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Discriminating Perception

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There is ample evidence that social categories influence behavior. A perceiver's age, a target's gender, the match or mismatch between the race of the perceiver and the race of the target—all of these may affect behavior. Efforts to clarify how these influences occur are critical for both theory and application, and the target article by Y. Jenny Xiao, Géraldine Coppin, and Jay J. Van Bavel (this issue) represents exactly this kind of effort. It highlights the intriguing and provocative idea that changes in perception—as opposed to other mental processes—mediate the path from social identity to intergroup relations. We are sympathetic to this view, and we view the question of distortions in perception as an exciting possibility.

It is difficult to specify what, exactly, constitutes a useful psychological model. In our view, a model should break down the phenomenon (or phenomena) in question and specify the linkages between components in a way that helps the reader understand how a process occurs and/or identify its boundary conditions. In the case of the current model, it seems critical, therefore, to (a) define and disaggregate each focal construct and differentiate it from related constructs, and (b) explain how the components of one construct relate to the components of another. For example, how do different components of social identity, like group identification or valuation, differentially affect attention, interpretation and judgment? The current article is helpful in that it compiles a large body of evidence that is broadly consistent with the idea that social identity affects perception, but we suggest that the model would be more valuable if it were to critically assess and decompose this evidence in a way that clarified the process(es) involved.

At the heart of this critique is an argument that the present model does not define the constructs of social identity, perception, and intergroup relations with sufficient clarity and granularity. We discuss this concern only briefly in the context of social identity and intergroup relations. We spend more time on the treatment of perception because we feel that Xiao et al. (this issue) intend their article primarily as a contribution to an active debate about “top-down” influences on perceptual processes (e.g., Albohn & Adams, 2016; Balci & Dunning, 2006; Bruner, 1957; Firestone & Scholl, 2015; Stoler & Freeman, 2016). To begin with, however, social identity is commonly understood as a product of the situation, not as a simple property of the perceiver (Correll & Park, 2005; Turner, Oakes, Haslam, & McGarty, 1994). Context can render one aspect of identity particularly salient, and it can make other aspects virtually irrelevant

(McGuire & Padawer-Singer, 1976). There are ways to manipulate social identity in the lab, for example, by telling a participant that he or she is a member of Group A rather than Group B (Van Bavel & Cunningham, 2009). But in most of the studies reviewed in the target article, the relevance of social identity derives from the perception of the stimulus itself. It is only because the White perceiver sees a Black face that race becomes relevant; it is only because a perceiver sees Barack Obama that political orientation (and race?) becomes relevant. So, perception of the target shapes identity ... and, Xiao et al. go on to suggest, identity shapes perception. How does this happen? What do the authors really mean by social identity beyond the simple existence of a social category? For example, Black targets often evoke a greater sense of threat (relative to White targets), and sometimes this bias is evident among *both* White and Black participants (Correll, Park, Judd, & Wittenbrink, 2002; Sagar & Schofield, 1980). This pattern is generally considered evidence of widespread cultural stereotypes (a potential top-down influence on perception), but because it does not depend on the race of the participant, is it fair to call it an aspect of social identity? It seems as if there is an important distinction here, but the processes at play in the domain of social identity are never directly addressed by the target article. A reader might be left with the sense that any kind of category to which the perceiver belongs (and any kind of category to which the target belongs) can be a social identity as long as it shows an effect on behavior. This approach is dissatisfying and verges on circularity. We do not believe that it constitutes an effective definition. A similar concern can be raised regarding the treatment of intergroup relations. The article's literature review addresses many different behaviors: classification of a face as Black versus White, intention to vote, memory for a face, event-related potentials, judgments of distance. Some behaviors are presumably meant to show changes in perception, others to show downstream consequences related to intergroup relations. But the target article leaves that interpretation largely to the reader, essentially trusting that the reader will know “intergroup relations” when he or she sees them. It would be helpful for the model to define, decompose, and explicitly discuss the relationship of various behaviors (e.g., categorization, stereotyping, memory) to the model. Do the authors view these behaviors as interchangeable, or are there meaningful distinctions to be made? Again, greater specificity would be helpful because it would help us understand *how* social identity and perception impact (and are impacted by) intergroup relations.

Turning to perception, we again believe that the model would benefit from a more critical, fine-grained, and nuanced treatment of the construct. The authors define perception as “the organization, identification, and interpretation of sensory information to represent our environment” (p. 258). By our reading, this definition includes processes that knit together sensory input into a unified or holistic representation, but also selective attention, which may alter the nature of the sensory input in the first place. We adopt a similar perspective for the purpose of this commentary (but see Firestone & Scholl, 2015). Even so, it is critical to clearly distinguish perception from other mental processes. Although we do not subscribe to a modular view of the mind in which perception can be completely walled off from cognition, failure to draw certain basic distinctions would render the present argument meaningless.¹ By way of example, Keith Payne’s (2001) weapon identification task briefly presents a face (White or Black) followed by an object (a gun or a tool). He asks participants to classify the object, and his work shows that exposure to a Black face (rather than a White face) facilitates classification of guns, and exposure to a White face (rather than a Black face) facilitates classification of tools. This priming effect could certainly occur as a function of changes in perception. Perhaps participants actually see a given object differently as a function of the prime. A drill might look more like a gun when it is preceded by a Black face (e.g., 50% gunlike) and much less like a gun when it is preceded by a White face (only 20% gunlike). But the effect could also occur for reasons that have nothing to do with perception. When the participant sees a White face, she or he may unconsciously set a relatively high bar: Only objects that look 70% gunlike will be classified as guns. When she or he sees a Black face, the participant may lower that criterion: Objects that look 30% gunlike will be classified as guns. Even if the prime does not alter perception of the object, this participant will show bias. If a drill looks 40% gunlike, it will be classified as a tool when it appears after a White face, because it does not reach the criterion of 70%. The same drill (still perceived as 40% gunlike) will be classified as a gun when it appears after a Black face, because it does exceed the 30% criterion. Perception has not changed; the bar has simply been lowered when the prime is Black. There is yet another alternative. When the participant sees a Black face, she or he may initiate a motor response to indicate “gun” based solely on the prime stimulus. This motor program would facilitate responses to guns (and inhibit responses to tools) in a manner very similar to a change in perception. But critically, this kind of response priming has nothing to do with perception of the object. In our view, any argument that seeks to meaningfully discuss perception must, at a minimum, draw distinctions between (a) detection, encoding, and representation of the stimulus; (b) judgment criterion; and (c) execution of a motor response.

The target article reviews a sizeable literature that is *consistent with* the idea that categories influence perception, but much of the work is also consistent with other, nonperceptual processes. For example, the target article discusses research

showing that participants (mostly White) are more likely to categorize a racially ambiguous target as Black if that target is dressed in a janitor’s clothes rather than a business suit (Freeman, Penner, Saperstein, Scheutz, & Ambady, 2011). This is a clever and interesting effect, but does it demonstrate a change in *perception*? A perceptual account would suggest that participants perceive an ambiguous face as having more Afrocentric features. An alternative account might explain the same pattern of data without resorting to a change in perception at all. Perhaps blue-collar targets prompt the participant to use a more stringent criterion, setting a higher bar for membership in the racial ingroup. As a field, how do we tease these possibilities apart? The target article also discusses political research which shows that participants rate a lightened image of own-party candidates as more representative (Caruso, Mead, & Balci, 2009). It is ostensibly possible that this effect occurs because participants visually perceive their candidate as lighter (but see Firestone & Scholl’s, 2014, discussion of the El Greco fallacy). But it is certainly possible that this effect occurs because participants evaluate a lightened image as more positive and they have positive associations with their candidate (mine = good = light). Again, according to the latter account, perception of the candidate has not changed at all. Although much of the reviewed work is consistent with a perceptual account, many of these studies do not rule out plausible alternatives.

We believe that the target article might benefit from a somewhat more discriminating analysis of the literature, helping the reader understand which studies effectively implicate perception and which can be plausibly explained by other processes. A clear discussion of these alternatives could have tremendous benefits. It could help to identify the characteristics of studies that more effectively isolate changes in perception (as opposed to other processes), and in so doing, it could clarify objectives for future research. What does it take to convincingly demonstrate a perceptual effect? Do the authors believe that methodological innovations like reverse correlation offer evidence that is less susceptible to alternative accounts (Dotsch, & Todorov, 2012)? Does the study of brain activity provide leverage (Stolier & Freeman, 2016)? Do sophisticated analytical techniques help us disentangle these issues? Next we describe one approach that we have taken in recent work. This approach does not perfectly isolate perception from other processes, and we do not offer it as a standard of top-down influence on perception, but it represents one attempt to differentiate attention/perception from other processes that involve changes in judgment criterion/response priming.

For more than 15 years, we have studied racial bias in the decision to shoot (e.g., Correll, Hudson, Guillermo, & Ma, 2014; Correll, Park, Judd, & Wittenbrink, 2002). Our paradigm is structured like a simplistic video game. The participant views a computer screen on which a series of uninhabited backgrounds appears. Eventually, a male target pops up in one of the backgrounds. Sometimes this target is Black, sometimes he is White; sometimes he is holding a pistol, sometimes he is holding an innocuous object like a cell phone or wallet. The participant’s task is to shoot the armed targets (by pressing Button A) but not to shoot the unarmed targets (a decision that is registered by pressing Button B). Our data typically show that the race of the target affects the likelihood of shooting. Participants shoot Black

¹Such a model would simply suggest that social identity influences cognition (in general), so any discussion of perception (in particular) would be unwarranted.

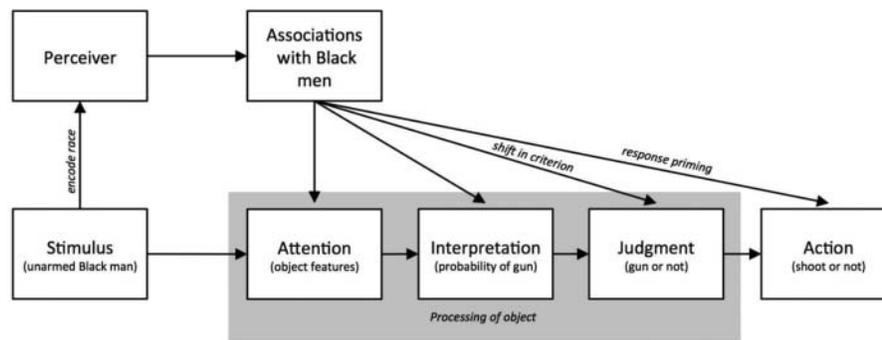


Figure 1. A model of four distinct potential causes of racial bias in a first-person shooter task (adapted from Correll et al., 2002).

targets more than Whites and choose the *don't shoot* response more often for White targets than for Blacks. These data rarely reveal differences in overall accuracy. Participants do not make more (or fewer) errors overall if the target is Black rather than White. We generally use signal detection theory (SDT) to analyze these data, and this approach typically shows that participants are equally sensitive to the armed–unarmed distinction regardless of race. SDT suggests that target race affects only the response criterion, such that participants use a more lenient (or trigger-happy) criterion when reacting to a Black target. This pattern occurs because participants are more likely to false alarm (shoot an unarmed target) if the target is Black and more likely to miss (fail to shoot an armed target) if the target is White. It is critical to note that there are many processing pathways that lead to this exact pattern of results: SDT cannot distinguish between them (see Figure 1). First, the participant may *attend* to different visual information about the object when it appears in the hands of a Black target, perhaps turning his or her eyes to the most gunlike edges of a cell phone. Second, holding visual input constant, the participant may *interpret* the information differently, construing a certain shape as the barrel of a gun rather than the spine of a wallet and concluding that the object is more likely to be a gun (e.g., 50% gunlike in the hands of a Black target, 20% in the hands of a White target). Third, holding interpretation constant (e.g., the object is always perceived as 30% gunlike, regardless of race), the participant may require different levels of certainty to *judge* that the object is a gun. If the target is Black, 30% may be sufficient evidence to pull the trigger, but if the target is White, a more stringent criterion may be used. Finally, even if we hold judgment constant, a Black target may directly influence *action*, leading the participant to shoot even though she consciously knows that the object is a wallet.

We proposed (most of) these possibilities in our initial work on this topic (Correll et al., 2002). Only recently have we found a way to begin teasing them apart. In a recent article (Correll, Wittenbrink, Crawford, & Sadler, 2015), we used Roger Ratcliff's (1978; see also Voss & Voss, 2007) diffusion model to analyze (and reanalyze) data from our task. The diffusion model is based on the idea that decisions unfold over time. As the target appears, a participant in our studies may start with an assumption that there is a 50% likelihood of shooting. Searching the visual image, the participant begins to collect visual information, which serves to update the assessment. Aspects of the object that seem consistent with the presence of a gun may lead

to an increase in the likelihood of shooting. Aspects that seem inconsistent with a gun may lead to a decrease in that likelihood. Finally, once the judgment has been reached, the participant must execute the chosen response. The actual model is a bit more complicated than we have described it, but these ideas suffice to illustrate our point. The diffusion model estimates parameters of the decision-making process based on empirical data by using both accuracy and response times for each trial. It thus provides an estimate of the start point (or the a priori response bias), the rate of evidence accumulation, and “nondecision time” (which includes response execution). We would like to consider this framework from the perspective of the alternative pathways that can lead to bias (attention, interpretation, judgment, action). If target race influences only the judgment criterion, the effect of race should manifest as a change in the starting point, suggesting an a priori tendency to favor one decision over the other. The process of evidence accumulation about the object should not be affected, because a change in criterion does not involve “seeing” a different stimulus. If target race directly influences action in the manner of response priming, it should manifest in the nondecision time. Again, this process does not involve differences in perception, so it should not affect the accumulation of evidence. However, if target race influences selective attention or the interpretation of a visual stimulus, the influence should manifest as a change in the rate of accumulation. A Black target might promote attention to gunlike features and construal of the object in a manner that is biased toward the *gun* decision, leading to rapid accumulation for armed targets and slow accumulation for unarmed targets. A White target might promote accumulation of evidence that is inconsistent with a gun. Our data showed clear evidence that race alters the accumulation of evidence. The rate of accumulation was greater for Black targets with guns and for White targets without guns.² Moreover, the magnitude of this stereotypic accumulation predicted interesting behavioral effects. When

²In their critique of biases in perception, Firestone and Scholl (2015) suggested that our results could be due to demand effects. That account does not seem plausible because demand would presumably operate in a manner akin to an a priori race-based expectation about either the judgment (probably manifesting in start point) or the behavioral response (probably manifesting in nondecision time). It does seem plausible that our effects derive from changes in selective attention rather than interpretation (see next), and in as much as Firestone and Scholl viewed attention as a nonperceptual process, these data may fall victim to one of their “pitfalls.”

participants make a mistake, like shooting an unarmed Black target, it is possible that they knew full well that the target was unarmed (an error of action rather than perception). It is also possible that they actually believed they saw a gun and acted in accordance with an erroneous interpretation. To examine these possibilities, we conducted a study in which we presented the target for only 175 ms (the image was then removed and masked). Participants made an initial speeded decision about whether to shoot (Response 1), then, after a delay, they made a second, slower, more deliberative response (Response 2). We conducted a diffusion model analysis on the initial speeded responses and again found evidence of racial bias in the accumulation of evidence. This pattern suggests that some aspects of attention and interpretation may be influenced by race. We then analyzed the second response. The purpose of that response was to give participants a chance to correct their initial decision—if they had seen the object correctly (and simply executed the wrong response) they could now execute the correct response, but participants were unable to correct their errors and showed persistent bias on this second judgment—they were still more likely to shoot Black targets than White targets. Even more interesting, the magnitude of this persistent behavioral bias was related to bias in their initial accumulation of evidence. In our view, this research suggests that attention and/or perception may, indeed, be influenced by social categories.

Considering the question at hand (discrimination between perceptual and nonperceptual processes), it is particularly interesting to note that we borrowed the delayed-response paradigm from Payne, Shimizu, and Jacoby (2005). Using virtually this approach with the weapon identification task (just described), these researchers found a very different pattern of results. Their participants showed bias on the speeded response, but they corrected themselves almost perfectly on the delayed response. This pattern suggests that participants perceived correctly and simply acted incorrectly (perhaps due to a shift in response criterion or to behavioral priming). The authors concluded that race did not influence perception. Critically, Payne and his colleagues used stimuli that are much less visually complex, so perhaps it was easier for their participants to generate an unbiased perceptual representation. The important point here is that similar patterns of bias (on the initial response) may derive from entirely different psychological processes. The clever paradigm developed by these researchers helps to pit those processes against one another and uncover evidence for (or against) perceptual distortion.

We hasten to note that our data are still open to multiple interpretations. For example, it might be argued that the bias in evidence accumulation is not driven by changes in interpretation of a stimulus (holding constant visual input) but rather by changes in the visual input itself. Perhaps participants selectively attend to different kinds of visual information when the target is Black, turning their eyes to more gunlike features. Although we have adopted the target article's definition of perception for the purposes of this comment (which includes selective attention), Firestone and Scholl (2015) argued that these processes must be differentiated. The diffusion model analysis presented earlier does not provide an obvious way to distinguish between these alternatives. As just discussed, we do

not mean to suggest that this approach somehow settles the debate about the penetrability of perception. But there are some important features of this work that, in our view, at least advance the discussion. First, this work explicitly acknowledges several alternative accounts (i.e., shifts in judgment criterion and response priming, as well as in perception). Second, the analysis *measures outcomes related to each of those alternatives*, allowing us to assess and compare the potential explanations. By differentiating and evaluating these alternatives, we hope to gain traction on a very difficult question about the nature of perception.

As reviewed in the target article and elsewhere, there is ample evidence that the experiences and characteristics of a perceiver impact attention, evaluation, and judgment of a target (e.g., Bodenhausen, & Macrae, 1998; Von Hippel, Sekaquaptewa, & Vargas, 1995). Characteristics of the perceiver also impact the neural substrates of person perception, including, in some instances, brain areas thought to support early perceptual processes (Cloutier, Li, Mišić, Correll, & Berman, in press; Ito & Bartholow, 2009). Nonetheless, we believe it is premature to interpret these findings as conclusive evidence that perception mediates the impact of social identity. This conclusion is not intended to minimize the importance of the topic of investigation. Much remains to be learned about the interaction between facets of a perceiver's identity and processes supporting person perception—including the role of perception itself.

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