Effect of Priming Black, Hispanic/Latino, and White Faces on Firearm and Non-Firearm Identification

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Abstract

Previous research on the shooter bias effect has focused on Black versus White male stimuli, with participants mistakenly shooting unarmed Black stimuli more often than White stimuli. If shooter bias is related to threat perception, a pattern of bias should be present when using images of other threat-related ethnic minorities. Forty participants completed a computerized shooter task adapted from previous research in which participants made rapid repeated decisions to shoot or not shoot. Repeated measures ANOVA conducted on mean response times and error rates found participants significantly shot unarmed Black stimuli more quickly, more frequently, and at higher percentages compared to Hispanic/Latino and White stimuli. Signal detection analyses found that participants were significantly more accurate at discriminating weapons when primed with a Hispanic/Latino stimulus than other ethnic stimuli. Participants adopted the expected generous criterion for Black stimuli and cautious criterion for White stimuli when deciding to shoot.

Keywords: shooter bias, decision to shoot, response time, signal detection, stereotypes

The human ability to automatically identify faces impacts various social cognitive functions such as group membership (Kurzban, Tooby, & Cosmides, 2001), theory of mind (Iacoboni, 2009), and making judgments about others' behavior (Rule, Krendl, Ivcevic, & Ambady, 2013). In addition, identification contributes to how people develop attitudes about others and learn how to categorize others primarily by deciphering facial profiles, facial expressions, and situational factors (Baird, Scheffer, & Wilson, 2011; Winkielman, Carr, Hofree, & Kavanagh, 2016). Faces represent the most reliable information for social interaction (Rivolta, 2014). The human eye can effectively process and distinguish specific features of a face and remember them after mere exposure (Parr, 2011). The unconscious efficiency of visually processing faces is a distinct human ability often taken for granted.

An individual is, first and foremost, perceived as a member of a social category (Fiske, Lin, & Neuberg, 1999). Social categorization occurs quickly and effortlessly (Banaji & Hardin, 1996; Fiske, 1998). Categorization has classically been defined as treating two or more agents as equivalent in some way to minimize processes for accessing knowledge and making predictions about outgroup members (Medin, 1989; Susa, Meissner, & de Heer, 2010). Social categorization is based primarily on visually prominent and culturally relevant characteristics of an individual (e.g., gender, race, age, clothing, trappings, etc.) that have profound, multifaceted influences on human cognition and behavior (Bartholow & Dickter, 2008; Trawalter, Todd, Baird, & Richeson, 2008). Across cultures, people prefer others that resemble same group and negatively perceive outgroup members early in development.

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The Development of Racial Prejudice in Children

Humans tend to be better at perceiving, memorizing and identifying others from an individual's own race than members of other races (Allport, 1954; Jackiw, Arbuthnott, Pfeifer, Marcon & Meissner, 2008; Susa et al., 2010). From a very early age, as early as five, children form implicit attitudes about social groups and exhibit a self-preference for same-race children over other-race children (Baron & Banaji, 2006; Dunham, Baron, & Banaji, 2008; Tham, Bremner, & Hay, 2017). Race is perhaps the most salient and retrievable facial characteristic an individual can recall from brief exposure and ethnicity represents larger cultural factors. Race is intended to refer to the physical characteristics of an individual such as skin color, hair, facial structure and other cues that facilitate categorization (Sadler, Correll, Park, & Judd, 2012). Racial categorization has been conceived as involving early perceptual judgments about a person's ethnicity, especially while categorizing in-group/outgroup membership (Ito & Urland, 2003, 2005; Levin, 1996, 2000; Rivolta, 2014; Susa et al., 2010). However, when people observe faces of other ethnic groups, they quickly categorize the face based on race alone, at the expense of encoding other facial features (Sporer, 2001). Once racial categorization is perceived, automatic processes can activate stereotypes and prejudices about a social group (Devine, 1989; Senholzi, Depue, Correll, Banich, & Ito, 2015).

The Social Psychology of Stereotypes and Prejudice

Social psychology has had a long investment in understanding stereotypes, prejudice and how these concepts are interrelated (Devine, 1989; Lippmann, 1922). Stereotypes are cognitive structures of perceptions, beliefs, and intergroup attitudes about social group members and their associated traits (i.e., personality, morality) (Allport, 1954; McCauley, Jussim, & Lee, 1995). Stereotypes serve as a function of social categorization and are an inevitable product of cognitive functioning that allow for prediction of others' actions in the absence of contextual information. Further, stereotypes conserve cognitive resources by automatically simplifying social perceptions, judgments, and actions (Macrae, Milne, & Bodenhausen, 1994). Social psychology's interest in stereotypes and prejudice attitudes have led to the development of implicit measures to understand implicit attitudes toward race and ethnic groups. Prejudice has been defined as holding negative feelings toward a group and its members (Levy & Hughes, 2009). Prejudice is considered a motivation and emotion component of intergroup attitudes (Aboud, 1988). Implicit bias toward minority ethnic groups are evident very early in development. Previous research has extensively studied implicit racial biases (Greenwald, Oakes, & Hoffman, 2003). Implicit racial bias is a tendency to respond in a stereotypical way when a person is unable to exert control over responses (Greenwald & Banaji, 1995). In one study, White and Asian participants completed an Implicit Association Test (IAT) to assess implicit racial bias by performing speeded categorizations of Black stimuli and White stimuli to safety (e.g., trust) and danger (e.g., criminal/violent) words using a computer keyboard (Dasgupta & Greenwald, 2001). Exposing participants to admired Black and disliked White exemplars reduced automatic pro-White attitudes. These study results have guided the standard approach to measuring implicit bias.

Dominant cultural stereotypes of groups in society are widely known (Steele, 1997). Activating cultural stereotypes of targeted social groups can produce stereotype-consistent behavior (Major & O'Brien, 2005). Even when stereotypes do exist partly in truth, initial attitudes can be misleading when applied to a particular individual (Jones & Fazio, 2010).

The Automaticity of Cultural Stereotypes and Racial Attitudes

Historical and conventional models of prejudice attitudes have held stereotypes as activated automatically and influencing behavior beyond an agent's knowledge or intentions when exposed to outgroup stimuli (Allport, 1954; Payne, 2001; Wittenbrink, Judd, & Park 1997). Following Allport's (1954) classical work, *The Nature of Prejudice*, many researchers have theorized that stereotype activation occurred effortlessly when people come into contact with members of stereotyped groups (Brewer, 1988; Devine, 1989; Fiske, 2000, Fiske et al., 1999). This has been particularly true of racial stereotypes, which has been viewed as socially problematic. Sociocultural constructions about race often trigger negative stereotypes associated with a member of a specific race that can affect the perception of behavior as more threatening or criminal, resulting in biased prejudiced responses (Hugenberg & Bodenhausen, 2003).

Social psychological research has modeled that social cognition information processing operates between two independent mechanisms - automatic (implicit) and controlled (explicit) processing. Automaticity and control

processes are strongly impacted by cultural stereotypes and racial prejudice. Automaticity has been operationalized as an influence that impacts performance regardless of whether an agent facilitates or attempts control. Control has been operationalized as the ability to monitor and control responses with flexibility (Payne, 2001). A previous research report by Devine (1989), has guided research in how cultural stereotypes and prejudiced attitudes affect automatic and controlled processes of intergroup perception for over a quarter of a century. Devine was interested in the distinction between an individual's knowledge of a group stereotype and their personal beliefs about a group. During early socialization, a culture's beliefs about various social groups are frequently activated and become well learned. Deep-rooted stereotypes and evaluative biases are automatically activated, without conscious awareness or intention, in the presence of stereotyped group members (or their symbolic equivalent) and can consequently influence social thought and behavior (Devine & Sharp, 2009). Although knowledge of a stereotype is known, personal beliefs may or may not be congruent with the stereotype and can override prejudice when combined with group norms to not respond in prejudiced ways.

Devine (1989) examined how the cultural stereotypes and personal beliefs about Black Americans follow a dissociative process of priming biased responses when it is accessible (Neely, 1977). The results of Devine (1989) suggested that regardless of high or low self-reported prejudiced attitudes, people categorized Black males using knowledge of negative cultural stereotypes when presented with thoughts of Black males constructing associations of criminality and hostile. High and low prejudiced people respond to ambiguous stereotype-related behavior with stereotype-congruent and prejudice responses, even when performed by a race-unspecified individual and given time to activate unbiased responses. Devine (1989) suggested negative cultural stereotypes associating Black males as dangerous and criminal have a longer history of activation rather than positively replacing that activation and are therefore more likely to be accessible than personal beliefs when asked to categorize a Black stimulus. Exerting control over these cognitive-affective tendencies would be an ongoing process that required time and sustained effort over individual behavior. Importantly, Devine demonstrated that control processes of cultural stereotypes can be activated by low-prejudice people because they have a lesser tendency to attribute traits to the group as a whole and express more of an attempt to evade and manage racial impressions.

Devine (1989) is a significant contributor to psychological science in racial bias because her results demonstrated that although negative cultural traits are associated with stereotyped groups, people with low-prejudice beliefs about Black stimuli were more likely to inhibit activated stereotypes when met with stereotype congruent thoughts and replace them with thoughts of equality to suppress biased responses. Inhibiting stereotype-congruent or prejudiced responses and replacing them with non-prejudiced responses requires intention, attention, and time. Devine's work has made a call of research for articulated models of controlled processes and how low prejudiced attitudes activate cognitive control (Devine & Sharp, 2009). Devine's (1989) model found that in order for successful control over stereotypes to occur, it requires awareness that a stereotype has been activated, motivation to respond without bias, cognitive resources to inhibit the influence of stereotypes, and to replace any race-biased response tendencies with an intentional nonprejudiced response (Bodenhausen & Macrae, 1998; Devine & Sharp, 2009). Because racial bias is largely automatic, it is difficult to control and measure, especially when cognitive resources, such as time, are limited (Payne, 2001). Automatic and controlled processes of racial bias have traditionally compared performance on tasks that include a time constraint rather than free responses made on self-report measures (Devine & Sharp, 2009). In recent years, social psychologists have applied more complex methods to understand the automatic and controlled processes of stereotypes.

Threat Perceptions and Decision Errors to Shoot Black Americans

Negative cultural stereotypes associating young Black males with violence and hostility are prevalent (Major & O'Brien, 2005). Research has concluded that hostility, violence, crime, and danger are automatically associated with images and thoughts of Black males but not White males (Devine, 1989). Mere thoughts about crime can illicit thoughts of young Black men (Eberhardt, Goff, Purdie, & Davies, 2004). The automatic activation of racially-biased stereotypes can lead to the visual misidentification of harmless objects as firearms (Correll, Park, Judd, & Wittenbrink, 2002). Previous research investigating the implicit relationship between race and weapon identification has found that participants misidentify a harmless object as a firearm more often when primed with a Black stimulus rather than a White stimulus (Correll et al., 2002, Correll, Wittenbrink, Crawford, & Sadler, 2015; Payne, 2001).

Payne (2001) estimated the extent to which racial bias involves automatic and controlled processes in the identification of firearms and non-firearms (Devine & Sharp, 2009). Using Jacoby's (1991) process dissociation

procedure to explore how automaticity and control are activated in the context of intergroup biases, Payne designed the Weapon Identification Task (WIT), a sequential priming paradigm in which participants were briefly primed with an image of a Black stimulus or White stimulus (e.g., 200 ms), followed by a brief image of a firearm or a hand tool (e.g., 200 ms), and pressed a specific button if the image was a firearm or hand tool within a response deadline (e.g., 500 ms; Devine & Sharp, 2009). In Payne's (2001) study, a time constraint required participants to use stereotype-based inferences which increased participant's likelihood to respond 'gun' if they had been primed with a Black stimulus rather than a White stimulus (Payne, Lambert, & Jacoby, 2002). Results of this research strongly supported the hypothesis that race paired with an object influenced the perceptual identification of a weapon or threat being present (Payne, 2001). When participants were given unlimited time to respond (Experiment 1) there were no significant differences in correctly identifying weapons and non-weapons when primed with a Black stimulus and White stimulus. When time was limited (Experiment 2), Black stimuli resulted in racially biased errors. Results found participants were faster and more accurate at identifying firearms from tools when primed with Black stimuli than White stimuli. Moreover, hand tools were more likely to mistakenly be classified as handguns when primed by a Black stimulus rather than a White stimulus. Priming with Black stimuli but not White stimuli increased the automatic activation of the threat or weapon response rather than the non-threat or tool response.

Furthermore, participants who scored higher in explicit prejudice showed higher response bias estimates – willingness to respond – and participants who scored higher in motivation to control prejudice showed less response bias. Payne's study indicates that for participant's error rates to produce response bias, racial cues must be present and opportunities for control must be constrained by time (Payne, 2001). Research by Payne, Lambert and Jacoby (2002) tried to further distinguish automatic and controlled processes of racial bias by examining how suggestions to use race or suppress racial responses affect errors in correctly identifying weapons in a WIT. Using race and the attempt to suppress race both led to weapon bias and increased the accessibility of racial stereotypes. Error results of Payne (2005) were consistent with the assessment that weapon misidentification is an individual's inability to control for automatic racial bias, rather than an incorrect decision, which would lead to incorrect decisions. The work of Payne (2001, 2006) suggests that in split-second decisions, people inevitably and implicitly misidentify tools as firearms in stereotypic and prejudiced ways when primed with Black stimuli, even for people who are actively trying to avoid it. The effects found in Payne's research are not limited to a specific experimental procedure. Numerous adaptations of the WIT have been constructed to extrapolate on Payne's (2001) original findings of the implicit bias to shoot Black stimuli (Greenwald et al., 2002, 2003; Payne, 2006; Sadler et al., 2012).

Decisions to Shoot and Not to Shoot

An implicit racial-response bias in weapon identification is prevalent in the environment and in the laboratory setting. Multiple articles have consistently found that priming with Black stimuli has a significant effect not only on the decision to categorize non-weapons as weapons (Amodio et al., 2004; Payne 2001, 2002), but also how quickly people decide to shoot individuals holding weapons, and the probability people will shoot at all (Correll et al., 2002, 2006; Ma & Correll, 2011; Mange, Sharvit, Margas, & Sénémeaud, 2015). Correll, Park, Judd, and Wittenbrink (2002) developed on the original weapon identification task by making a First-Person Shooter Task (FPST) which was a more ecological and realistic virtual simulation of the processes involved in the decision to shoot. Participants had to decide to shoot armed 'suspects' holding a firearm and decide to not shoot unarmed civilians holding ordinary objects as images flashed on a computer monitor. Importantly, race was not relevant to the task in that a correct response depended only on the object a stimulus was holding in an image. Nonetheless, participants held a cultural stereotype shooting Black stimuli holding firearms more quickly and more frequently than White stimuli holding firearms. Correll and colleagues (2002) suggested the pattern of findings found in their study and Payne (2001) can be better known as a shooter bias suggesting that bias to shoot Black stimuli reflects sociocultural stereotypes about race and ethnicity linking Black Americans to violence and criminality (Steele & Aronson, 1995). Correll and colleagues' (2002) signature research on cultural stereotypes and shooter bias is especially important because even undergraduate White and Black students displayed a bias to a stimulus' ethnicity on reactions to weapons. These data imply that cultural stereotypes about race have an effect on the perception of ethnic groups.

The work of Correll and colleagues (Correll et al., 2002; Correll, Urland, & Ito, 2006; Correll, Park, Judd, Wittenbrink, Sadler, & Keesee, 2007) has suggested that participant's response bias to shoot Black stimuli rather than White stimuli might be based on the perception of threat and danger. Previous research has indicated that the behavior of African Americans are rated as more threatening than behaviors of European Americans (Duncan,

1976). Angry facial expressions, even using images of young children, produce bias to shoot Black stimuli more than White stimuli (Kubota & Ito, 2014; Todd, Thiem, & Neel, 2016).

Neuroscience research has demonstrated faces of Black men capture visual attention (Trawalter et al., 2008) and trigger amygdala activation associated with threat detection (Senholzi et al., 2015). Other research employing social cognitive neuroscience methodology has found a similar pervasive connection between Black stimuli and threat perception (Amodio et al., 2004). A study by Amodio and colleagues (2004) measuring neural signals that detect the need for cognitive control replicated the weapon bias effect and showed that bias is mediated by individual differences in ability to control prejudice. Another study by Correll, Urland, and Ito (2006) was interested in examining event-related potentials (ERPs), or fluctuations of neuronal electrical activity in response to time-locked stimuli, related to threat detection and cognitive control as processes involved in the decision to shoot. Results from this study found that participant's with ERP amplitudes exhibiting greater threat (higher P200) and reduced response inhibition (smaller N200) for Black stimuli rather than White stimuli had greater shooter bias and greater errors (Kahn & McMahon, 2015). The consistent findings of threat perception activating a stereotype-congruent bias to shoot explain why White participants produce higher false positive errors when presented with unarmed Black stimuli and respond to armed Black stimuli without error (Fleming, Bandy, & Kimble, 2010).

The Police Officer's Dilemma

The tendency for people to perceive individuals of a race other than their own as threatening has had long-term ramifications for misidentifying a weapon versus a non-weapon when an individual belongs to a different race. What does an implicit racial bias say about police officers? Moreover, what does automatic processes about associations between racial category and the perception of threat say about law enforcements accuracy in the WIT and FPST? Correll and colleagues' (2002) monumental study intended to simulate the quick decisions that police officers are sometimes forced to make. Police officers often have to navigate ambiguous situations where behavior and objects are unclear making them rely on salient social cues to interpret information (Correll et al., 2014). Occasionally, these situations may include life or death situations based on the identification of a weapon or a threat. In threatening situations, police officers and undergraduates may activate stereotypes more frequently when individuals fit threatening stimuli congruent with cultural stereotypes and implicit racial biases even when considering training (Correll et al., 2002; Miller, Zielaskoski, & Plant, 2012). Relative to community samples, the cultural stereotypes and response bias to shoot Black stimuli has also been found using samples of police officers. Previous research has shown that police officers use more deadly force against Black males than White males[1] (Goff & Kahn, 2012; Kahn & McMahon, 2015).

A relevant study by Correll, Park, Judd, Wittenbrink, Sadler, and Keesee (2007) found that when police officers complete a FPST they produce a response bias to quickly shoot armed Black stimuli and slowed response to defy shooting unarmed Black stimuli similar to civilian samples. With police officers, a Black stimulus activates the perception of threat which creates a predisposition to shoot. When a Black stimulus is armed, the stereotype becomes congruent with the threat and thus the correct response to shoot. When a Black stimulus is unarmed, the stereotype becomes incongruent and should interfere with making the correct response to not shoot. In support of the researcher's findings, participants exhibiting greater cultural stereotypes demonstrated a greater bias to shoot Black stimuli. The shooter bias implies that Black Americans and other minority groups trigger racial stereotypes associated with threat; however, officer's decisions to shoot are not biased based on signal detection criteria – detection performance of identifying and recognizing targets among distractors (Stanislaw & Todorov, 1999). Importantly, police officers made correct responses faster, were better at identifying armed and unarmed stimuli, and set higher standards for shooting Black stimuli compared to civilians. The results of this study suggest that with training, police officers are able to effortlessly suppress stereotypes that effect their error rates or focus more on the contextual and motivation to shoot during the task. These results are reinforced by other findings (Fryer, 2016). Other research has investigated how police training can reduce racial biases in the decision to shoot. Plant, Peruche, and Butz (2005; Plant & Peruche, 2005) found in separate studies that although both police officers and undergraduates early responses revealed a bias toward mistakenly shooting unarmed Black rather than White stimuli, after training, this bias was eliminated. Moreover, using the process dissociation approach, the authors showed that training led to increases in control from early to later trials and particularly for Black stimuli. Further,

[1]However, these results conflict with another study that investigated officer-involved shootings using databases (Fryer, 2016, 2018).

training led participants to inhibit racial stereotypes (Devine & Sharp, 2009). Similarly, there is evidence of the possibility that training assists police officers and individual by activating cognitive control. In a recent study, police officers trained on the FPST showed no bias to shoot Black stimuli, even when an experimental manipulation increased accessibility to the Black-criminal. However, training can reinforce the stereotypical association between Black stimuli and danger, as found in special unit officers that routinely had to monitor minority gang members (Sim, Correll, & Sadler, 2013).

Multiethnic Approach to Shooter Bias

Most research on racial bias focuses on prevalent stereotypes and prejudice associated with Black stimuli in comparison to White stimuli. There is a lack of evidence for response bias among racial categories qualifying as Brown or Dark-skinned Americans. There exists a cultural stereotype toward young Black males as being violent and criminal (Devine, 1989; Correll et al., 2002, 2006). It is also true there are negative cultural stereotypes toward other ethnic minority groups. There is a need for research in cultural stereotypes to take a multiethnic approach to racial response bias. Hispanic/Latino Americans compose a significant minority (17.4%; U.S. Census Bureau, 2015) of the U.S. population and thereby should be included in research. Limited research using law enforcement personnel and undergraduate student samples found both Black stimuli and Hispanic/Latino stimuli were stereotypically associated with threat and violence more than White stimuli and Asian stimuli (Sadler, Correll, Park, & Judd, 2012). Older reports have shown that people who are identified as Hispanic/Latino individuals are shot and killed more by police than identified White individuals but less than identified Black individuals (Geller, 1982). Recent research has provided the first evidence that when participants are White, Hispanic/Latino stimuli capture and hold visual attention faster and longer than White stimuli (Guillermo & Correll, 2016).

Sadler et al., (2012) were the first to investigate a potential shooter bias when presented with Hispanic/Latino stimuli and Asian stimuli. With undergraduate participants, the researchers replicated previous findings with bias to shoot Black stimuli being the only prevalent marker. However, police officers produced additional biases toward Hispanic/Latino stimuli relative to Asian stimuli and White stimuli. Further, police officers who overestimated the violence within a community had a greater response bias towards Black stimuli and Hispanic/Latino stimuli than White stimuli. The results of this data suggest that the decision to shoot minority groups is not simply an "anti-Black" ethnic phenomenon. Because of pervasive cultural stereotypes about minority groups being violent, criminal, and impoverished, university students and police officers are more biased to shoot Black stimuli and Hispanic/Latino stimuli (Sadler et al., 2012). The shooter-response bias associated with cultural stereotypes occurs not only for Black stimuli but is also produced when presented with images of dark-skinned stimuli and images of ethnic minority groups that are congruent with a cultural stereotype of threat (Fleming, Bandy, & Kimble, 2010).

Project Overview

The shooter bias is prevalent in our environment and in the laboratory setting. Multiple articles have consistently found participants are more accurate and make more errors identifying firearms when primed with Black faces rather than White faces. Although the shooter bias is considered a robust phenomenon, most of the research has focused exclusively on Black versus White stimuli. This raises the question of whether this effect can be found using stimuli of other threat-related minority groups. The current project's purpose is to replicate previous research findings in error rates and decisions to shoot using Black, Hispanic/Latino, and White stimuli. In the present decision to shoot task, stimuli included images of firearms and hand tools. Participants were instructed to 'shoot' when a firearm was present and to "not shoot" when a tool was present as quickly and accurately as possible by pressing a computer key. Distractors consisted of tool images to increase shooting error rates. For each trial, a participant was primed with a Black, Hispanic/Latino, or White stimulus followed by a firearm or tool image. Response times and error rates were recorded on each trial.

If the shooter bias is driven by threat-related schemas, results of this study should find a pattern of bias when using other ethnic outgroup stimuli. It was hypothesized that the shooter bias effect is generalizable to other ethnic minority groups and expected a similar response pattern consistent with previous research on the shooter bias effect. Specifically, it was hypothesized that participants would be significantly faster and produce greater error rates when primed with Black stimuli compared to Hispanic/Latino and White stimuli. Further, it was hypothesized that

participants produce greater error rates and bias to shoot Black stimuli and Hispanic/Latino stimuli rather than White stimuli. In the context of multiethnic bias, it was expected that any Hispanic/Latino bias would be more similar to error rates and signal detection measures found with Black stimuli than White stimuli because of negative cultural stereotypes associated with ethnic minority groups, consistent with Sadler et al., (2012)

Method

Participants

Forty-two introductory psychology students participated in the study. Demographic information was collected from only 35 (Female, n = 19; Male, n = 16) participants included in the final analyses because of survey issues. Participant's ages ranged from 18-30 years old and consisted primarily of 19-year-olds (54%, SD = 3.01), and 20-year-olds (11%, SD = 3.01). Participant's ethnic breakdown included White, non-Hispanic (57%) students followed by Black/African-American and Asian (11%), American Indian/Alaska Native, Hispanic/Latino, and Other (6%).

Materials and Stimuli

Ethnic stimuli consisted of a total of 230 (Black = 86, Hispanic/Latino = 54, White = 90) non-expressive faces from the Chicago Face Database (CFD). The unequal frequencies of images across ethnic stimulus is due to the CFD limitations. The CFD is a free resource for scientific research providing high-resolution, standardized photographs of male and female faces of varying ethnicities (Ma, Correll, & Wittenbrink, 2015). All ethnic stimuli in the current study consist of Black, Hispanic/Latino, and White males between the ages of 17 and 65 facing forward and depicting non-emotional expressions in gray t-shirts with a blank, white background. Each stimulus was converted into a .bmp file with an area of 527 x 750 pixels.

Furthermore, firearm and tool images obtained from a free online research materials stimuli database were included (see Payne, 2001). Six images of various firearms and six images of various common household tools (e.g., vice grips, electric hand-drill, metal wrench, air pump, and needle-nose plyers) were used in this study. Some tool images resemble actual firearms more than others to increase false error likelihood. Each firearm and tool image was a .bmp file with an area of approximately 140 x 105 pixels. All firearm and tool images were black and metal to control for color-based cues. All firearm and tool images varied in orientation to increase potential false positive errors. A mask image was also used to interrupt attentional mechanisms and reduce any learning effects of responding to target objects (see Appendix A).

Apparatus and Design

A computer mouse was used to complete each trial of the decision to shoot task. The experimental task was programmed in Direct RT software package (Jarvis, 2016) used for stimulus presentation and recording response times. In total, 150 experimental trials were recorded for each participant in the decision to shoot task with a random sequence of 25 firearm trials and 25 tool trials for each ethnic stimuli type in a 3 ethnic stimuli (Black, Hispanic/Latino, and White) x 2 target object (firearm/tool) repeated measures design made to record response time, accuracy rates, and false positive errors of participants responses in the decision to shoot during weapon identification. Face stimuli were randomized, drawing from a pool for each ethnicity. Target objects were also randomized from a pool for each target type. Thus, each participant saw many different faces, ethnicities, and stimuli on any given trial.

Procedure

Participants completed the decision to shoot (choice-response) task with ethnic stimuli and objects presented randomly by the computer software. Participants clicked the left mouse button with their right index fingers when an image of a firearm was present and pressed the spacebar with their left index fingers when a tool image was present. The choice to use the left mouse key was decided because people who use firearms may be

dominantly right-handed and the click and grip of the mouse is closer to firing a handgun than pressing a keyboard. The spacebar was used to simulate cognitive behavioral control by requiring participants to make an alternative forced correct choice by pressing a different button than the shoot response. Participants were informed their data would be deidentified and their performances would not be shared in any way to abolish any motivation to control for any bias during the experiment (see Amodio et al., 2004). The goal of each task was to respond as quickly and as accurately as possible to targets while maintaining as few errors as possible. Participants were instructed to identify firearms and 'Shoot' when an image of a firearm is present and to 'Not Shoot' when an image of a tool was present (see Appendix B, Appendix C, and Appendix D).

Each trial began with a fixation point (+) presented in the center of a blank white background for 250ms followed by a 200ms Black, Hispanic/Latino, or White ethnic stimuli and then immediately replaced by a firearm or tool target image presented for 200 ms in which a participant had a stimulus onset asynchrony (SOA) (the amount of time from making one decision to the next on each trial) of 650 ms. A visual mask image followed a target image in which participants made a choice response on whether they identified a firearm or a tool within 1500 ms from the onset of the target image to end each trial.

Results

Data Screening

The values in Table 2 report the mean response times for each stimuli condition. Two participants had to be removed from data analyses because they produced errors on a minimum of 20% of trials, leaving a total of 40 participants for analyses. These outliers were removed because participants with greater errors may have not been vigilant or alert during the decision to shoot task and could skew final results. In addition, errors were not high for the majority of other participants in the study. To analyze the response times, thirty null (no-response) trials in which participants timed-out (>1500 ms) were eliminated immediately because no time response was recorded. A priori cutoff criteria did not accept responses quicker than 100 ms and slower than 850 ms because these values were three standard deviations from the mean and only slightly varied in data screening techniques from previous literature finding similar results (Correll et al., 2002; Payne, 2001). The a priori cutoff criteria resulted in an additional 231 trials eliminated from analyses. Overall, only 4.35 % of the raw data were removed resulting in a total of 5,739 trials to analyze. Frequencies, percentages, and mean response times for each response type as a function of ethnic stimuli are reported (See Table 1).

Table 1

Response Measurements in Shooter Task for Frequencies, Percentages, and Mean Response Times (RT) as a Function of Ethnic Stimuli

	Ethnic Stimuli		
Response Type	Black	Hispanic/Latino	White
Unarmed Trials			
False positive errors			
Frequency	43	22	35
Percentage	6.20%	5%	5.90%
Mean RT (*SD*)	425 ms (49)	454 ms (54)	446 ms (58)
Correct rejections			
Frequency	1057	763	906
Percentage	94%	93.60%	94.10%
Mean RT (*SD*)	555 ms (62)	549 ms (61)	552 ms (60)
Armed Trials			
Misses			
Frequency	43	39	43
Percentage	4.50%	6.30%	6.30%
Mean RT (*SD*)	430 ms (69)	488 ms (65)	449 ms (74)
Correct detections			

Frequency	970	975	843
Percentage	93.90%	94.40%	92.70%
Mean RT (*SD*)	490 ms (62)	483 ms (65)	486 ms (62)

Correct Mean Response Times

A repeated measures analysis of variance (ANOVA) was conducted with 3 (Black, Hispanic/Latino, and White) ethnic stimuli and 2 (Hit/Correct Rejection) response types. The repeated measures analysis on correct response times (RTs) for Hs and correct rejections (CRs) revealed a significant within-subjects effect of response type, $F(1, 39) = 199.37$, $p = < 0.01$, $\eta_p^2 = .84$, indicating that participants identified firearms more quickly than non-firearms. However, there was no within-subjects effect of ethnic stimuli nor a significant interaction between correct responses and ethnic stimuli type. Although participants were quicker to decide to shoot and not shoot when primed with images of Hispanic/Latino stimuli compared to Black and White stimuli, RT results did not statistically differ based on ethnic stimuli.

Error Response Times and Error Rates

Error means and percentages for false alarms (FAs) and misses (Ms) were also analyzed. A false alarm or false positive error (Type II) in the decision to shoot task indicates an incorrect decision to shoot when the target is a non-firearm. Conversely, a miss or false negative error (Type I) in the decision to shoot task indicated an incorrect decision to not shoot when the target is a firearm. A repeated measures ANOVA was conducted with 3 (Black, Hispanic/Latino, and White) ethnic stimuli and 2 (False Alarm/Miss) response types. Repeated measures analysis on mean RTs of FA and M trials found a significant within-subjects effects of ethnic stimulus, $F(2, 78) = 10.24$, $p < 0.01$, $\eta_p^2 = .21$, indicating that participants had quicker mean RTs committing FAs and Ms when primed with Black stimuli rather than White stimuli and Hispanic/Latino stimuli. Further, a significant within-subjects effect was found for response type, $F(1, 39) = 4.05$, $p = .05$, $\eta_p^2 = .09$, indicating that participants had statistically different RTs in FAs and Ms when primed with Hispanic/Latino stimuli compared to Black stimuli and White stimuli. Post hoc tests using the Bonferroni correction revealed that participants committed errors significantly quicker when primed with Black stimuli compared to Hispanic/Latino stimuli, $F(2, 38) = 15.74$, $p < 0.01$, $\eta_p^2 = .45$ but not White stimuli ($p = .164$). No significant interaction was found between ethnic stimuli type and response type.

The error rates for incorrect response types and ethnic stimuli were also investigated. Repeated measures found a significant interaction between error rates and ethnic stimuli, $F(2, 78) = 4.71$, $p = .01$, $\eta_p^2 = .11$, such that, participants produced greater FA and lower M rates when primed with Black stimuli rather than Hispanic/Latino and White stimuli. These results indicate that ethnicity affected decisions to shoot when errors were committed.

Signal Detection Analyses

Correct detection (H) and false positive error (FA) responses for each ethnic stimuli were submitted to measures of signal detection sensitivity (strength of information in stimuli) and bias (willingness to respond). Participants' proportions of both H and FAs for only correct trials were converted into standardized z-scores for each racial/ethnic stimulus type. Signal detection sensitivity or the *d´* statistic was calculated by subtracting the z-scores for Hs from the z-scores for FAs. Higher *d´* values indicate greater accuracy or sensitivity in discriminating a firearm from a tool image, while lower sensitivity values indicate less discrimination. Response bias, considered an estimate of automatic processing, reflects the threshold at which stimuli are perceived as a threat and was calculated as the c statistic or decision criterion by multiplying the sum of the z-scores for Hs and FAs by a factor of -1 and dividing by 2 (Fleming et al., 2010; Stanislaw & Todorov, 1999). Negative bias scores indicate a generous criterion to decide to shoot, while positive bias scores indicate a cautious criterion to decide to shoot. Together, these measures can and have been interpreted as estimates of a dual process between automatic and controlled processes (Payne, 2001) based on threat detection (Correll et al., 2002). The average z-score value for each ethnic stimulus type along with sensitivity (*d´*) and response bias (c) measures are presented in Table 2.

Table 2

Signal Detection Bias and Sensitivity Measure Scores as a Function of Ethnic Stimuli

	Ethnic Stimuli		
Scores	**Black**	**Hispanic/Latino**	**White**
False Alarms (z)	-0.14	-0.15	-0.19
Hits (z)	0.17	0.18	0.18
Response Bias (c)	- 0.003	0.02	0.04
Sensitivity (d')	3.18	3.31	3.12

Sensitivity to accurately discriminate between armed and unarmed stimuli was greatest when primed with Hispanic/Latino stimuli ($d' = 3.31$) rather than Black stimuli ($d' = 3.18$) with White stimuli ($d' = 3.12$) having the least accuracy, though these results are not significantly different in aspects of identifying a firearm versus a non-lethal object. Black stimuli produced a small generous response bias (c = -0.003) to shoot during the randomized study. Hispanic/Latino stimuli produced a more cautious bias (c = 0.02) to shoot with White stimuli producing the most cautious criterion (c = 0.04).

Discussion

This study investigated the effect of race and ethnicity on decisions to shoot using a multiethnic approach. The purpose of this research project was to investigate the participant's decisions to shoot and not shoot when presented with Black, Hispanic/Latino, and White stimuli. If the shooter bias is indeed driven by threat perception, a pattern of bias should emerge when using images of other minority groups associated with threat, in this case, Hispanic/Latino stimuli. In the computer simulation, participants made rapid, repeated decisions to shoot or not shoot. This research project's methodology and findings are consistent with previous research examining decisions to shoot from a multiethnic approach (Sadler et al., 2012).

The main findings of this experiment include a significant interaction between ethnic stimuli and error means and error rates. Significant effects include participant's quicker error mean RT and greater FA rates and lower M rates when primed with Black stimuli compared to Hispanic/Latino stimuli. Other significant effects were found between participants correct (H versus CR) and incorrect (FA versus M) response types. The main conclusion from this study is that participants significantly shot unarmed Black stimuli more often, more frequently, and at high percentages compared to Hispanic/Latino stimuli and White stimuli. All significant results were consistent with previous shooter bias findings (Correll et al., 2002; Payne, 2001) and this study's hypotheses.

These findings replicate and extend prior knowledge related to the effect of race and ethnicity on decisions to shoot and not shoot. This study presents an extension of shooter bias in such that participants produced significantly different mean RTs and error rates when primed with Black and Hispanic/Latino stimuli. These findings imply that participants have different attentional-threat biases when primed with different threat-related ethnic minority stimuli. Participants produced slower mean RTs on correct trials compared to other ethnic stimuli and produced greater FA rates and committed FAs quicker when primed with Black stimuli compared to Hispanic/Latino stimuli. Conversely, participants produced quicker mean RTs on correct trials compared to other ethnic stimuli and produced greater M rates and committed FAs and Ms slower when primed with Hispanic/Latino stimuli compared to Black stimuli. Further, signal detection measures found results that supported the study's hypotheses. Signal detection analyses showed that participants produced greater sensitivity to firearms and non-firearms when primed with Hispanic/Latino and Black stimuli than other ethnic stimuli. Participants adopted the expected generous criterion for Black stimuli and cautious criterion for White stimuli in decisions to shoot. Overall, the results demonstrate that race and ethnicity have an effect on the decisions to shoot.

Limitations

This study replicated how race and ethnicity affects undergraduates' decisions to shoot using an experimental design similar to previous research and extends shooter bias to different threat-related ethnic minority groups. Nonetheless, this study has limitations that must be considered. This study addressed a prevalent social issue using undergraduate students rather than using law enforcement personnel or other applied populations. Factors such as undergraduate participants consisting mostly of young, White, college freshman females, sampling a Midwestern

university population, and the instructional context of "shooting" armed ethnic stimuli and "not shooting" unarmed ethnic stimuli could have contributed to significant findings in this study. However, the population total and sample demographics were similar to those used in other studies (Correll et al., 2002). In addition, this shooting task was largely comprised of a firearm/tool categorization task on the computer keyboard and mouse. Right-handedness and experience with computers may have had an impact on the results.

Results of this study are consistent with the hypothesis that participants would have the lowest sensitivity identifying firearms from non-firearms when primed with White stimuli compared to Black and Hispanic/Latino stimuli because the White ethnic group makes up the majority in the US and therefore is considered a low threat ethnic group compared to people of color. Hispanic/Latino stimuli may have produced greater sensitivity to object discrimination than Black stimuli and White stimuli because participants spent more time making decisions to shoot, which represents an established operation to avoid negative interpersonal response biases when primed with Hispanic/Latino stimuli. Further, The signal detection measures for each ethnic stimuli were consistent with the hypothesis that undergraduates would produce a more cautious criterion to decide to shoot when primed with White stimuli, followed by Hispanic/Latino stimuli producing a moderate cautious criterion, and Black stimuli producing a generous criterion. These results are corroborated by the RT and ANOVA analyses described above.

The mean RT results for H trials were inconsistent with the expected hypothesis that participants would be quicker to correctly decide to shoot when primed with Black stimuli compared to another ethnic stimuli. Correct mean response times for Hs and CRs were relatively the same speed and not statistically different across ethnic stimuli type. However, participants correctly shot quicker when primed with Hispanic/Latino stimuli and correctly shot slower when primed with Black stimuli compared to another ethnic stimulus. Concerning Black ethnic stimuli, these results were inconsistent with the hypotheses and present Hispanic/Latino ethnic stimuli as having a quicker response than other ethnic stimuli, however, this result was not statistically significant. This effect may have emerged because of participants' motivation to control for bias towards Black stimuli and a potential greater likelihood for participants to perceive Hispanic/Latino stimuli as similar to White stimuli which would explain participants' smaller difference in mean response times toward Hispanic/Latino and White stimuli. Results for CR means were consistent with the expected hypothesis that participants would be slower to correctly decide to not shoot when primed with Black stimuli compared to other ethnic stimuli because of potential attentional-threat related biases. Participants may have been quicker to correctly decide to not shoot when primed with Hispanic/Latino stimuli and White stimuli because of a low perception of threat associated with these ethnic groups. Interestingly, results for Hs and CRs display relatively similar responding patterns for each ethnic stimuli suggesting a nuanced interpretation of attentional-threat related bias in the context of race that may pertain to the individual differences among participants sampled. Findings from correct mean response times were expected and related to previous research findings. Despite results displaying a pattern of bias correctly deciding to shoot, ethnic stimuli did not play a statistically significant role in decisions. These results in combination with the other findings imply an attentional-threat attribution toward minority ethnic groups that results in participants having longer fixations during FAs and Ms when primed with Hispanic/Latino stimuli and perhaps exhibit overcorrection during FAs and Ms when primed with Black stimuli.

Some of the significant differences in response time, error rates, and signal detection analyses compared to Black stimuli and Hispanic/Latino stimuli may be due to individual differences in participants' exposure and contact with Hispanic/Latino Americans compared to Black/African Americans and motivation to control for negative interpersonal biases (Naylor, Reich, Casa de Calvo, & Mather, 2006). This assertion is supported by participants exhibiting the lowest FA error rates. In other words, participants may have had more positive interpersonal relationships with ethnic minority groups in development or potentially was a person of color that may explain the quasi-inverse relationship between participant's incorrect mean RTs, error rates, and signal detection analyses when primed with Hispanic/Latino stimuli compared to Black stimuli. The fact that participants were quicker to make correct decisions and significantly slower to make errors when primed with Hispanic/Latino stimuli compared to Black stimuli and White stimuli is interesting because it is consistent with hypotheses and allows for the development of hypotheses related to intergroup threat and cooperation among ethnic groups. Hispanic/Latino stimuli exhibited significantly lower FA error rate compared to Black stimuli and White stimuli while demonstrating significantly higher M error rates compared to Black stimuli. Participants were inconsistently slower to correctly shoot or not shoot Black stimuli compared to Hispanic/Latino and White stimuli. These results may illustrate some motivation for participants to control for potential interpersonal biases specifically toward Black stimuli when making correct shoot/do not shoot decisions and toward Hispanic/Latino stimuli when making shoot/do not shoot errors.

Future Directions

There appears to be limited efforts to determine what attentional-threat biases related to ethnic minority stimuli other than Black stimuli versus White stimuli affect shooter bias (Guillermo & Correll, 2016; Sadler et al., 2012). This study's results are important because they replicate findings using methodology and data analyses similar to previous research (Payne et al., 2001). This study used repeated measures ANOVAs to replicate previous shooter bias findings in which participants shot unarmed Black stimuli significantly quicker and produced greater FA error rates than unarmed White stimuli. Moreover, results extend to Hispanic/Latino stimuli as participants had significantly slower error mean RTs and greater M error rates with armed Hispanic/Latino stimuli compared to Black stimuli. Hypotheses about Black stimuli versus other ethnic stimuli were confirmed (except for correct mean RTs) and hypotheses about Hispanic/Latino stimuli versus other ethnic stimuli were confirmed and present new findings that require further investigation of shooter bias among various ethnic minority groups and people of color. This can be interpreted perhaps as participants detecting a threat and making quick decisions because threatening objects and threat-related ethnic minority stimuli are congruent stimuli for deciding to shoot. Individual differences in decision criteria and culture factors may vary shooter biases toward threat-related ethnic minority groups. Future research plans should test and evaluate the implementation of behavioral interventions at the individual and organizational level to mitigate shooter bias and racial bias among ethnic groups related to crime and violence.

Conclusions

Shooter bias is the phenomenon in which participants are quicker to decide to shoot unarmed Black stimuli and make errors more frequently compared to White stimuli based on sociocultural stereotypes associating Black Americans with violence, crime, and threat. If shooter bias is indeed driven by threat perception, a pattern of bias should emerge when using images of other threat-related ethnic minority groups, in this case, Hispanic/Latino stimuli. Results found significantly different patterns of bias toward Black stimuli compared to Hispanic/Latino stimuli.

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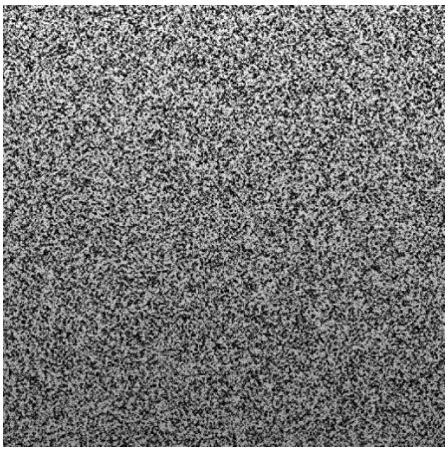
Appendix A



Appendix B

Experimental Procedure

Greeting script:

Welcome to the "First Person Shooter Task," my name is _____ and I am the researcher for this experiment. This study will take approximately 60 minutes and you will receive 1 credit for your participation. What you will be doing today is completing a weapon identification task in which images of faces will appear followed by an image of a firearm or non-firearm. Your task will be to press a button to 'shoot' if the target is armed or press a different button to 'not shoot' if the target is unarmed. Before we begin the task, you will complete a questionnaire. The results may contribute to research on categorization and object identification with specific applications to test for attentional-threat biases. Please remember that at any time, if you should wish to stop the study, just let me know and I will disconnect you from the monitor and you will be free to go. Are you ready to begin?

Debriefing Script:

Thank you for your participation in the experiment. The results may contribute to research on social categorization and object identification with specific applications to test for attentional-threat biases. The facial and object images were selected from previous empirical research, but we understand that it is possible you might have experienced discomfort while viewing them. They were chosen in order to determine whether faces of individuals with skin color other than White would evoke bias to shoot, which will help test our hypotheses. If you would like to discuss anything distressing that you experienced as a result of being in this study, we urge you to contact the UCO Center for Counseling and Well-being at 405-974-2215. Do you have any specific questions for me? Thank you and have a nice day!

Appendix C

IRB approved informed consent form

UNIVERSITY OF CENTRAL OKLAHOMA

INFORMED CONSENT FORM

Research Project Title: Weapon Identification

Researcher (s): Justin D Durham & Dr. Robert D Mather

A. Purpose of this research: The purpose of this research project is to examine the link between the decision to shoot/not shoot and visual stimuli.

B. Procedures/treatments involved: You will complete the task at a computer monitor as quickly and accurately as possible. You will be presented with a brief image of a face followed by a brief image of a firearm or non

firearm. You will press one button if an image of a firearm is presented or you press a different button if an image of a non-firearm is presented. You will be asked to complete a questionnaire before or after the task.

C. Expected length of participation: 60 minutes

D. Potential benefits: You will not directly benefit from this study other than receipt of partial class credit, when applicable and experience as a research participant. Indirectly, this research helps to further our knowledge of the relationship between visual stimuli and the decision to shoot/not shoot.

E. Potential risks or discomforts: In this study, you will be exposed to potentially emotion-evoking visual stimuli that may contain personal or sensitive information about subject or family. These images have no greater risk than is encountered in daily life and are available from the public domain.

F. Medical/mental health contact information (if required): UCO Center for Counseling and Well-being, 405-974-2758

G. Contact information for researchers: Robert Mather: rmather@uco.edu; Justin Durham: jdurham@uco.edu

H. Contact information for UCO IRB: UCO IRB office, irb@uco.edu, 405-974-5497

I. Explanation of confidentiality and privacy: Any information collected from you will be confidential and kept in documents represented by a special code only viewed by the team of researchers. Once the experiment is finished, all of your data information will be shredded, disposed of, and deleted.

J. Assurance of voluntary participation: If at any time, you, the participant, wishes to discontinue participation, please inform the researcher and you will be immediately disconnected from the task and debriefed or

allowed to leave at your discretion. There is no penalty for not completing this research. You are free to refuse to answer any question asked in the course of this study.

AFFIRMATION BY RESEARCH SUBJECT

I hereby voluntarily agree to participate in the above listed research project and further understand the above listed explanations and descriptions of the research project. I also understand that there is no penalty for refusal to participate, and that I am free to withdraw my consent and participation in this project at any time without penalty. I acknowledge that I am at least 18 years old. I have read and fully understand this Informed Consent Form. I sign it freely and voluntarily. I acknowledge that a copy of this Informed Consent Form has been given to me to keep.

Research Subject's Name:

Signature: Date

Appendix D

SONA listing for experiment