and White primes on a given group-level parameter, the standardized effect size is calculated as $d = (\mu_{Black} - \mu_{White})/\sqrt{(1/\tau)}$, where τ is the estimated group-level precision parameter (the inverse of the variance). Details on model specification, including model code, are in the online supplemental materials.

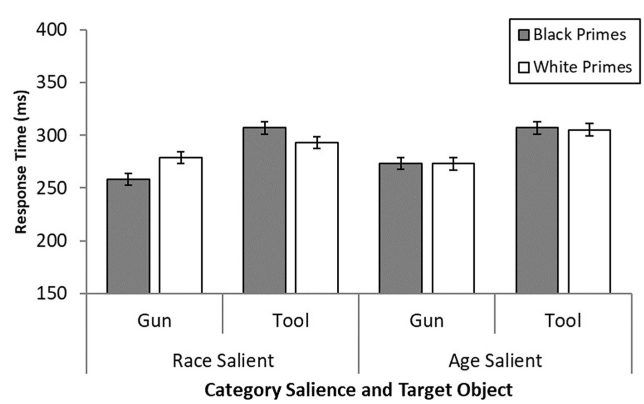

Figure 3. Correct response times by race prime, target object, and category salience; error bars are standard errors (Experiment 1).

We first tested whether participants displayed an initial bias to respond with "gun" or "tool" based on race prime, as reflected in the relative start point (β). There was a race prime main effect, μ_{diff} = −.06, d = −0.90, 95% HDI [−1.12, −0.60]: Across conditions, seeing Black versus White male faces shifted the start of the decision process closer to "gun" than to "tool." Moreover, this race effect differed across category salience conditions, μ_{diff} = −.04, d = −0.60, 95% HDI [−0.81, −0.38]. When race was salient, participants displayed a greater initial bias to choose "gun" over "tool" when primed with Black versus White male faces, μ_{diff} = −.10, d = −1.50, 95% HDI [−1.81, −1.19]. When age was salient, racial bias in the relative start point was not credible, μ_{diff} = −.02, d = −0.28, 95% HDI [−0.60, 0.04]. This difference in the relative start point explains why age salience reduced racial bias in behavior: When age was salient, participants' initial bias to choose "gun" or "tool" was no longer affected by the race prime.

We next examined the other decision parameters. A small but credible race prime main effect emerged on the drift rate (δ), μ_{diff} = −0.14, d = −0.14, 95% HDI [−0.28, −0.01]: Seeing Black versus White male faces resulted in slightly stronger drift rates. The race prime effect did not vary by object type, μ_{diff} = 0.07, d = 0.08, 95% HDI [−0.07, 0.21], or category salience, μ_{diff} = −0.08, d = −0.09, 95% HDI [−0.22, 0.05]. Participants were faster to accumulate evidence for both guns *and* tools when primed with Black versus White male faces, and this race difference did not vary based on whether race or age was salient.

Threshold separation (α) did not vary by race prime, μ_{diff} = −0.01, d = −0.07, 95% HDI [−0.25, 0.13], nor did category salience moderate this effect, μ_{diff} = 0.00, d = 0.01, 95% HDI [−0.16, 0.21]. Finally, nondecision time (τ) also did not vary by race prime, μ_{diff} = −3 ms, d = −0.09, 95% HDI [−0.22, 0.03], nor was this effect moderated by object type, μ_{diff} = −1 ms, d = −0.02, 95% HDI [−0.15, 0.09], or category salience, μ_{diff} = −2 ms, d = −0.05, 95% HDI [−0.18, 0.07].

Overall, the race of the primes affected whether the "gun" or "tool" response was initially favored, with participants setting their relative start point closer to "gun" when primed with Black versus White male faces. This racial bias in the relative start point was strong in the race-salient condition, but not in the age-salient condition, and occurred for both adult and child primes.

Discussion

The results of Experiment 1 indicate that racial biases more strongly linking Black versus White men with guns versus tools generalized to Black versus White boys, replicating prior work (e.g., Todd, Thiem et al., 2016). Furthermore, racial bias in behavior was weaker—and was eliminated on the error rate metric but not on the response time metric—when attending to age (see also Gawronski et al., 2010; Jones & Fazio, 2010). Finally, the racial biases in behavior (i.e., being faster and more likely to say "gun" after Black vs. White primes) were attributable to biases in cognitive processing that occurred prior to the object appearing. Participants displayed a starting point bias to choose "gun" after seeing Black male faces, and the reduction in racial bias that resulted from age salience was also due to its impact on the relative start point. Indeed, racial bias in the relative start point was eliminated when age was salient.

Experiment 2

Experiment 2 was a conceptual replication of Experiment 1 with a different category salience manipulation. Rather than classifying facial images by race or by age prior to the WIT, participants completed a WIT that was modified to make either race or age more salient (i.e., contextually distinctive; Taylor & Fiske, 1978). Specifically, we used a "blocked" design in which the WIT comprised two blocks of trials: In the race-salient condition, facial images of Black men and White men appeared together as primes in one trial block, and facial images of Black boys and White boys appeared together as primes in the other trial block. Varying race while holding age constant within each block ensured that race was more distinctive throughout the task. In the age-salient condition, facial images of Black men and Black boys appeared together as primes in one trial block, and facial images of White men and White boys appeared together as primes in the other trial block. Varying age while holding race constant within each block ensured that age was more distinctive throughout the task. Such "blocked" designs have been used in prior work to direct attention to specific identity dimensions (e.g., Jones & Fazio, 2010; Macrae & Cloutier, 2009; Mitchell et al., 2003; Rees, Ma, & Sherman, 2020).

We expected the same general pattern of results as in Experiment 1: Racial bias in behavior should be driven by an initial bias to choose the "gun" response over the "tool" response when primed with Black versus White men's and boys' faces. Furthermore, these racial biases in behavior and in the relative start point should be weaker when age versus race is salient.

Method

Participants. Undergraduates (N = 142; 76 women, 66 men; 131 White, seven Latinx, four Asian), none of whom identified as Black, participated for course credit. No participants' data were excluded in this experiment. A sensitivity analysis (Faul et al., 2007) indicated that this sample size afforded 80% power to detect a medium-sized effect (η_p^2 = .054) for the predicted Category Salience × Race Prime × Target Object interaction in the behavioral analyses of error rates and correct response times.

Procedure. Participants completed one of two variants of a WIT, each of which comprised two blocks of trials with the same face primes and target objects from Experiment 1. In the *race-salient* condition, primes were grouped by age, making race contextually distinctive: In one block, primes were Black men and White men; in the other block, primes were Black boys and White boys. In the *age-salient* condition, primes were grouped by race, making age distinctive: In one block, primes were Black men and Black boys; in the other block, primes were White men and White boys. Block order was counterbalanced across participants in both conditions. All other aspects of the tasks were identical to the WIT from Experiment 1.

Results

Behavioral analyses.

Error rates. A 2 (Category Salience) × 2 (Age Prime) × 2 (Race Prime) × 2 (Target Object) mixed ANOVA on the error rates yielded the predicted Category Salience × Race Prime × Target Object interaction, $F(1, 140)$ = 3.97, p = .048, η_p^2 = .028, 90% CI [.0001, .086], which did not vary by Age Prime, $F(1, 140) = 0.01$, $p = .916$, $\eta_p^2 < .001$. We decomposed the three-way interaction by conducting separate 2 (Race Prime) × 2 (Target Object) ANOVAs in each category salience condition (see Figure 4).

Racial bias emerged when race was salient—Race Prime × Target Object interaction, $F(1, 70) = 13.84$, $p < .001$, $\eta_p^2 = .165$, 90% CI [.052, .291]. Guns were misidentified as tools less often after Black primes ($M = 8.8\%$, $SD = 6.6$) versus White primes ($M = 12.4\%$, $SD = 8.7$), $F(1, 70) = 17.83$, $p < .001$, $\eta_p^2 = .203$, 90% CI [.078, .330], whereas misidentifications of tools as guns after Black primes ($M = 12.1\%$, $SD = 11.7$) and White primes ($M = 10.9\%$, $SD = 10.3$) did not significantly differ, $F(1, 70) = 3.53$, $p = .064$, $\eta_p^2 = .048$. When age was salient, the Race Prime × Target Object interaction was not significant, $F(1, 70) = 0.06$, $p = .804$, $\eta_p^2 = .001$.

Approaching the three-way interaction differently, we examined the effect of category salience on indices of racial bias on gun trials and tool trials. These analyses indicated that racial bias on gun trials was weaker when age versus race was salient, $F(1, 140) = 6.25$, $p = .014$, $\eta^2 = .043$, 90% CI [.005, .109], whereas racial bias on tool trials did not significantly differ across category salience conditions, $F(1, 141) = 0.01$, $p = .921$, $\eta^2 < .001$.

Correct response times. An identical ANOVA on the correct response times revealed the predicted Category Salience × Race Prime × Target Object interaction, $F(1, 140) = 5.81$, $p = .017$, $\eta_p^2 = .040$, 90% CI [.004, .104], which did not vary by Age Prime, $F(1, 140) = 0.02$, $p = .888$, $\eta_p^2 < .001$. We decomposed the three-way interaction by inspecting the underlying pattern of racial bias in each category salience condition (see Figure 5).

Racial bias emerged when race was salient—Race Prime × Target Object interaction, $F(1, 70) = 7.04$, $p = .010$, $\eta_p^2 = .091$, 90% CI [.013, .207]. Whereas the speed of gun identifications after Black primes ($M = 268$ ms, $SD = 38$) and White primes ($M = 272$ ms, $SD = 39$) did not significantly differ, $F(1, 70) = 3.21$, $p = .077$, $\eta_p^2 = .044$, tools were identified more slowly after Black primes ($M = 303$ ms, $SD = 41$) versus White primes ($M = 297$ ms, $SD = 44$), $F(1, 70) = 4.77$, $p = .032$, $\eta_p^2 = .064$, 90% CI [.003, .171]. When age was salient, the Race Prime × Target Object interaction was not significant, $F(1, 70) = 0.75$, $p = .391$, $\eta_p^2 = .011$.

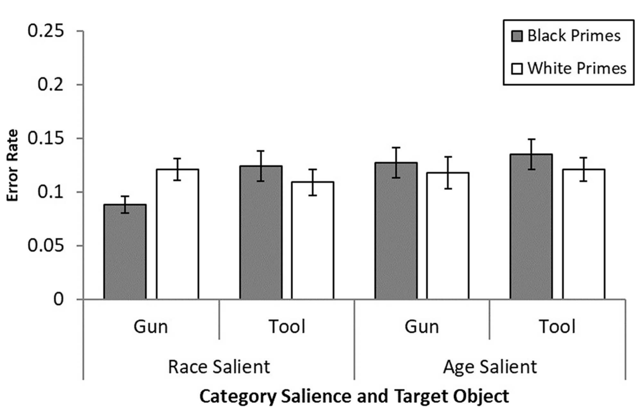

Figure 4. Error rates by race prime, target object, and category salience; error bars are standard errors (Experiment 2).

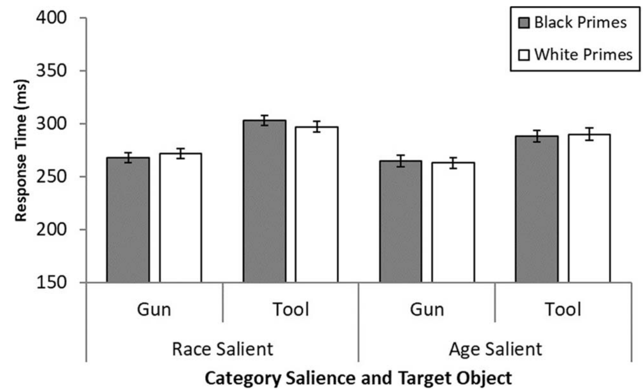

Figure 5. Correct response times by race prime, target object, and category salience; error bars are standard errors (Experiment 2).

Approaching the three-way interaction differently, we again examined the effects of category salience on indices of racial bias separately on gun trials and tool trials. These analyses revealed that racial bias was directionally weaker on both gun trials, $F(1, 140) = 2.22$, $p = .139$, $\eta^2 = .016$, and tool trials, $F(1, 140) = 3.45$, $p = .065$, $\eta^2 = .024$, when age was salient than when race was salient; however, neither difference was statistically significant.

Process analyses. We next tested whether changes in DDM process parameters explained the effects of the face primes on object identification and why these effects differed based on category salience. Replicating Experiment 1, a race prime main effect emerged on the relative start point (β), $\mu_{diff} = -.03$, $d = -0.55$, 95% HDI [−0.77, −0.32]: Participants displayed a greater initial bias to choose "gun" over "tool" after seeing Black versus White male faces. This race prime effect differed across category salience conditions, though this difference was not credible, $\mu_{diff} = -.01$, $d = -0.18$, 95% HDI [−0.41, 0.02]. When race was salient, participants displayed a greater initial bias to choose "gun" over "tool" after seeing Black versus White male faces, $\mu_{diff} = -.05$, $d = -0.71$, 95% HDI [−1.06, −0.38]. When age was salient, this race difference in the relative start point was weaker, though not eliminated, $\mu_{diff} = -.02$, $d = -0.35$, 95% HDI [−0.63, −0.07].

Unlike Experiment 1, the race prime main effect on the drift rate (δ) was not credible, $\mu_{diff} = -0.01$, $d = -0.01$, 95% HDI [−0.15, 0.12], nor was this effect moderated by object type, $\mu_{diff} = 0.12$, $d = 0.11$, 95% HDI [−0.03, 0.26], or category salience, $\mu_{diff} = -0.14$, $d = -0.14$, 95% HDI [−0.27, 0.00]. Threshold separation (α) also did not vary by race prime, $\mu_{diff} = -0.01$, $d = -0.04$, 95% HDI [−0.23, 0.15], nor did category salience moderate this effect, $\mu_{diff} = -0.01$, $d = -0.06$, 95% HDI [−0.25, 0.12]. Finally, nondecision time (τ) did not vary by race prime, $\mu_{diff} = 0$ ms, $d = 0.01$, 95% HDI [−0.11, 0.14], nor was this effect moderated by object type, $\mu_{diff} = -2$ ms, $d = -0.07$, 95% HDI [−0.19, 0.06], or category salience, $\mu_{diff} = -2$ ms, $d = -0.06$, 95% HDI [−0.19, 0.06].

Discussion

These results replicated those from Experiment 1 using a different category salience manipulation. Directing attention to the age of the face primes by grouping them by race decreased behavioral biases linking Black versus White men and boys with guns. DDM analyses again revealed that racial bias in the relative start point was slightly weaker when age was salient; however, this difference indicated a noncredible reduction in racial bias.

Experiment 3

The first two experiments revealed that category salience shaped racial bias in weapon identification. Both experiments used manipulations designed to direct attention to either race or age, leaving it unclear whether age salience dampened racial bias, race salience enhanced racial bias, or both. We examined these different possibilities in Experiment 3 by including a new condition in which neither race nor age was made salient. As in Experiment 1, participants completed a face categorization task prior to the WIT. Alongside the race-salient and age-salient conditions, we included a control condition in which participants classified the faces based on which side of the computer screen they appeared.

Once again, we expected that racial bias in weapon identification would be driven by an initial bias to choose "gun" over "tool" when primed with Black versus White men's and boy's faces. Furthermore, we predicted that category salience would moderate this pattern of racial bias both in behavior and in DDM analyses of the relative start point.

Method

Participants. Undergraduates (N = 183) participated for course credit. Data were excluded from five participants with below-chance performance on the WIT and from one participant for whom a computer error caused the WIT to end early. Finally, because this research focused on racial bias toward Black Americans, we excluded data from 15 participants who identified as Black.[4] The final sample comprised 162 participants (107 women, 54 men, one unreported; 134 White, 10 Asian, six Latinx, and 12 reporting two or more [non-Black] races/ethnicities). A sensitivity analysis (Faul et al., 2007) indicated that this sample size afforded 80% power to detect a medium-sized effect (η_p^2 = .059) for the predicted Category Salience × Race Prime × Target Object interaction in the behavioral analyses.

Procedure. The general procedure and all task materials were identical to those from Experiment 1, except we made two changes to the face categorization task that served as the manipulation of category salience. First, for all category salience conditions, the same photos of Black and White men and boys from Experiments 1 and 2 appeared individually either on the left side of the screen or on the right side of the screen (25% and 75% of the way across the screen from its left side, respectively, and thus within the foveal visual field), rather than in the middle of the screen. Which specific faces of each race category and each age category appeared on which side of the screen was randomized for each participant. Second, along with the *race-salient* and *age-salient* conditions in which participants categorized each face by race (Black vs. White) or by age (adult vs. child), respectively, we included a *control* condition in which participants categorized each face based on the side of the screen (left vs. right) it appeared. This latter condition allowed us to hold constant across conditions exposure to the faces prior to the WIT, but in a way that made neither race nor age particularly salient. After completing the face categorization task, participants completed the WIT from Experiment 1.

Results

Behavioral analyses.

Error rates. In a 3 (Category Salience) × 2 (Age Prime) × 2 (Race Prime) × 2 (Target Object) mixed ANOVA on the error rates, the predicted Category Salience × Race Prime × Target Object interaction was not significant, $F(2, 159) = 1.65$, $p = .196$, $\eta_p^2 = .020$. Nor was the four-way interaction, $F(2, 159) = 0.41$, $p = .663$, $\eta_p^2 = .005$. Nevertheless, we inspected the underlying pattern of racial bias in each category salience condition (see Figure 6).

Racial bias emerged when race was salient—Race Prime × Target Object interaction, $F(1, 51) = 39.94$, $p < .001$, $\eta_p^2 = .439$, 90% CI [.264, .561]. Guns were misidentified as tools less often after Black primes (M = 7.9%, SD = 6.6) versus White primes (M = 14.2%, SD = 9.3), $F(1, 51) = 37.48$, $p < .001$, $\eta_p^2 = .424$, 90% CI [.248, .548], whereas tools were misidentified as guns more often after Black primes (M = 13.1%, SD = 10.6) versus White primes (M = 9.3%, SD = 10.1), $F(1, 51) = 10.88$, $p = .002$, $\eta_p^2 = .176$, 90% CI [.044, .322]. Racial bias also emerged, albeit more weakly, in the control condition—Race Prime × Target Object interaction, $F(1, 55) = 10.53$, $p = .002$, $\eta_p^2 = .161$, 90% CI [.038, .301]. Guns were misidentified as tools less often after Black primes (M = 9.6%, SD = 7.3) versus White primes (M = 12.6%, SD = 8.5), $F(1, 55) = 12.93$, $p = .001$, $\eta_p^2 = .190$, 90% CI [.056, .332], whereas misidentification of tools as guns after Black primes (M = 13.3%, SD = 10.8) and White primes (M = 11.5%, SD = 10.2) did not significantly differ, $F(1, 55) = 3.98$, $p = .051$, $\eta_p^2 = .068$. Finally, racial bias also emerged, albeit even more weakly, when age was salient—Race Prime × Target Object interaction, $F(1, 53) = 4.29$, $p = .043$, $\eta_p^2 = .075$, 90% CI [.001, .203]. Guns were misidentified as tools less often after Black primes (M = 10.3%, SD = 6.5) versus White primes (M = 14.1%, SD = 12.3), $F(1, 53) = 5.21$, $p = .027$, $\eta_p^2 = .089$, 90% CI [.006, .222], whereas misidentification of tools as guns after Black primes (M = 14.7%, SD = 16.8) and White primes (M = 12.3%, SD = 13.3) did not significantly differ, $F(1, 53) = 2.46$, $p = .123$, $\eta_p^2 = .044$.

Also as before, we examined the effects of category salience on indices of racial bias separately on gun trials and tool trials. These analyses revealed no significant differences in racial bias based on category salience on either gun trials, $F(2, 159) = 2.02$, $p = .136$, $\eta^2 = .025$, or tool trials, $F(2, 159) = 0.66$, $p = .520$, $\eta^2 = .008$.

Correct response times. An identical ANOVA on the correct response times revealed the predicted Category Salience × Race Prime × Target Object interaction, $F(2, 159) = 9.95$, $p < .001$, $\eta_p^2 = .111$, 90% CI [.040, .185], which did not vary by Age Prime, $F(1, 141) = 0.58$, $p = .560$, $\eta_p^2 = .007$. We decomposed the predicted three-way interaction by conducting separate 2 (Race Prime) × 2 (Target Object) ANOVAs in each category salience condition (see Figure 7).

[4] Across experiments, retaining Black participants' data produced nearly identical results. In no case did a previously significant effect involving racial bias become non-significant (or vice versa).

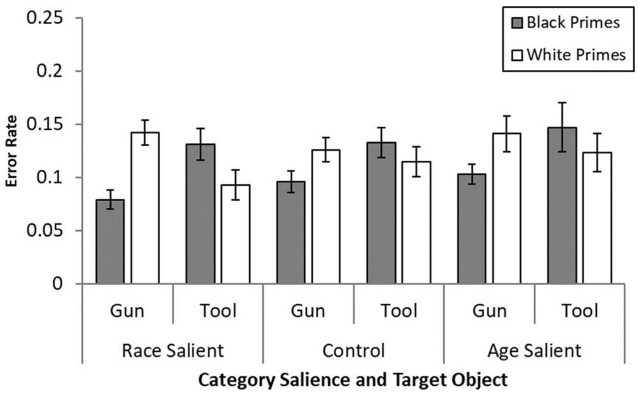

Figure 6. Error rates by race prime, target object, and category salience; error bars are standard errors (Experiment 3).

Racial bias emerged when race was salient—Race Prime × Target Object interaction, $F(1, 51) = 33.39$, $p < .001$, $\eta_p^2 = .396$, 90% CI [.220, .525]. Guns were identified more quickly after Black primes ($M = 268$ ms, $SD = 36$) versus White primes ($M = 289$ ms, $SD = 42$), $F(1, 51) = 25.61$, $p < .001$, $\eta_p^2 = .334$, 90% CI [.162, .472], whereas tools were identified more slowly after Black primes ($M = 312$ ms, $SD = 40$) versus White primes ($M = 301$ ms, $SD = 39$), $F(1, 51) = 16.81$, $p < .001$, $\eta_p^2 = .248$, 90% CI [.091, .393]. The Race Prime × Target Object interaction in the control condition followed the same pattern, but it was not significant, $F(1, 55) = 2.89$, $p = .095$, $\eta_p^2 = .050$. The Race Prime × Target Object interaction was not significant when age was salient, $F(1, 53) = 1.00$, $p = .261$, $\eta_p^2 = .024$.

Approaching the three-way interaction differently, we examined the effects of category salience on indices of racial bias separately on gun trials and tool trials. Racial bias on gun trials significantly differed based on category salience, $F(2, 159) = 11.66$, $p < .001$, $\eta^2 = .128$, 90% CI [.052, .204]. Follow-up analyses indicated that racial bias on gun trials was weaker when age versus race was salient, $t(159) = 4.19$, $p < .001$, $d = 0.81$, and weaker in the control condition than when race was salient, $t(159) = 4.22$, $p < .001$, $d = 0.81$, whereas racial bias on gun trials did not significantly differ between the control and age-salient conditions, $t(159) = 0.01$, $p = .991$, $d = 0.002$. Racial bias on tool trials did not significantly differ based on category salience, $F(2, 159) = 1.70$, $p = .186$, $\eta^2 = .021$.

Process analyses. As in Experiments 1 and 2, a race prime main effect emerged on the relative start point (β), $\mu_{diff} = -.05$, $d = -0.82$, 95% HDI [−1.06, −0.63]: Participants displayed a greater initial bias to choose "gun" over "tool" after seeing Black versus White male faces. This race prime effect differed across category salience conditions, $\mu_{diff} = .02$, $d = 0.29$, 95% HDI [0.10, 0.49]. The initial bias to choose "gun" over "tool" after seeing Black versus White male faces was stronger in the race-salient condition than in both the age-salient condition, $\mu_{diff} = -.03$, $d = -0.41$, 95% HDI [−0.67, −0.15], and the control condition, $\mu_{diff} = -.02$, $d = -0.23$, 95% HDI [−0.49, −0.005]. The difference in racial bias between the control and age-salient conditions was not credible, $\mu_{diff} = -.01$, $d = -0.18$, 95% HDI [−0.39, 0.08]. When race was salient, participants displayed an initial bias to choose "gun" over "tool" after seeing Black versus White male faces, $\mu_{diff} = -.08$, $d = -1.29$, 95% HDI [−1.67, −0.90]. When age was salient, this race difference was reduced, though not eliminated, $\mu_{diff} = -.03$, $d = -0.48$, 95% HDI [−0.82, −0.12]. In the control condition, participants also displayed an initial bias to choose "gun" over "tool" after seeing Black versus White male faces, $\mu_{diff} = -.05$, $d = -0.79$, 95% HDI [−1.11, −0.47].

A small but credible race prime main effect also emerged on the drift rate (δ): Seeing Black versus White male faces resulted in slightly stronger drift rates, $\mu_{diff} = -0.10$, $d = -0.12$, 95% HDI [−0.26, −0.01]. This race effect was not moderated by object type, $\mu_{diff} = 0.07$, $d = 0.08$, 95% HDI [−0.07, 0.21], or category salience, $\mu_{diff} = 0.06$, $d = 0.06$, 95% HDI [−0.06, 0.19]. Participants were faster to identify both guns *and* tools after seeing Black versus White male faces, and this race difference did not vary based on whether race or age had been made salient.

Threshold separation (α) did not vary by race prime, $\mu_{diff} = -0.02$, $d = -0.13$, 95% HDI [−0.33, 0.04], nor was this effect moderated by category salience, $\mu_{diff} = 0.01$, $d = 0.05$, 95% HDI [−0.13, 0.23]. Finally, nondecision time (τ) also did not vary by race prime, $\mu_{diff} = 0$ ms, $d = 0.00$, 95% HDI [−0.12, 0.11], nor was this effect moderated by object type, $\mu_{diff} = -2$ ms, $d = -0.07$, 95% HDI [−0.19, 0.04], or category salience, $\mu_{diff} = 2$ ms, $d = 0.05$, 95% HDI [−0.06, 0.16].

Discussion

The results of Experiment 3 generally replicated those from Experiments 1 and 2: Category salience moderated behavioral biases (albeit only on correct response times) linking Black versus White men and boys with guns. This racially biased behavior was reflected in a process bias to start the decision process closer to the "gun" response when primed with Black versus White male faces. As in Experiments 1 and 2, the difference in racial bias between the race-salient and age-salient conditions was sizable. The magnitude of racial bias in the control condition—both in behavior and in the relative start point—was intermediate with that observed in the race-salient and age-salient conditions but did not reliably differ from either condition.

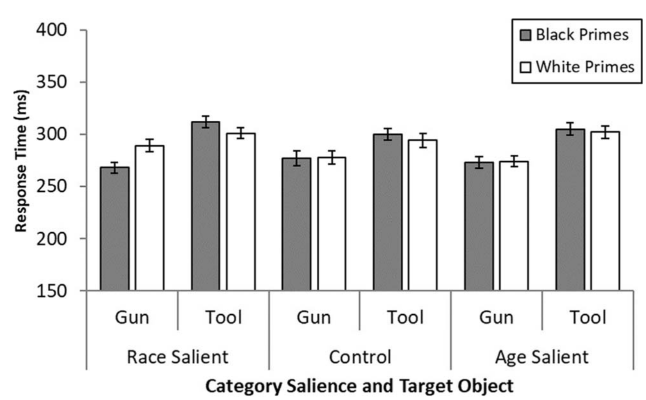

Figure 7. Correct response times by race prime, target object, and category salience; error bars are standard errors (Experiment 3).

Experiment 4

A primary aim of the current research is to examine how category salience shapes racial biases in weapon identification. To accomplish this goal, in two of the first three experiments, we manipulated category salience by having participants classify faces according to some dimension (race, age, side of screen) prior to completing the WIT. Because the same faces of Black and White men and boys served both as stimuli in the face categorization task and as primes in the WIT, however, the face categorization task may not have been a clean manipulation of category salience. According to the theory of event coding (Hommel et al., 2001), processing during the face categorization task may have led to the formation of an event file in memory wherein feature codes of the specific faces were integrated with the categorization response (e.g., Black vs. White, adult vs. child). Subsequently, when encountering a specific face (e.g., a particular Black man) as a prime in the WIT, the entire event file—including the categorization response (e.g., "Black" when categorizing by race, "adult" when categorizing by age)—formed for that face during the face categorization task may have been retrieved spontaneously.

According to this event coding account, the face categorization task may have produced effects on the WIT because participants formed a memory between the specific face and the relevant response rather than because of category salience per se.[5] Although this event coding interpretation cannot explain the results of Experiment 2, we nevertheless addressed this issue in Experiment 4 by using different sets of faces for the face categorization task and for the WIT. Additionally, as in Experiment 3, we included a control condition in which neither race nor age was made salient prior to completing the WIT. Participants in this condition simply completed the WIT without having completed the face categorization task beforehand.

As before, we expected that racial bias in behavior would be driven by an initial bias to favor "gun" over "tool" when seeing Black versus White men's and boy's faces. We further predicted that category salience would moderate this pattern of racial bias in both behavior and the relative start point parameter.

Method

Participants. Undergraduates (N = 202) participated for course credit. Data were excluded from three participants with below-chance performance on the WIT and five participants who identified as Black. The final sample comprised 194 participants (148 women, 46 men; 137 Asian, 36 White, 17 Latinx, and three reporting two or more [non-Black] races/ethnicities). A sensitivity analysis (Faul et al., 2007) indicated that this sample size afforded 80% power to detect a medium-sized effect ($\eta_p^2 = .050$) for the predicted Category Salience × Race Prime × Target Object interaction in the behavioral analyses.

Procedure. The procedure and materials were identical to those from Experiment 1, with the following exceptions. First, we used different sets of facial images in the face categorization task and in the WIT. The images in the face categorization task were eight photos of (~25-year-old) men (four Black, four White) and eight photos of (~5-year-old) boys (four Black, four White); the prime images in the WIT were a different set of 16 photos of Black and White men and boys (four of each). Second, along with the *race-salient* and *age-salient* conditions in which participants classified each face by race (Black vs. White) or by age (adult vs. child), respectively, prior to the WIT, we included a baseline *control* condition in which participants simply completed the WIT without completing the face categorization task beforehand.

Results

Behavioral analyses.

Error rates. A 3 (Category Salience) × 2 (Age Prime) × 2 (Race Prime) × 2 (Target Object) mixed ANOVA on the error rates revealed the predicted Category Salience × Race Prime × Target Object interaction, $F(2, 191) = 10.78$, $p < .001$, $\eta_p^2 = .101$, 90% CI [.039, .167], which did not significantly vary by Age Prime, $F(2, 191) = 2.82$, $p = .062$, $\eta_p^2 = .029$. Indeed, the predicted three-way interaction was significant for both adult primes, $F(2, 191) = 8.85$, $p < .001$, $\eta_p^2 = .085$, 90% CI [.028, .147], and child primes, $F(2, 191) = 7.27$, $p = .001$, $\eta_p^2 = .071$, 90% CI [.019, .130]. To better understand the predicted three-way interaction, we conducted separate 2 (Race Prime) × 2 (Target Object) ANOVAs in each category salience condition (see Figure 8).

Racial bias emerged when race was salient—Race Prime × Target Object interaction, $F(1, 63) = 50.20$, $p < .001$, $\eta_p^2 = .443$, 90% CI [.287, .555]. Guns were misidentified as tools less often after Black primes (M = 8.7%, SD = 9.8) versus White primes (M = 14.3%, SD = 10.6), $F(1, 63) = 29.43$, $p < .001$, $\eta_p^2 = .318$, 90% CI [.165, .446], whereas tools were misidentified as guns more often after Black primes (M = 14.3%, SD = 11.8) versus White primes (M = 9.4%, SD = 8.6), $F(1, 63) = 30.37$, $p < .001$, $\eta_p^2 = .325$, 90% CI [.171, .452]. Racial bias also emerged, albeit more weakly, in the control condition—Race Prime × Target Object interaction, $F(1, 64) = 10.29$, $p = .002$, $\eta_p^2 = .138$, 90% CI [.032, .267]. Guns were misidentified as tools less often after Black primes (M = 11.3%, SD = 9.4) versus White primes (M = 14.0%, SD = 11.3), $F(1, 64) = 7.97$, $p = .006$, $\eta_p^2 = .111$, 90% CI [.019, .238], whereas tools were misidentified as guns more often after Black primes (M = 14.3%, SD = 14.8) versus White primes (M = 12.6%, SD = 13.1), $F(1, 64) = 6.64$, $p = .012$, $\eta_p^2 = .094$, 90% CI [.012, .215]. Finally, the same pattern of racial bias emerged, albeit even more weakly and nonsignificantly, when age was salient—Race Prime × Target Object interaction, $F(1, 64) = 3.58$, $p = .063$, $\eta_p^2 = .053$.

Approaching the three-way interaction differently, we examined the effects of category salience on indices of racial bias separately on gun trials and tool trials. Racial bias on gun trials significantly differed based on category salience, $F(2, 191) = 5.87$, $p = .003$, $\eta^2 = .058$, 90% CI [.012, .113]. Follow-up analyses indicated that racial bias on gun trials was weaker when age versus race was salient, $t(191) = 3.36$, $p = .001$, $d = 0.59$, and weaker in the control condition than when race was salient, $t(191) = 2.26$, $p = .025$, $d = 0.40$, whereas the control condition and the age-salient condition did not significantly differ, $t(191) = 1.11$, $p = .270$, $d = 0.19$. Racial bias on tool trials also differed based on category salience, $F(2, 191) = 7.28$, $p = .001$, $\eta^2 = .071$, 90% CI [.012, .113]. Follow-up analyses indicated that racial bias on tool trials was weaker when age versus race was salient, $t(191) = 3.65$, $p <$

[5] We thank Christoph Klauer for suggesting this alternative interpretation based on event coding.

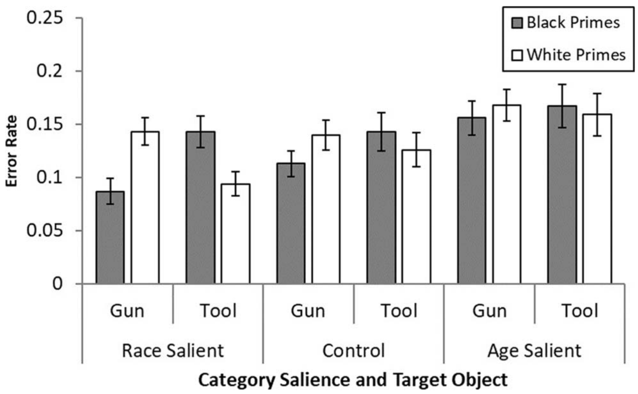

Figure 8. Error rates by race prime, target object, and category salience; error bars are standard errors (Experiment 4).

.001, $d = 0.65$, and weaker in the control condition than when race was salient, $t(191) = 2.80$, $p = .006$, $d = 0.49$, whereas the control condition and the age-salient condition did not significantly differ, $t(191) = 0.86$, $p = .392$, $d = 0.02$.

Correct response times. An identical ANOVA on the correct response times yielded the predicted Category Salience × Race Prime × Target Object interaction, $F(2, 191) = 7.57$, $p < .001$, $\eta_p^2 = .073$, 90% CI [.021, .133], which did not vary by Age Prime, $F(2, 191) = 2.26$, $p = .107$, $\eta_p^2 = .023$. We decomposed the three-way interaction by conducting separate 2 (Race Prime) × 2 (Target Object) ANOVAs in each category salience condition (see Figure 9).

Racial bias emerged when race was salient—Race Prime × Target Object interaction, $F(1, 63) = 55.69$, $p < .001$, $\eta_p^2 = .469$, 90% CI [.315, .577]. Guns were identified more quickly after Black primes (M = 286 ms, SD = 52) versus White primes (M = 306 ms, SD = 51), $F(1, 63) = 47.23$, $p < .001$, $\eta_p^2 = .428$, 90% CI [.272, .542], whereas tools were identified more slowly after Black primes (M = 336 ms, SD = 47) versus White primes (M = 322 ms, SD = 47), $F(1, 63) = 19.31$, $p < .001$, $\eta_p^2 = .235$, 90% CI [.095, .367]. Racial bias also emerged, albeit more weakly, in the control condition—Race Prime × Target Object interaction, $F(1, 64) = 11.56$, $p = .001$, $\eta_p^2 = .153$, 90% CI [.041, .283]. Whereas the speed of gun identifications after Black primes (M = 286 ms, SD = 43) and White primes (M = 288 ms, SD = 44) did not significantly differ, $F(1, 64) = 0.75$, $p = .390$, $\eta_p^2 = .012$, tools were identified more slowly after Black primes (M = 321 ms, SD = 46) versus White primes (M = 307 ms, SD = 48), $F(1, 64) = 13.14$, $p = .001$, $\eta_p^2 = .170$, 90% CI [.051, .302]. Finally, only when age was salient did racial bias fail to emerge—Race Prime × Target Object interaction, $F(1, 64) = 1.60$, $p = .211$, $\eta_p^2 = .024$.

Approaching the three-way interaction differently, we again examined the effects of category salience on indices of racial bias separately on gun trials and tool trials. Racial bias on gun trials significantly differed based on category salience, $F(2, 191) = 13.88$, $p < .001$, $\eta^2 = .127$, 90% CI [.058, .196]. Follow-up analyses indicated that racial bias on gun trials was weaker in the age-salient condition than in the race-salient condition, $t(191) = 4.98$, $p < .001$, $d = 0.88$, and weaker in the control condition than in the race-salient condition, $t(191) = 3.99$, $p < .001$, $d = 0.70$, whereas the control condition and the age-salient condition did not significantly differ, $t(191) = 1.00$, $p = .319$, $d = 0.18$. Racial bias on tool trials did not significantly differ based on category salience, $F(2, 191) = 1.17$, $p = .314$, $\eta^2 = .012$.

Process analyses. As before, a race prime main effect emerged on the relative start point (β), $\mu_{diff} = -.06$, $d = -0.95$, 95% HDI [−0.07, −0.05]: Participants displayed a greater initial bias to choose "gun" over "tool" after seeing Black versus White male faces. This race prime effect differed across category salience conditions, $\mu_{diff} = .03$, $d = 0.42$, 95% HDI [0.24, 0.59]. The initial bias to choose "gun" over "tool" after seeing Black versus White male faces was stronger in the race-salient condition than in the age-salient condition, $\mu_{diff} = -.04$, $d = -0.60$, 95% HDI [−0.82, −0.37], or the control condition, $\mu_{diff} = -.02$, $d = -0.35$, 95% HDI [−0.57, −0.11]. Racial bias in the relative start point was also stronger in the control condition than in the age-salient condition, $\mu_{diff} = -.02$, $d = -0.25$, 95% HDI [−0.48, −0.03]. When race was salient, participants displayed a stronger initial bias to choose "gun" over "tool" after seeing Black versus White male faces, $\mu_{diff} = -.10$, $d = -1.59$, 95% HDI [−1.92, −1.23]. When age was salient, this race difference was substantially reduced, though not eliminated, $\mu_{diff} = -.02$, $d = -0.40$, 95% HDI [−0.72, −0.09]. In the control condition, participants also displayed this same pattern of racial bias in the relative start point, $\mu_{diff} = -.06$, $d = -0.91$, 95% HDI [−1.24, −0.58].

The race prime main effect on the drift rate (δ) was not credible, $\mu_{diff} = -0.09$, $d = -0.06$, 95% HDI [−0.19, 0.04], nor was this effect moderated by object type, $\mu_{diff} = 0.12$, $d = 0.11$, 95% HDI [−0.01, 0.23], or category salience, $\mu_{diff} = 0.05$, $d = 0.04$, 95% HDI [−0.07, 0.15]. Although the threshold separation (α) was larger for Black primes versus White primes, $\mu_{diff} = -0.03$, $d = -0.19$, 95% HDI [−0.35, −0.02], category salience did not moderate this effect, $\mu_{diff} = 0.02$, $d = 0.12$, 95% HDI [−0.03, 0.27]. Finally, nondecision time (τ) did not vary by race prime, μ_{diff} = 1 ms, $d = 0.02$, 95% HDI [−0.09, 0.12], nor was this effect moderated by object type, μ_{diff} = −1 ms, $d = -0.02$, 95% HDI [−0.12, 0.08], or category salience, μ_{diff} = 3 ms, $d = 0.07$, 95% HDI [−0.03, 0.16].

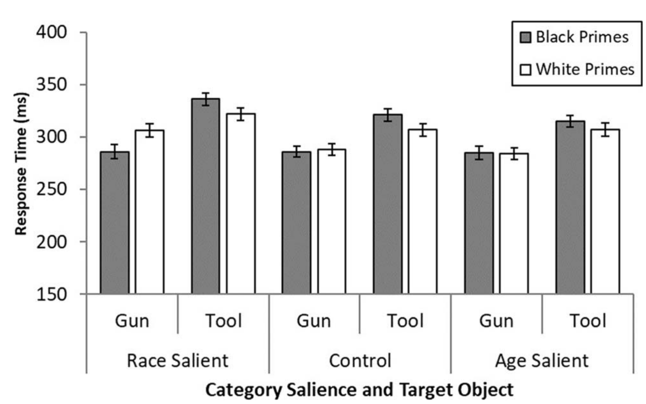

Figure 9. Correct response times by race prime, target object, and category salience; error bars are standard errors (Experiment 4).

Discussion

The results of Experiment 4 align with those of Experiment 3. Participants displayed behavioral biases linking Black versus White men and boys with guns and a process bias to begin the decision process closer to the "gun" response when seeing Black versus White male faces. Importantly, category salience moderated these patterns of racial bias in both behavior and the relative start point. As in Experiment 3, there was a sizable difference in racial bias between the race-salient and age-salient conditions both in behavior and in the relative start point. Also as in Experiment 3, the magnitude of racial bias in the control condition was reliably weaker than in the race-salient condition but not reliably stronger than in the age-salient condition in the behavioral analyses. In the process analyses, however, the race differences in starting point bias between the race-salient and control conditions and between the control and age-salient conditions were both credible. Together, the results of Experiments 3 and 4 indicate that, relative to control, race salience reliably increased racial bias. The evidence that age salience decreased racial bias relative to control was weaker and more mixed.

Because we used different faces of Black and White men and boys in the face categorization task and in the WIT, moreover, any event files between a specific face (e.g., a particular Black man) and a specific response (e.g., "Black" when categorizing by race) that may have formed during the face categorization task could not have affected performance in the WIT. Thus, an event coding interpretation of our findings, in which specific responses are bound to specific faces, is less tenable than a category salience interpretation.

Experiment 5

Across the first four experiments, racial biases linking Black versus White men and boys with guns was weaker when a social category besides race (i.e., age) was salient. In Experiment 5, we tested whether attending to a nonsubstantive category, relative to attending to race, is sufficient to moderate this pattern of racial bias. We created a nonsubstantive category by adding different colored dots to the facial images that served as primes in the WIT (see Quadflieg et al., 2011, for a similar procedure). Half the faces of each race bore a green dot, and the other half bore an orange dot, creating a novel category (i.e., dot color) orthogonal to race. Participants first completed a face categorization task during which they classified the faces either by race (as in Experiments 1, 3, and 4) or by dot color, after which they completed the WIT.

We expected that racial bias in behavior would be driven by an initial bias to favor "gun" over "tool" when primed with Black versus White men's and boy's faces. Furthermore, we predicted that attending to an applicable nonsubstantive category would moderate this racial bias both in behavior and in process analyses of the relative start point.

Method

Participants. Undergraduates ($N = 139$) participated for course credit. We excluded data from one participant with below-chance task performance and five participants who identified as Black. The final sample comprised 133 participants (89 women, 38 men, five unreported, one reporting a nonbinary gender identity; 106 White, nine Latinx, seven Asian, four reporting two or more [non-Black] races/ethnicities, seven unreported). A sensitivity analysis (Faul et al., 2007) indicated that this sample size afforded 80% power to detect a medium-sized effect ($\eta_p^2 = .058$) for the predicted Category Salience × Race Prime × Target Object interaction in the behavioral analyses.

Procedure. Participants first completed a face categorization task similar to the one used in Experiments 1, 3, and 4; however, we modified the images so that the faces bore a dot in one of four locations (forehead, chin, left cheek, or right cheek). Half the faces of each race category and each age category bore a green dot; the other half of each race category and each age category bore an orange dot (which faces from each race—age combination were paired with which dot color was counterbalanced across participants). As in Experiments 1, 3, and 4, participants in the *race-salient* condition classified the faces by race (Black vs. White). Participants in the *dot-color-salient* condition classified the faces by dot color (green vs. orange). Next, participants completed a WIT that was identical to those used in Experiments 1, 3, and 4, except the faces retained the green and orange dots from the face categorization task.

Results

Behavioral analyses.

Error rates. A 2 (Category Salience) × 2 (Age Prime) × 2 (Race Prime) × 2 (Target Object) mixed ANOVA on the error rates revealed the predicted Category Salience × Race Prime × Target Object interaction, $F(1, 131) = 14.40$, $p < .001$, $\eta_p^2 = .099$, 90% CI [.032, .184]. Unlike Experiments 1–4, the Category Salience × Age Prime × Race Prime × Target Object interaction was also significant, $F(1, 131) = 4.99$, $p = .027$, $\eta_p^2 = .037$, 90% CI [.002, .102]. To better understand this four-way interaction, we conducted 2 (Category Salience) × 2 (Race Prime) × 2 (Target Object) ANOVAs separately for adult primes and child primes.

Adult primes. The Category Salience × Race Prime × Target Object interaction was significant for adult primes, $F(1, 131) = 17.36$, $p < .001$, $\eta_p^2 = .117$, 90% CI [.044, .205]. We decomposed this interaction by conducting separate 2 (Category Salience) × 2 (Race Prime) × 2 (Target Object) ANOVAs in each category salience condition (see Figure 10A).

Racial bias emerged when race was salient—Race Prime × Target Object interaction, $F(1, 66) = 75.19$, $p < .001$, $\eta_p^2 = .533$, 90% CI [.390, .628]. Guns were misidentified as tools less often after Black adult primes ($M = 9.4\%$, $SD = 10.4$) versus White adult primes ($M = 19.7\%$, $SD = 11.5$), $F(1, 66) = 48.16$, $p < .001$, $\eta_p^2 = .422$, 90% CI [.269, .535], whereas tools were misidentified as guns more often after Black adult primes ($M = 18.6\%$, $SD = 13.3$) versus White adult primes ($M = 10.3\%$, $SD = 11.5$), $F(1, 66) = 36.63$, $p < .001$, $\eta_p^2 = .357$, 90% CI [.204, .478]. The Race Prime × Target Object interaction was weaker, though still evident, when dot color was salient, $F(1, 65) = 9.01$, $p = .004$, $\eta_p^2 = .122$, 90% CI [.024, .247]. Guns were misidentified as tools less often after Black adult primes ($M = 11.2\%$, $SD = 9.2$) versus White adult primes ($M = 14.5\%$, $SD = 10.5$), $F(1, 65) = 8.06$, $p = .006$, $\eta_p^2 = .110$, 90% CI [.019, .234], whereas tools were misidentified as guns more often after Black adult primes ($M =$

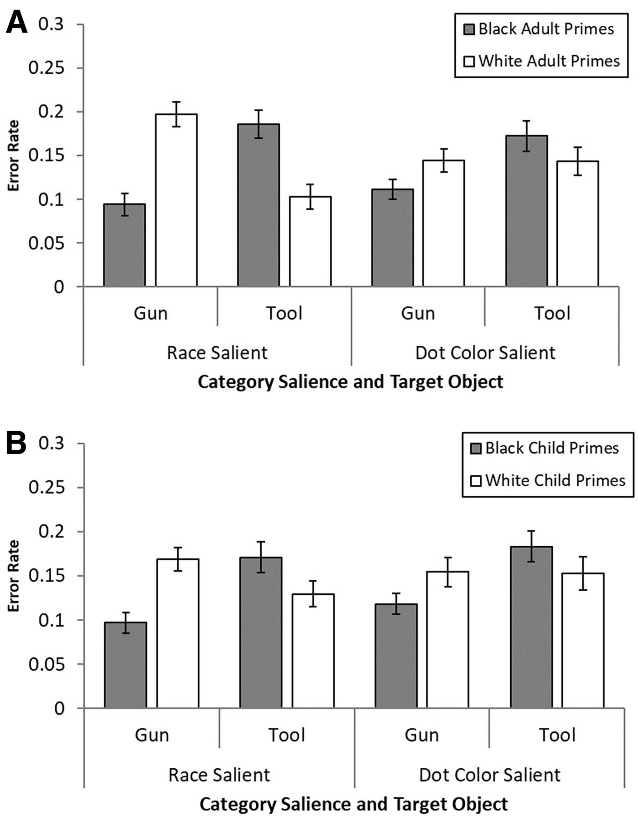

Figure 10. Error rates for adult primes (A) and child primes (B) by race prime, target object, and category salience; error bars are standard errors (Experiment 5).

17.2%, *SD* = 14.0) versus White adult primes (*M* = 14.3%, *SD* = 12.9), $F(1, 65) = 4.55$, $p = .037$, $\eta_p^2 = .065$, 90% CI [.002, .177].

Approaching the three-way interaction differently, we examined the effect of category salience on indices of racial bias separately on gun trials and tool trials. Racial bias was weaker on both gun trials, $F(1, 131) = 13.85$, $p < .001$, $\eta^2 = .096$, 90% CI [.030, .180], and tool trials, $F(1, 131) = 7.74$, $p = .006$, $\eta^2 = .056$, 90% CI [.009, .129], when dot color versus race was salient.

Child primes. The Category Salience × Race Prime × Target Object interaction was not significant for child primes, $F(1, 131) = 2.97$, $p = .087$, $\eta_p^2 = .022$. Nevertheless, we conducted separate 2 (Category Salience) × 2 (Race Prime) × 2 (Target Object) ANOVAs in each category salience condition (see Figure 10B).

Racial bias emerged when race was salient—Race Prime × Target Object interaction, $F(1, 66) = 27.83$, $p < .001$, $\eta_p^2 = .297$, 90% CI [.149, .423]. Guns were misidentified as tools less often after Black child primes (*M* = 9.7%, *SD* = 9.5) versus White child primes (*M* = 16.9%, *SD* = 10.9), $F(1, 66) = 34.50$, $p < .001$, $\eta_p^2 = .343$, 90% CI [.191, .466], whereas tools were misidentified as guns more often after Black child primes (*M* = 17.1%, *SD* = 14.3) versus White child primes (*M* = 13.0%, *SD* = 12.2), $F(1, 66) = 8.69$, $p = .004$, $\eta_p^2 = .116$, 90% CI [.022, .240]. The Race Prime × Target Object interaction was slightly weaker, though still evident, when dot color was salient, $F(1, 65) = 17.02$, $p < .001$, $\eta_p^2 = .207$, 90% CI [.077, .339]. Guns were misidentified as tools less often after Black child primes (*M* = 11.8%, *SD* = 9.4) versus White child primes (*M* = 15.4%, *SD* = 13.5), $F(1, 65) = 8.61$, $p = .005$, $\eta_p^2 = .117$, 90% CI [.022, .242], whereas tools were misidentified as guns more often after Black child primes (*M* = 18.3%, *SD* = 14.3) versus White child primes (*M* = 15.3%, *SD* = 15.1), $F(1, 65) = 5.23$, $p = .026$, $\eta_p^2 = .074$, 90% CI [.005, .189].

Approaching the three-way interaction differently, we examined the effect of category salience on indices of racial bias separately on gun trials and tool trials. Racial bias was weaker on gun trials, $F(1, 131) = 4.27$, $p = .041$, $\eta^2 = .032$, 90% CI [.0007, .094], but not on tool trials, $F(1, 131) = 0.30$, $p = .585$, $\eta^2 = .002$, when dot color versus race was salient.

Correct response times. An identical ANOVA on the correct response times revealed the predicted Category Salience × Race Prime × Target Object interaction, $F(1, 131) = 12.54$, $p = .001$, $\eta_p^2 = .087$, 90% CI [.025, .170], which did not vary by Age Prime, $F(1, 131) = 0.49$, $p = .485$, $\eta_p^2 = .004$. We decomposed the three-way interaction by inspecting the underlying pattern of racial bias in each category salience condition (see Figure 11).

Racial bias emerged when race was salient—Race Prime × Target Object interaction, $F(1, 66) = 46.24$, $p < .001$, $\eta_p^2 = .412$, 90% CI [.258, .526]. Guns were identified more quickly after Black primes (*M* = 261 ms, *SD* = 43) versus White primes (*M* = 286 ms, *SD* = 44), $F(1, 66) = 29.23$, $p < .001$, $\eta_p^2 = .307$, 90% CI [.158, .433], whereas tools were identified more slowly after Black primes (*M* = 307 ms, *SD* = 41) versus White primes (*M* = 292 ms, *SD* = 46), $F(1, 66) = 19.97$, $p < .001$, $\eta_p^2 = .232$, 90% CI [.096, .362]. Racial bias also emerged, albeit more weakly, when dot color was salient, $F(1, 65) = 5.84$, $p = .019$, $\eta_p^2 = .082$, 90% CI [.008, .200]. Whereas the speed of gun identifications after Black primes (*M* = 263 ms, *SD* = 52) and White primes (*M* = 264 ms, *SD* = 46) did not significantly differ, $F(1, 65) = 0.23$, $p = .636$, $\eta_p^2 = .003$, tools were identified more slowly after Black primes (*M* = 302 ms, *SD* = 53) versus White primes (*M* = 291 ms, *SD* = 47), $F(1, 65) = 7.58$, $p = .008$, $\eta_p^2 = .104$, 90% CI [.016, .227].

Approaching the three-way interaction differently, we again examined the effects of category salience separately on indices of racial bias on gun trials and tool trials. Racial bias was significantly weaker on gun trials, $F(1, 131) = 17.86$, $p < .001$, $\eta^2 =$

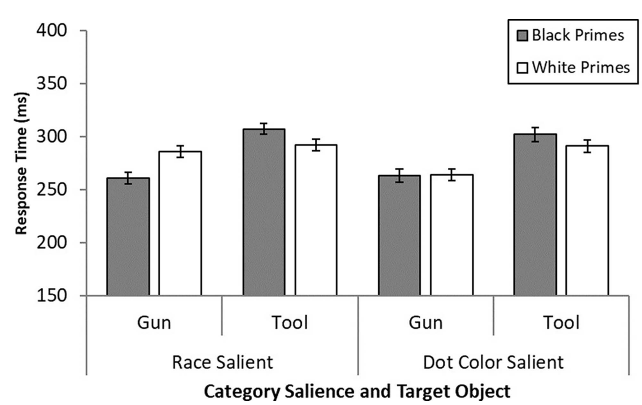

Figure 11. Correct response times by race prime, target object, and category salience; error bars are standard errors (Experiment 5).

.120, 90% CI [.046, .208], but not on tool trials, $F(1, 131) = 0.72$, $p = .397$, $\eta^2 = .005$, when dot color versus race was salient.

Process analyses. DDM analyses again revealed a race prime main effect on the relative start point (β), $\mu_{diff} = -.08$, $d = -1.30$, 95% HDI [−1.57, −1.05]: Participants displayed a greater initial bias to choose "gun" over "tool" after seeing Black versus White male faces. This race effect again differed across category salience conditions, $\mu_{diff} = -.03$, $d = -0.57$, 95% HDI [−0.77, −0.31]. When race was salient, participants displayed a greater initial bias to choose "gun" over "tool" after seeing Black versus White male faces, $\mu_{diff} = -.11$, $d = -1.84$, 95% HDI [−2.21, −1.49]. When dot color was salient, racial bias in the relative start point was reduced by more than half, though still sizable, $\mu_{diff} = -.04$, $d = -0.74$, 95% HDI [−1.09, −0.42].

A small, nearly credible race prime main effect emerged on the drift rate (δ), $\mu_{diff} = -0.14$, $d = -0.15$, 95% HDI [−0.28, 0.00]: Seeing Black versus White male faces resulted in slightly stronger drift rates. This race effect was not moderated by object type, $\mu_{diff} = 0.00$, $d = 0.00$, 95% HDI [−0.14, 0.15], or category salience, $\mu_{diff} = -0.08$, $d = -0.09$, 95% HDI [−0.23, 0.05].

Threshold separation (α) did not vary by race prime, $\mu_{diff} = -0.01$, $d = -0.11$, 95% HDI [−0.33, 0.08], nor did category salience moderate this effect, $\mu_{diff} = -0.01$, $d = -0.05$, 95% HDI [−0.27, 0.13]. Finally, nondecision time (τ) also did not vary by race prime, $\mu_{diff} = -2$ ms, $d = -0.08$, 95% HDI [−0.22, 0.04], nor was this effect moderated by object type, $\mu_{diff} = -3$ ms, $d = -0.11$, 95% HDI [−0.24, 0.02], or category salience, $\mu_{diff} = 1$ ms, $d = 0.02$, 95% HDI [−0.10, 0.15].

Discussion

The results of Experiments 5 indicate that attending to a nonsubstantive category (i.e., dot color) may be sufficient to weaken, but not eliminate, racial bias in both behavior and the relative start point. One interpretation of these findings is that attending to dot color reduced semantic processing of the face primes as people, dampening racial stereotype activation (e.g., Macrae et al., 1997). However, because race and dot color were orthogonal (i.e., half the faces of each race bore a green dot; the other half of each race bore an orange dot), dot color instead may have served as a shared category that cut across race (Deschamps & Doise, 1978; Klauer et al., 2014). According to this cross-cutting category account, attending to dot color should reduce racial bias only when dot color applies equally to members of both racial groups. The semantic processing account, by contrast, predicts that attending to dot color should reduce racial bias even when dot color is perfectly confounded with race and thus provides no additional identity information. Our final experiment examined these possibilities.

Experiment 6

In Experiment 6, we modified the facial images so that all the Black faces bore the same color dot (green or orange) and all the White faces bore the other color dot, confounding race and dot color. As in Experiment 5, participants classified the faces by race or by dot color prior to the WIT. The only difference between Experiments 5 and 6 was that dot color was a cross-cutting category that was orthogonal to race in Experiment 5, whereas dot color was confounded with race in Experiment 6.

Method

Participants. Undergraduates ($N = 168$) participated for course credit. Data were excluded from six participants with below-chance task performance, two participants for whom a computer error resulted in complete data loss, two participants for whom a computer error caused the WIT to end early, and one participant who had no valid responses for some trial types. We also excluded data from three participants who identified as Black. The final sample comprised 154 participants (100 women, 54 men; 131 White, 11 Latinx, six Asian, six reporting two or more [non-Black] races/ethnicities). A sensitivity analysis (Faul et al., 2007) indicated that this sample size afforded 80% power to detect a medium-sized effect ($\eta_p^2 = .050$) for the Category Salience × Race Prime × Target Object interaction in the behavioral analyses.

Procedure. Participants first completed a face categorization task that was identical to the one from Experiment 5, except all the faces of a given race bore the same color dot (which race was paired with which dot color was counterbalanced across participants). Thus, unlike Experiment 5, here race was perfectly confounded with dot color. Participants then completed a WIT in which the faces retained the dots from the face categorization task.

Results

Behavioral analyses.

Error rates. A 2 (Category Salience) × 2 (Age Prime) × 2 (Race Prime) × 2 (Target Object) mixed ANOVA on the error rates yielded the predicted Category Salience × Race Prime × Target Object interaction, $F(1, 152) = 6.38$, $p = .013$, $\eta_p^2 = .040$, 90% CI [.005, .102], which did not vary by Age Prime, $F(1, 152) = 0.02$, $p = .896$, $\eta_p^2 < .001$. We decomposed the predicted three-way interaction by inspecting the underlying pattern of racial bias in each category salience condition (see Figure 12).

Racial bias emerged when race was salient—Race Prime × Target Object interaction, $F(1, 76) = 52.78$, $p < .001$, $\eta_p^2 = .410$, 90% CI [.268, .518]. Guns were misidentified as tools less often after Black primes ($M = 13.3\%$, $SD = 12.0$) versus White primes ($M = 20.4\%$, $SD = 12.4$), $F(1, 76) = 49.63$, $p < .001$, $\eta_p^2 = .395$, 90% CI [.252, .505], whereas tools were misidentified as guns more often after Black primes ($M = 20.1\%$, $SD = 15.2$) versus

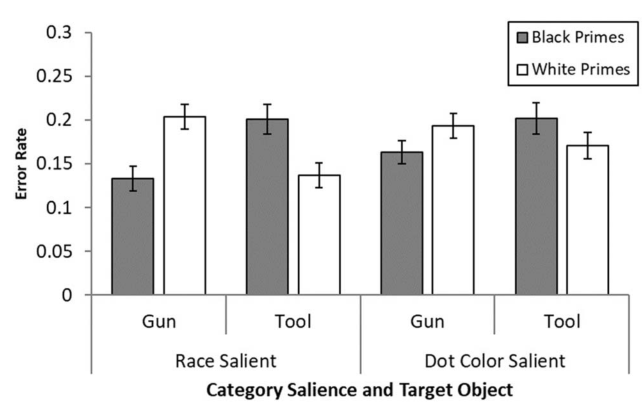

Figure 12. Error rates by race prime, target object, and category salience; error bars are standard errors (Experiment 6).

White primes (M = 13.7%, SD = 12.0), $F(1, 76) = 34.29$, $p < .001$, $\eta_p^2 = .311$, 90% CI [.172, .429]. Racial bias also emerged, albeit more weakly, when dot color was salient—Race Prime × Target Object interaction, $F(1, 76) = 7.84$, $p = .006$, $\eta_p^2 = .094$, 90% CI [.015, .205]. Guns were misidentified as tools less often after Black primes (M = 16.3%, SD = 11.8) versus White primes (M = 19.3%, SD = 12.4), $F(1, 76) = 5.90$, $p = .017$, $\eta_p^2 = .072$, 90% CI [.007, .177], whereas tools were misidentified as guns more often after Black primes (M = 20.2%, SD = 16.1) versus White primes (M = 17.1%, SD = 13.4), $F(1, 76) = 7.03$, $p = .010$, $\eta_p^2 = .085$, 90% CI [.012, .193].

Approaching the three-way interaction differently, we examined the effects of category salience on indices of racial bias separately on gun trials and tool trials. Racial bias on both gun trials, $F(1, 152) = 6.31$, $p = .013$, $\eta^2 = .040$, 90% CI [.005, .101], and tool trials, $F(1, 152) = 4.19$, $p = .042$, $\eta^2 = .027$, 90% CI [.005, .082], was weaker when dot color versus race was salient.

Correct response times. An identical ANOVA on the correct response times revealed the predicted Category Salience × Race Prime × Target Object interaction, $F(1, 152) = 12.60$, $p < .001$, $\eta_p^2 = .077$, 90% CI [.022, .151], which did not vary by Age Prime, $F(1, 152) = 0.22$, $p = .636$, $\eta_p^2 = .001$. We inspected the pattern of racial bias in each category salience condition to better understand the predicted three-way interaction (see Figure 13).

Racial bias emerged when race was salient—Race Prime × Target Object interaction, $F(1, 76) = 103.55$, $p < .001$, $\eta_p^2 = .577$, 90% CI [.452, .659]. Guns were identified more quickly after Black primes (M = 258 ms, SD = 44) versus White primes (M = 282 ms, SD = 45), $F(1, 76) = 61.45$, $p < .001$, $\eta_p^2 = .447$, 90% CI [.306, .550], whereas tools were identified more slowly after Black primes (M = 304 ms, SD = 50) versus White primes (M = 281 ms, SD = 41), $F(1, 76) = 48.12$, $p < .001$, $\eta_p^2 = .388$, 90% CI [.245, .498]. Racial bias also emerged, albeit more weakly, when dot color was salient—Race Prime × Target Object interaction, $F(1, 76) = 15.86$, $p < .001$, $\eta_p^2 = .173$, 90% CI [.061, .294]. Guns were identified more quickly after Black primes (M = 262 ms, SD = 47) versus White primes (M = 272 ms, SD = 52), $F(1, 76) = 8.20$, $p = .005$, $\eta_p^2 = .097$, 90% CI [.017, .209], whereas tools were identified more slowly after Black primes (M = 297 ms, SD = 52) versus White primes (M = 286 ms, SD = 50), $F(1, 76) = 9.59$, $p = .003$, $\eta_p^2 = .112$, 90% CI [.024, .227].

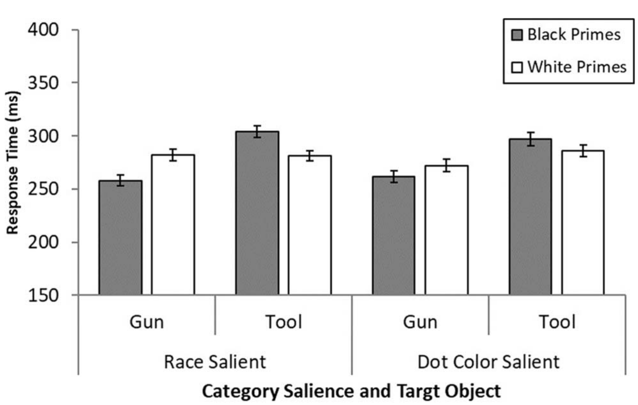

Figure 13. Correct response times by race prime, target object, and category salience; error bars are standard errors (Experiment 6).

Approaching the three-way interaction differently, we again examined the effects of category salience on indices of racial bias separately on gun trials and tool trials. Racial bias on both gun trials, $F(1, 152) = 8.25$, $p = .005$, $\eta^2 = .051$, 90% CI [.009, .118], and tool trials, $F(1, 152) = 6.92$, $p = .009$, $\eta^2 = .044$, 90% CI [.006, .107], was weaker when dot color versus race was salient.

Process analyses. Once again, a race prime main effect emerged on the relative start point (β), $\mu_{diff} = -.06$, $d = -1.01$, 95% HDI [−1.24, −0.77]: Participants displayed a greater initial bias to choose "gun" over "tool" after seeing Black versus White male faces. This race prime effect again differed across category salience conditions, $\mu_{diff} = -.03$, $d = -0.50$, 95% HDI [−0.73, −0.30]. When race was salient, participants displayed a greater initial bias to choose "gun" over "tool" when primed with Black versus White male faces, $\mu_{diff} = -.08$, $d = -1.52$, 95% HDI [−1.86, −1.18]. When dot color was salient, racial bias in the relative start point was substantially reduced, though still moderate in size, $\mu_{diff} = -.03$, $d = -0.51$, 95% HDI [−0.80, −0.19].

The race prime main effect on the drift rate (δ) was not credible, $\mu_{diff} = -0.08$, $d = -0.09$, 95% HDI [−0.22, 0.03], nor was this effect moderated by object type, $\mu_{diff} = -0.07$, $d = -0.07$, 95% HDI [−0.21, 0.05], or category salience, $\mu_{diff} = -0.02$, $d = -0.01$, 95% HDI [−0.12, 0.13]. Threshold separation (α) also did not vary by race prime, $\mu_{diff} = -0.01$, $d = -0.09$, 95% HDI [−0.27, 0.10], nor did category salience moderate this effect, $\mu_{diff} = 0.00$, $d = -0.02$, 95% HDI [−0.19, 0.19]. Finally, non-decision time (τ) did not vary by race prime, $\mu_{diff} = 0$ ms, $d = -0.01$, 95% HDI [−0.12, 0.11], nor was this effect moderated by object type, $\mu_{diff} = 0$ ms, $d = -0.01$, 95% HDI [−0.13, 0.11], or category salience, $\mu_{diff} = 1$ ms, $d = 0.04$, 95% HDI [−0.08, 0.15].

Discussion

The results of Experiment 6 extend those from Experiment 5. In line with the semantic processing account, even when race and dot color were perfectly confounded, categorizing faces by dot color prior to the WIT continued to attenuate, but again did not eliminate, racial bias. These findings are notable in suggesting that attending to a category that is redundant with race, and thus necessarily not one that is shared between Black and White people, may be sufficient to moderate weapon identification bias.

Combined Process Analysis

As a final step, we fit the hierarchical DDM to data from all experiments simultaneously (Pleskac et al., 2018), which allowed us to summarize the effects of race prime, age prime, target object, and category salience on the decision process. We used the same basic model as in the individual experiments. The condition-level estimates of the parameters were allowed to vary by race prime, age prime, and category salience condition. To maintain the between-subjects nature of the salience manipulations, we allowed the condition-level precisions to vary by category salience and experiment. JAGS code for this model appears in the online supplemental materials.

Figure 14 displays the condition-level DDM parameter estimates averaged across experiments. Specifically, it depicts how race primes (white circles are White primes, black triangles are Black primes)

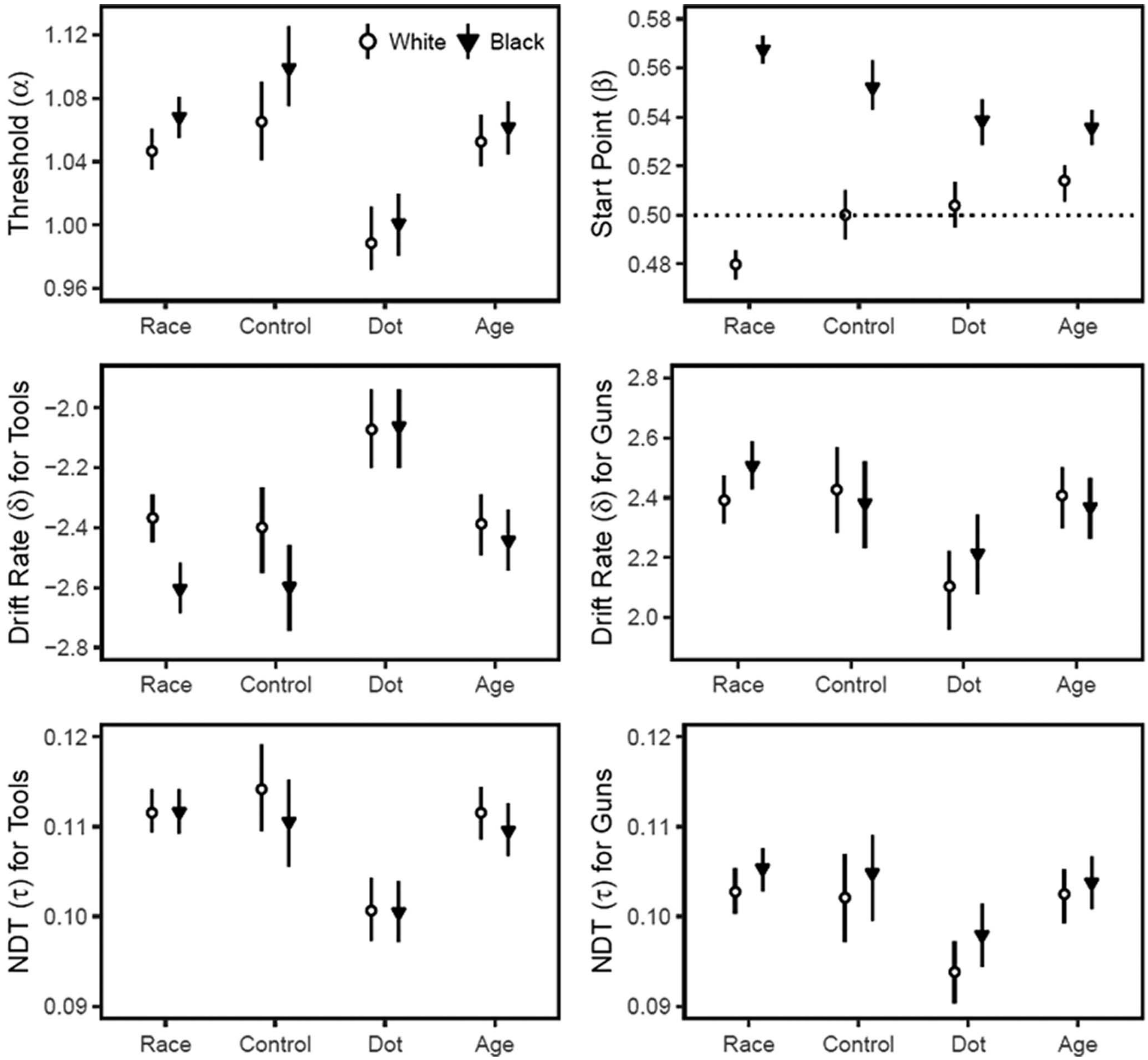

Figure 14. Combined analysis diffusion decision model (DDM) parameters by race prime (White, Black), target object (Tool, Gun), and category salience (Race, Control, Dot, Age). Markers represent mean posterior predictions at the condition level; bars are 95% highest density intervals (95% HDI).

affect the relative start point, threshold separation, drift rate for guns and for tools, and nondecision time (NDT) for guns and for tools across the category salience conditions. Each panel displays data for a different parameter (see Table 1 for descriptions of what higher and lower values on the *y* axis indicate for each parameter), and the category salience conditions are plotted on the *x* axis.

Overall, a race prime effect emerged on the relative start point (β), $\mu_{diff} = -.05$, $d = -0.79$, 95% HDI [−0.90, −0.50]: Participants displayed a greater initial bias to choose "gun" over "tool" after seeing Black versus White male faces. Again, there was a credible difference in starting point bias across category salience conditions, $\mu_{diff} = .02$, $d = 0.31$, 95% HDI [0.24, 0.37]. Racial bias in the relative start point was largest in the race-salient condition, $\mu_{diff} = -.09$, $d = -1.41$, 95% HDI [−1.56, −1.28], followed by the control condition, $\mu_{diff} = -.05$, $d = -0.85$, 95% HDI [−1.08, −0.61], and the dot-color-salient condition, $\mu_{diff} = -.03$, $d = -0.57$, 95% HDI [−0.77, −0.35]. Racial bias in the relative start point was smallest, though still credible, in the age-salient condition, $\mu_{diff} = -.02$, $d = -0.36$, 95% HDI [−0.53, −0.21].

The difference between the race-salient and control conditions was credible, $\mu_{diff} = -.02$, $d = -0.28$, 95% HDI [−0.42, −0.15], as was the difference between the control and age-salient conditions,

$\mu_{diff} = -.01$, $d = -0.24$, 95% HDI [−0.38, −0.10]. These results indicate that attending to race increased racial bias in the relative start point, whereas attending to age decreased racial bias in this parameter. The difference between the control and dot-color-salient conditions was nearly credible, $\mu_{diff} = -.01$, $d = -0.15$, 95% HDI [−0.30, 0.004], whereas the difference between the dot-color-salient and age-salient conditions was not credible, $\mu_{diff} = -.01$, $d = -0.09$, 95% HDI [−0.22, 0.04]. The sizable difference between the race-salient and age-salient conditions was credible, $\mu_{diff} = -.03$, $d = -0.52$, 95% HDI [−0.63, −0.42], as was the difference between the race-salient and dot-color-salient conditions, $\mu_{diff} = -.03$, $d = -0.44$, 95% HDI [−0.56, −0.31]. Finally, the race prime effect on the relative start point did not vary by age prime, $\mu_{int} = .00$, $d = -0.04$, 95% HDI [−0.14, 0.05]. In sum, the effect of race primes on the relative start point varied based on category salience, but this effect generalized across target age.

We also explored another mechanism through which target race might produce the observed behavioral biases: the evidence accumulation process. Research with the first-person shooter task (FPST), which is conceptually similar to the WIT, has found that target race affects evidence accumulation, as indicated by the drift rate (δ) parameter (Correll et al., 2015; Pleskac et al., 2018): Participants are faster to accumulate evidence to shoot armed Black targets and slower to accumulate evidence to *not* shoot unarmed Black targets. Contrary to this prior work, participants in the current experiments accumulated evidence slightly faster for both guns *and* tools after seeing faces of Black versus White men and boys, $\mu_{diff} = -.08$, $d = -0.08$, 95% HDI [−0.14, −0.02]. This overall race prime effect was largely driven by the race-salient condition, $\mu_{diff} = -.17$, $d = -0.18$, 95% HDI [−0.26, −0.10], and did not vary by age prime, $\mu_{int} = -.02$, $d = -0.02$, 95% HDI [−0.08, 0.03]. Thus, the effect of race primes on evidence accumulation was limited to when race was salient and generalized across age prime.

Examination of the condition-level plots also revealed that making a nonsubstantive category salient may have changed how participants approached the task. Relative to the other conditions, participants in the dot-color-salient condition set lower thresholds (α), $\mu_{diff} = -.06$, $d = -0.39$, 95% HDI [−0.49, −0.28], had slower evidence accumulation (δ), $\mu_{diff} = -.31$, $d = -0.32$, 95% HDI [−0.39, −0.24], and decreased nondecision time (τ), $\mu_{diff} = -8$ ms, $d = -0.25$, 95% HDI [−0.31, −0.19]. These results are consistent with a pattern of decreased caution and lower effort when a nonsubstantive category was made salient prior to completing the WIT.

General Discussion

The current research examined whether and how category salience shapes racial bias in weapon identification. The overall pattern of results indicates that behavioral biases linking Black versus White men and boys with guns (Thiem et al., 2019; Todd, Simpson, et al., 2016; Todd, Thiem, et al., 2016) were weaker, though not eliminated, when attending to identity dimensions other than race. In Experiments 1–4, racial bias was weaker when attending to age than when attending to race. In Experiments 5 and 6, racial bias was also weaker when attending to a novel, nonsubstantive category (i.e., dot color) than when attending to race.

More important, diffusion decision model (DDM) analyses provided a mechanistic account of how race biased behavior and how category salience shaped racial bias in behavior. We found a strong race effect whereby seeing Black versus White men's and boys' faces biased decision-making before the objects appeared. Participants displayed an initial bias to choose "gun" over "tool" when primed with Black versus White male faces. Furthermore, attending to both a real, social target category (i.e., age) and a nonsubstantive target category (i.e., dot color) reduced, but did not eliminate, racial bias in behavior via its effects on the relative start point.

Across experiments, there were some inconsistencies in the results of both the behavioral analyses and the process analyses. For example, category salience effects on the behavioral indices of racial bias on gun trials and tool trials sometimes failed to reach significance. With one exception (i.e., the error rates in Experiment 3), however, the key Category Salience × Race Prime × Target Object interaction was always significant. Similarly, category salience effects on racial bias in the relative start point were not always credible. The weak behavioral and process effects in Experiment 2 might reflect specifics of the category salience manipulation we used (i.e., structuring the WIT so that race or age was more contextually distinctive). Although such "blocked" designs have been used previously to draw attention to particular categories (e.g., Jones & Fazio, 2010; Macrae & Cloutier, 2009; Rees et al., 2020), they are arguably more subtle category salience manipulations than the face categorization tasks used in our other experiments.

Furthermore, simple comparisons between the age-salient and control conditions in Experiment 3 failed to reveal reliable differences in both behavioral analyses ($ts < 1$, $ps > .54$) and process analyses of the relative start point. These results might reflect specifics of the control condition, which entailed classifying the faces based on which side of the screen they appeared. Because faces of both races were equally likely to appear on each side of the screen, this procedure could have inadvertently created a novel category (i.e., side of screen) that cut across racial groups, masking the racial bias one might expect in a "purer" control condition. Indeed, evidence for the presence of racial bias was generally weaker (and nonsignificant on the correct response times) in the control condition in Experiment 3 than in the baseline control condition in Experiment 4. Importantly, both the process analysis in Experiment 4 and the combined process analysis revealed credible between-condition differences in starting point bias. Specifically, compared with the control condition, attending to race increased racial bias in the relative start point, whereas attending to age decreased racial bias in this parameter.

In sum, despite some inconsistencies in the individual experiments, the overall pattern of findings was clear: Racial bias was stronger when race was salient than when some other applicable category was salient, and this difference in behavior was rooted in processing differences in the relative start point that emerged before the target object appeared.

Theoretical Contributions and Connections With Prior Research

Our findings have implications for understanding the operation of racial bias. All people belong to multiple social categories, and increasing the salience of an applicable identity dimension besides race can reduce, though not always eliminate, racial biases in weapon identification. Prior work has found that attending to the age of face primes in sequential priming tasks can decrease racial bias toward both younger and older (i.e., elderly) Black versus White men (Gawronski et al., 2010; Jones & Fazio, 2010; see also Mitchell et al., 2003). Experiments 1–4 complement this prior work by documenting analogous effects of category salience on racial bias toward young Black versus White men and young Black versus White *boys*. More important, our findings extend this earlier work—and research on weapon identification bias more generally—in at least two other noteworthy ways.

First, Experiments 5 and 6 moved beyond increasing the salience of age, a basic social category. We created a nonsubstantive category (i.e., dot color) and found that attending to this identity dimension likewise weakened, but did not eliminate, weapon identification bias. In Experiment 5, dot color and race were orthogonal categories, which has also been the case in other studies that have used conceptually similar paradigms (e.g., Ito & Tomelleri, 2017; Ito & Urland, 2005; Wheeler & Fiske, 2005; see also Macrae et al., 1997; Quadflieg et al., 2011). Findings from these paradigms are often attributed to a reduction in semantic processing of the face primes as people when focusing on the dot. Because the presence/color of the dot has always been orthogonal to race in these prior studies, however, an equally possible explanation is that dot presence/color serves as a meaningful cross-cutting category shared by members of different racial groups (Deschamps & Doise, 1978; Klauer et al., 2014) that weakens racial bias.

We tested this cross-cutting category explanation in Experiment 6 by ensuring that dot color and race were fully redundant. Attending to dot color prior to completing a WIT reduced racial bias, even when dot color was confounded with race and thus communicated no additional identity information. These findings are better accommodated by a semantic processing account than by a cross-cutting categorization account; thus, the current work clarifies findings from prior studies that have used similar dot presence/color paradigms.

The results of Experiments 5 and 6 also suggest that attending to any applicable category besides race may reduce, but not eliminate, weapon identification bias. Indeed, the combined process analysis revealed that, compared with when race was salient, the reduction in racial bias in the relative start point was credible both when age was salient and when dot color was salient. Compared with the control condition, however, the reduction in starting point bias was credible when age was salient, but not when dot color was salient. These findings suggest that attending to meaningful social categories like age might more effectively reduce racial bias than does attending to nonsubstantive categories like the color of a dot superimposed on a person's face.

Second, the current research breaks new theoretical ground by using the DDM to provide an account of both how target race biases decision-making in the WIT and how category salience shapes racial bias in these decisions. Although prior work has examined the behavioral effects of similar category salience manipulations on racial bias in weapon identification (Jones & Fazio, 2010), ours is the first to investigate the *processes* by which such manipulations affect weapon identification bias. Indeed, to our knowledge, this is the first time research has used the DDM to understand the decision process leading to racial bias in the WIT. An advantage of the DDM over other models of decision-making (e.g., multinomial modeling) is that it simultaneously models decisions and decision speed (i.e., explaining the error rate results and the response time results does not require different models). Our DDM analyses indicate that the observed racial biases in behavior can be explained by a single process—a shift in the relative start point to favor the "gun" decision when Black male faces are presented. Furthermore, this effect was consistently reduced when race was less salient than other categories.

As noted earlier, several studies have applied variants of the DDM to understand how target race biases decision-making in the FPST (Correll et al., 2015; Johnson et al., 2018; Pleskac et al., 2018). Whereas race primarily affects the evidence accumulation process in this task, it primarily affects starting point biases in the WIT. This difference most likely stems from the fact that race information appears and disappears *before* onset of the target object in the WIT, whereas race information appears *simultaneously* with the target object in the FPST. One methodological implication of this procedural difference is that presenting race and object information sequentially in the FPST should afford more opportunity for racial bias in the relative start point to emerge. Conversely, presenting race and object information simultaneously in the WIT should attenuate (and perhaps eliminate) racial bias in the relative start point.

This procedural difference between the FPST and the WIT (i.e., simultaneous vs. sequential presentation of race and object information) also has practical implications. When needing to make a quick decision about whether a person is holding a gun or something more innocuous (e.g., a phone), for example, different processes may lead to racial bias in behavior depending on whether one sees the person *before* noticing the object or *simultaneously* with the object. Furthermore, knowing whether target race biases the relative start point versus the evidence accumulation process may be informative for identifying means of curbing racial biases in behavior. Racial bias in the relative start point likely stems from expectancies about groups (e.g., stereotypes about gun violence); thus, changing group expectancies (e.g., via counterstereotypic training; Devine, Forscher, Austin, & Cox, 2012) may have promise for reducing racial bias in this parameter. Racial bias in evidence accumulation, by contrast, stems from how quickly object-identifying information is processed in the presence of racial group members, and thus a different approach (e.g., training in object identification under conditions of time pressure) may be more promising for reducing racial bias in this parameter.

The current results resemble results reported by Amodio and Swencionis (2018), who found that a response interference manipulation reduced racial bias in weapon identification. Specifically, their high interference condition included a greater number of trials in which the race of the face primes and the identity of the target objects were in conflict according to racial stereotypes (i.e., Black—tool trials and White—gun trials), which led to an increase in attention to the identity of the target objects. We have claimed, by contrast, that our category salience manipulations led to an increase in attention to different identity dimensions of the face primes (e.g., greater attention to age in the age-salient condition). Thus, although both manipulations produced similar changes in racial bias in behavior, we suspect that they did so via different mechanisms. Future research using the DDM could test whether Amodio and Swencionis's (2018) response interference manipulation led to changes in the relative start point, as in the current work, or in one of the other process parameters.

Our findings also have implications for theories of social categorization, perhaps most notably the dynamic interactive model of person construal (Freeman & Ambady, 2011). This model proposes that task goals and other top-down factors constrain the likelihood of categorizing a particular person (e.g., a young Black boy) along a specific dimension (e.g., race vs. age). Applying this model to the current research, manipulations that heighten the salience of a person's race should facilitate race categorization and impede age categorization. Conversely, manipulations that heighten the salience of a person's age should facilitate age categorization and impede race categorization.[6] The model also suggests, however, that task demands of the WIT itself may result in sustained activation of race information. Specifically, participants' focal task goal in the WIT is to identify whether objects are guns—objects that have strong associations with racial stereotypes pertaining to gun violence. Thus, even in conditions of age salience, race information should remain partially active throughout the task, potentially biasing decision-making. Overall, our results indicate that racial bias (both in behavior and in the relative start point) was still evident in the age-salient conditions, which is consistent with the dynamic interactive model of person construal.

Limitations and Future Research Directions

We acknowledge several limitations of this work, which suggest additional directions for future research. First, the focal comparison group for assessing racial bias toward Black men and boys was always White males of the same age. The strength of associations linking Black people with guns may depend on the specific racial/ethnic comparison group (e.g., Asian, Latinx). Second, our use of convenience samples comprising mostly White college students raises questions about the generalizability of our findings. One recent study, however, reported similar weapon identification bias in a community sample comprising both Black and White adults (Thiem et al., 2019). Though these findings are suggestive, it is as yet unknown whether and how category salience shapes weapon identification bias in such samples.

Third, our experiments focused exclusively on racial bias in *weapon identification*. Some prior work has found that biases stemming from intelligence-related and athleticism-related stereotypes evoked by Black versus White men (Amodio & Devine, 2006) generalize to Black versus White boys (Todd, Simpson, et al., 2016); however, it is unclear whether attending to age or to an applicable nonsubstantive category would attenuate these racial biases in the same way it does weapon identification bias. Because even positive stereotypes (e.g., those linking Black people with athleticism) can have negative consequences (e.g., discouragement from pursuing academic opportunities; Czopp, Kay, & Cheryan, 2015), future research might investigate whether and how category salience shapes racial biases stemming from positive stereotypes.

A final limitation concerns the interpretation of the change in the relative start point where participants favor the "gun" decision when primed with a Black male face. Although this initial bias does explain why participants are both faster and more likely to choose the gun option when primed with a Black versus White face, it does not explain why Black face primes have this effect or why the different category salience manipulations reduce it. We propose that activation of race information (and thus the racial stereotype that links Black males to guns) is weaker when other social categories are active. Another explanation is that, when race is salient as a category, it changes participants' interpretation of the primes. Because the face primes (Black males) are conceptually related via stereotypes to some of the target objects (guns), this expectancy may create an initial bias to favor the gun decision.

Because both these explanations would lead to the same change in the relative start point parameter, these data alone cannot clarify what causes these biasing effects. Furthermore, these two explanations need not be mutually exclusive; the observed start point effects could result from the joint contribution of differences in activation and differences in expectation driven by changes in the salience of competing categories. Our interpretation of these effects as reflecting differential activation stems from past work indicating that social categories are dampened when one dimension is more salient than the other (e.g., Macrae et al., 1995). However, future research would profit from testing whether these initial biases as reflected in the relative start point are due to differences in activation or expectancies.

Another direction for future research will be to identify factors that lead particular social categories to become salient in naturalistic settings, as well as the implications of this natural variation in category salience for expressions of racial bias. As noted earlier, contextual factors can affect the likelihood of categorizing by race (Freeman & Ambady, 2011). For example, White perceivers who are chronically concerned with danger are more likely to categorize Black and White people by race in contexts that elicit a self-protection motivation (Maner, Miller, Moss, Leo, & Plant, 2012). It stands to reason, then, that racial bias may be weaker in contexts where categories besides race are salient (e.g., visiting a retirement home should make age salient) or in contexts that elicit goals for which categories besides race may be important (e.g., wanting to win a team competition should make team membership salient; Kurzban et al., 2001).

Conclusion

When first encountering another person, multiple social categories (e.g., age, gender, race) may be activated concurrently (Freeman & Ambady, 2011). The current work suggests that attending to certain identity dimensions over others can have pronounced effects on decision-making. When race was salient, participants displayed an initial bias to identify an object as a gun when the object was preceded by a Black versus a White male face, and this bias was ultimately reflected in observed decisions and decision speed. When age or some other—even nonsubstantive—category was salient, this bias was weaker, though not eliminated. These process-level insights highlight the utility of the DDM as a tool for increasing precision in the assessment of cognitive processes underlying racial bias in weapon identification.

[6] Likewise, manipulations that heighten the salience of the color of a dot on a person's face (as in Experiments 5 and 6) should facilitate categorization by dot color and impede categorization by age and race.

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