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The Ecology of Automaticity: How Situational Contingencies Shape Action Semantics and Social Behavior

Joseph Cesario[1], Jason E. Plaks[2], Nao Hagiwara[3], Carlos David Navarrete[1], and E. Tory Higgins[4]
[1]Michigan State University; [2]University of Toronto; [3]Karmanos Cancer Institute, Wayne State University; and [4]Columbia University

Abstract

What is the role of ecology in automatic cognitive processes and social behavior? Our motivated-preparation account posits that priming a social category readies the individual for adaptive behavioral responses to that category—responses that take into account the physical environment. We present the first evidence showing that the cognitive responses (Study 1) and the behavioral responses (Studies 2a and 2b) automatically elicited by a social-category prime differ depending on a person's physical surroundings. Specifically, after priming with pictures of Black men (a threatening out-group), participants responded with either aggressive behavior (fight) or distancing behavior (flight), depending on what action was allowed by the situation. For example, when participants were seated in an enclosed booth (no distancing behavior possible) during priming, they showed increased accessibility of fight-related action semantics; however, when seated in an open field (distancing behavior possible), they showed increased accessibility of flight-related action semantics. These findings suggest that an understanding of automaticity must consider its situated nature.

Keywords

automaticity, motivated preparation, prime-to-behavior, ecology, human defensive behavior, situated cognition

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It is well documented that activation of social categories can cause automatic social behavior, with a person expressing behavior associated with stereotypes about the primed category. For example, priming "Black men" causes non-Black participants to be aggressive, and priming "elderly" causes undergraduate participants to walk slowly (Bargh, Chen, & Burrows, 1996). The central question in the current research is, "What is the role of ecology (a person's relation to his or her physical surroundings) in the automatic activation of action semantics and expression of behavior?"

We present data showing, for the first time, that the priming situation itself places opportunities and constraints on automatic cognitive processes and behavior by establishing which actions are available for a person to execute in response to a primed target. Specifically, following priming with pictures of Black men (a threatening out-group), participants showed automatic activation of either fight action semantics or flight action semantics (Study 1) and expressed fight behavior or flight behavior (Studies 2a and 2b). Participants' actions in both studies depended on what their physical surroundings allowed. Such contingencies were analogous to those that determine defensive threat behavior in nonhuman animals.

Automatic Social Behavior

In a study by Bargh et al. (1996), participants worked on a boring computer task while being subliminally primed with pictures of Black men or White men. After 10 min, the computer "crashed," and participants were provoked by the experimenter instructing them to start over. Participants primed with Black men responded with greater aggression than participants primed with White men.

The accounts addressing these and related findings (and, indeed, accounts of automaticity generally) place a strong emphasis on the role of stored category information and the translation of this information into behavior (see Wheeler, DeMarree, & Petty, 2007). Direct-expression accounts, such as those describing the perception-behavior link and ideomotor principles (Bargh et al., 1996), propose a direct translation of category information into behavior as a result of the increased accessibility of such information from priming. The

Corresponding Author:
Joseph Cesario, Psychology Building, Michigan State University, East Lansing, MI 48824
E-mail: cesario@msu.edu

active-self account (Wheeler et al., 2007) proposes that priming changes what information is in the active self-concept (which guides behavior). The assumed immunity of automaticity to situational contingencies, due to precisely the emphasis in these accounts on stored category content, renders these models silent on the role of the priming context.[1] We turn now to an alternative perspective that proposes that the ecology of the person defines what behavior can be expressed—and what corresponding action semantics are activated—following priming.

Motivated Preparation to Interact

Our motivated-preparation account proposes that automatic social behavior is the result of perceivers preparing to interact with members of the primed category (Cesario, Plaks, & Higgins, 2006). Exposure to a social category activates, in addition to trait information, goals relevant to interacting with members of that category. The behavioral output represents the most functional means for achieving those goals. For behavior to be functional, a person's physical surroundings must be taken into account; this is because the situation defines what behavioral options a person can execute. These situational opportunities and constraints are the focus of the present research.

Consider the computer-crash paradigm used by Bargh et al. (1996). Given that Black men are stereotyped as aggressive, we can conceptualize the experimental situation in that study as one in which participants are preparing to interact with a physical threat. In the standard paradigm, in which participants are primed in an enclosed space such as a booth or a cubicle, the physical situation precludes the possibility of escape. Thus, although a person's preference could be to avoid an interaction and distance himself or herself from the threat, the situation defines aggression as the only possible response. The researcher's choice of methodology—derived from assumptions of causal mechanism (Katzko, 2006)—restricts participants' range of available responses. Far from being incidental, the experimental situation is the ecology of the person, and as such, it will determine what behaviors can and cannot be used. We now describe the ecology of threat situations more generally by considering what is known about nonhuman animal responses to threats.

Defensive Behavior in Nonhuman Animals

The literature on the defensive behavior of nonhuman animals describes five primary behavioral threat responses and the ecological conditions influencing the likelihood of each (see D.C. Blanchard, Hynd, Minke, Minemoto, & Blanchard, 2001). We focus on two key predictors of flight versus defensive-attack responses: escape availability (Ydenberg & Dill, 1986) and resource-holding potential (RHP: an animal's assessment of its ability to counter threats; Parker, 1974). A consistent finding across animal species and predator types is that when an opportunity for escape is not available (e.g., when a rat is cornered), an imminent high-magnitude threat elicits defensive-attack behavior. When an opportunity for escape is available, a threat elicits distancing behavior (R.J. Blanchard, Flannelly, & Blanchard, 1986; Stankowich & Blumstein, 2005).

Current Studies

To test the idea that a person's physical surroundings establish opportunities and constraints on automatic cognition and behavior, we primed participants with Black male faces or White male faces and varied whether participants' surroundings allowed for distancing behavior. In Study 1, we assessed the automatic activation of fight action semantics versus flight action semantics while varying the physical situation during priming. In Studies 2a and 2b, we assessed participants' actual fight behavior versus flight behavior while varying the situation during behavioral expression.

Study 1: Priming While in a Booth Versus in an Open Field

Would priming participants while they were seated in an enclosed booth versus in an open field change what action semantics were automatically activated in response to a prime? An open field is an ecology that allows for distancing behavior, whereas a booth is one that prevents distancing behavior—indeed, a booth closely mimics the physicality (and according to many participants, the feeling) of being the "cornered rat." We primed participants in one of these two locations with pictures of Black male faces or White male faces, and we measured the accessibility of fight-related words compared with flight-related words. It is important to note that we also assessed individual differences in the degree to which participants associated Black men with danger, because there is no need for a person to prepare defensive responses if he or she does not perceive a threat.

Method

Participants. Ninety-nine participants (80.5% female and 19.5% male; age = 18–31 years) completed the experiment in return for partial credit in a psychology course. All participants self-identified as a racial-ethnic group other than African American. (One participant who did not provide racial-ethnic information was excluded.) Participants completed the priming task alone in either an enclosed booth or an open field (Fig. 1).

Procedure and materials. Prior to the experimental session, participants were instructed to arrive at either the field or the booth location, with restrictions due to weather. It is important to note that the field location provided a low likelihood of participants seeing other people (as the presence of other people could influence a person's assessment of resources; Jonas &

Fig. 1. Location of priming in Study 1. Participants completed the priming task either in an enclosed booth with the door closed (left panel) or in an open field (right panel; experimenter in foreground, participant in background).

Cesario, 2010) and gave participants the feeling of openness. Procedures were identical at both locations. After providing informed consent, participants began the computerized priming task.

The fight-or-flight priming task assessed the accessibility of fight action semantics and flight action semantics following priming of Black men or White men. The cover story was that the researchers were interested in the degree to which people could read words while doing another task. Participants were told they would be asked to judge whether a target letter string was a fight-related word, an escape-related word, or a nonword while they completed another task (viewing pictures for a later memory test). Participants registered their responses on a box with buttons labeled "fight" and "escape"; nonwords required no response. The box was positioned vertically, with participants' dominant hand positioned between the buttons such that the fight response required participants to move forward ("as if you are moving forward to attack") and the escape response required participants to move back ("as if you are moving away to avoid").

Each trial of the task began with the appearance of a 500-ms fixation point. This was followed by a 75-ms blank screen, and then a prime picture (one of 10 Black male faces or 10 White male faces) for 300 ms. The target letter string was presented simultaneously with the prime picture for 1,500 ms or until a response was registered. The intertrial interval was randomly assigned at 500 ms, 750 ms, or 1,000 ms. Participants completed 80 trials of the task, judging each of 20 target letter strings (10 nonwords, 5 fight-related words, and 5 flight-related words) four times. Half of the target letter strings were preceded by Black faces, and half were preceded by White faces.

Participants' reaction times in categorizing fight-related words and flight-related words were recorded. Two scores, one indicating the accessibility of action semantics following Black primes and one indicating the accessibility of action semantics following White primes, were computed for each participant. Specifically, average reaction time to fight-related words following each type of face was subtracted from average reaction time to flight-related words following each type of face.[2] Higher scores on the Black index or White index indicated greater accessibility of fight-related words, relative to flight-related words, following Black primes or White primes, respectively.

After the priming task, participants completed a variation of Fazio's sequential priming task (Fazio, Jackson, Dunton, & Williams, 1995), which was designed to assess participants' association between Black men and danger. The original task was modified by substituting danger adjectives or safety adjectives for most of the generic negative or positive adjectives. The first phase of the task assessed baseline latencies of participants' judgments (good or bad) of the target adjectives. A subsequent phase repeated this, but, on any given trial, a picture of a Black male or a White male preceded the target word. We followed the original procedure for calculating individual difference scores. Conceptually, these scores represent the strength of each participant's association of Black men with danger. The scores were calculated by comparing reaction times for danger adjectives or safety adjectives presented after Black faces compared with after White faces. Higher numbers represent stronger associations of Black men with danger. To the degree that participants associate Black men with danger, they should prepare threat responses during the priming task.

Nine participants experienced methodological problems and were removed from analyses. This left a final sample of 87 participants.

Results and discussion

For the booth location, we predicted that as participants' association between Black men and danger increased, the accessibility of fight-related action semantics would increase following Black primes. In contrast, for the field location, we

predicted that as participants' associations between Black men and danger increased, flight-related action semantics would increase in accessibility following Black primes. It is important to note that in neither the field nor the booth did we expect responses to change following White primes.

To test these predictions, we used a linear mixed-effects model with reaction times as the predicted variable and location (between subjects: 0 = booth, 1 = field), participants' Black-danger association (continuous, centered), and prime (within subjects: 0 = White, 1 = Black) as the predictor variables. As predicted, there was a significant three-way Location × Black-Danger Association × Prime interaction, $\beta = -0.54$, $t(83) = -2.40$, $p = .019$.

Taking the Black-prime trials first, we obtained the predicted Location × Black-Danger Association interaction, $\beta = 0.74$, $t(83) = 3.54$, $p < .001$. As shown in Figure 2, as the strength of participants' association between Black men and danger increased, participants in the booth showed increased accessibility of fight-related action semantics following Black priming, $\beta = 0.35$, $t(83) = 2.38$, $p = .019$. In contrast, participants in the field condition showed the opposite pattern of results: As their Black-danger association increased, they showed increased accessibility of flight-related action semantics following Black priming, $\beta = -0.39$, $t(83) = -2.62$, $p = .010$.

Also as predicted, for the White-prime trials, we found no significant Location × Black-Danger Association interaction, $\beta = 0.21$, $t(83) < 1$. Whether participants were in the booth, $\beta = 0.004$, $t(83) < 1$, or in the field, $\beta = -0.20$, $t(83) = -1.36$, $p = .178$, there was no significant relationship between Black-danger association and their reaction times to fight-related words and flight-related words.

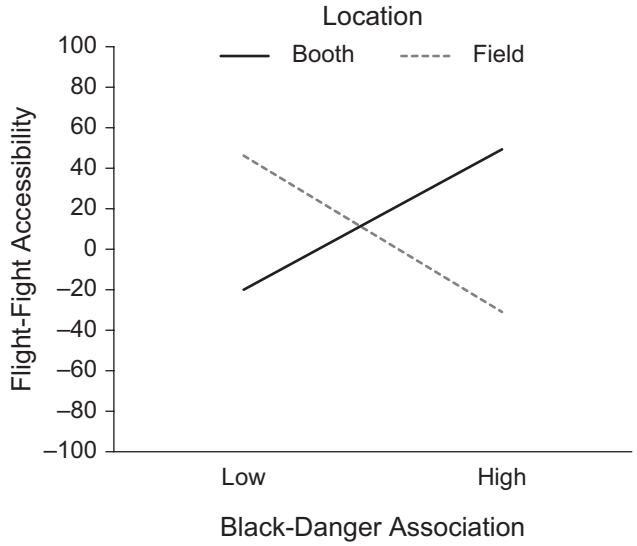

Fig. 2. Accessibility of fight-related and flight-related action semantics in response to Black-male primes in Study 1. Higher numbers on the *y*-axis indicate a relatively greater accessibility of fight-related words; lower numbers indicate a relatively greater accessibility of flight-related words. Higher values on the *x*-axis indicate stronger associations between Black men and danger. Results are shown separately for participants located in an open field and participants located in an enclosed booth.

To summarize, Black-male priming increased the accessibility of different action semantics, depending on whether participants were in an enclosed booth or in an open field. In the booth, where no distancing behavior was possible, priming with Black males resulted in a higher accessibility of fight-related words as participants' associations between Black men and danger increased. In contrast, in an open field, where distancing behavior was possible, priming with Black males resulted in a higher accessibility of flight-related words, again as participants' associations between Black men and danger increased. These findings demonstrate the fundamental role of a person's ecology in the automaticity of action semantics.

Such findings prompt two additional questions, both addressed by Studies 2a and 2b. First, might it be possible to keep the priming situation constant and instead manipulate the situation in which behavior following priming is executed? If such a manipulation produces differences in automatic behavior, this would demonstrate the dynamic nature of behavioral preparation and execution, in which situational opportunities are continuously but nonconsciously assessed to determine the most functional behavior. Moreover, it would suggest that the prime itself has little meaning to people until the situational contingencies are taken into account.

Second, we asked the question "for whom might such effects be greater?" in an additional way. Study 1 showed that the degree to which participants associated Black men with danger was important in preparing a threat response. In addition to this individual difference, it might also be the case that certain people are more likely to engage in distancing behavior when given the opportunity to do so, whereas other people might be more likely to take on threats even when distancing behavior is an option.

Studies 2a and 2b: Expressing Automatic Behavior in Different Situations

In this pair of studies, we varied the situation in which participants expressed automatic social behavior. All participants were primed with pictures of Black men or White men while seated in an enclosed booth. Half the participants, those in Study 2a, experienced the standard computer-crash procedure while remaining in the booth (no distancing behavior possible). The other half, those in Study 2b, did not experience a crash. Participants in this group were then moved to a situation in which they could exhibit either physical-distancing behavior or closing-in behavior (distancing behavior possible). We again assessed the degree to which participants associated Black men with danger.

As previously noted, when distancing behavior is not possible, an imminent high-magnitude threat elicits defensive-attack behavior. When distancing behavior is possible, a high-magnitude threat typically elicits flight behavior. The concept of RHP, however, contributes additional precision to these predictions because it influences whether animals "decide" to engage in aggressive strategies (Parker, 1974).

When distancing behavior is possible and resources are perceived to be low, flight behavior is more likely. If resources are perceived to be high enough to counter the threat, however, then flight behavior is less likely and attack is possible. When distancing behavior is not possible, defensive attack is likely regardless of RHP, because the situation has constrained the animal's behavioral options. A weaker animal will defensively attack a stronger threat if it is cornered (e.g., D.C. Blanchard & Blanchard, 1984).

In applying these principles to the procedures for these studies, we made the following predictions: First, when distancing behavior was not possible (Study 2a), priming with Black males would result in aggression. This would be true only for participants who associated Black men with danger, and we did not expect RHP to influence the likelihood of aggression. Second, when distancing behavior was possible (Study 2b), priming with Black males would result in either aggressive closing-in behavior or distancing behavior. This was expected to be true only for participants who associated Black men with danger, and RHP was expected to predict the likelihood of fighting or fleeing. We predicted that people with low RHP would show more distancing behavior, whereas people with high RHP would show more aggressive closing-in behavior.

Method

Participants and design. One hundred ninety-one White undergraduates (76.2% female and 23.8% male[3]; age = 18–23 years) completed the study for partial course credit. Participants were randomly assigned to either Study 2a (no distancing behavior possible) or Study 2b (distancing behavior possible). (These conditions are described as separate studies because of the different dependent variables assessed.) Each study had a Prime (between subjects; Black, White) × Black-Danger Association (continuous) × RHP (continuous) design.

Procedure and materials. The studies were divided into two sessions; participants completed both individually. In Session 1, participants' association between Black men and danger was assessed with the same sequential-priming task as in Study 1.

In Session 2, which occurred 3 weeks later, the priming task and the RHP measure were administered. Participants were placed in booths and began a bogus perceptual-judgment task, in which they made odd or even judgments of circles presented on the computer. The actual purpose of the task was to subliminally present pictures of either Black male faces or White male faces (between subjects, with the experimenter blind to condition).

After 100 trials, participants were randomly assigned by the computer to one of two conditions. In the no-distancing-behavior condition (Study 2a), the computer crashed, and while remaining in the booth, participants were told by the experimenter that they would have to start again. The experimenter then left to "contact the head experimenter" and rate participants' aggressiveness (scale from 0, *not at all hostile*, to 10, *extremely hostile*). On returning, the experimenter pressed a key sequence that "recovered" the data.

In addition to the experimenter's rating of aggressiveness, in-depth ratings were provided by two independent coders, also blind to prime condition, who viewed a recording taken by a hidden camera. (Written permission from participants was later obtained.) Coders rated how hostile, angry, irritable, uncooperative, and aggressive participants' reactions were (scale from 0, *not at all*, to 10, *extremely*). An overall aggressiveness rating was computed by averaging all ratings ($\alpha = .85$).

In the distancing-behavior-possible condition (Study 2b), in contrast, the computer task ended without incident. Participants were then led to an adjacent room where they believed they would work with another participant. There were several folding chairs in the room, one of which was already unfolded, with a backpack next to it and a coat hung over the back. The experimenter told the participant that he or she forgot to unfold an additional chair and that the participant should "just grab one and have a seat anywhere," also noting that the other participant would return soon. Thus, participants could then engage in either distancing behavior or aggressive closing-in behavior by placing their chair either far from or close to the other participant's chair. The experimenter later measured the distance between the chairs.

Participants later completed the RHP measure, in which they were shown four pictures of young men (one Black, two White, and one Asian; we were interested only in responses to Black targets). Participants were asked to record their likely response to getting into a confrontation with each person. Participants recorded their response on a scale from 0 (*I would feel up to the challenge*) to (*I would certainly back down*). Responses were reverse-coded such that higher scores indicated higher RHPs.

Eight participants expressed suspicion that the study concerned racial-intergroup behavior, and 14 participants experienced methodological problems. All were removed from analyses. This left a final sample of 169 participants.

Results and discussion

Considering first the standard booth condition in which no distancing behavior was possible (Study 2a), we conducted a multiple regression analysis with aggressiveness ratings as the predicted variable, and prime (between subjects; 0 = Black, 1 = White), Black-danger association (continuous, centered), and RHP (continuous, centered) as predictor variables. The analysis revealed the predicted two-way interaction between prime and Black-danger association, $\beta = -0.47$, $t(62) = -2.09$, $p = .041$. For participants primed with Black male faces, the greater their association between Black men and danger, the more aggressive their response, $\beta = 0.48$, $t(62) = 2.91$, $p = .005$; no such relationship was observed for participants primed with White male faces, $\beta = 0.01$, $t(62) < 1$. Thus, the variable of Black-danger association moderated the classic

automatic-behavior effect. There were no interactions with RHP—Prime × RHP: β = −0.07, $t < 1$; Prime × RHP × Black-Danger Association: β = −0.34, $t(62) = -1.11$, $p = .270$; this indicated that perceptions of sufficient resources to counter a threat were not significantly related to degree of aggressiveness. This was predicted by our model; in an enclosed situation—when fight-related action is the only option—the animal's perceived RHP should not be relevant.

In the condition in which distancing behavior was possible (Study 2b), we found the predicted three-way interaction of prime, Black-danger association, and RHP, β = 0.37, $t(79) = 1.81$, $p = .075$. Figure 3 shows results for the Black-male prime condition. As predicted, participants low in RHP (–1.5 *SD*) sat farther away from the target chair as their association between Black men and danger increased, β = 0.72, $t(79) = 1.87$, $p = .065$. In contrast, participants high in RHP (+1.5 *SD*) sat closer to the target chair as their association between Black men and danger increased, β = −0.49, $t(79) = -2.04$, $p = .045$.

Also as predicted, this interaction pattern was not observed for participants in the White-prime condition. The effect of Black-danger association on seating distance did not differ in direction between participants high in RHP and participants low in RHP, and the effect of Black-danger association on seating distance did not differ reliably from zero for participants either high in RHP, β = 0.17, $t(79) < 1$, or low in RHP, β = 0.27, $t(79) = 1.30$, $p = .198$.[4]

Studies 2a and 2b demonstrate that the situation in which action is executed establishes the options available for responding to a social category. Participants primed with Black male faces responded with aggression when that was the only response possible, but they responded with either aggression or distancing behavior when the situation allowed for both responses. It is critical to note that the interactions with Black-danger association and RHP rule out several alternative interpretations (e.g., that closing-in behavior represents general confidence or friendly approach). Furthermore, by showing distancing behavior in response to Black-male priming, we provide the first evidence that behaviors that have no feature overlap with the category stereotype can be enacted following priming; this makes it clear that stored trait information cannot be entirely responsible for automatic social behavior and cognition.

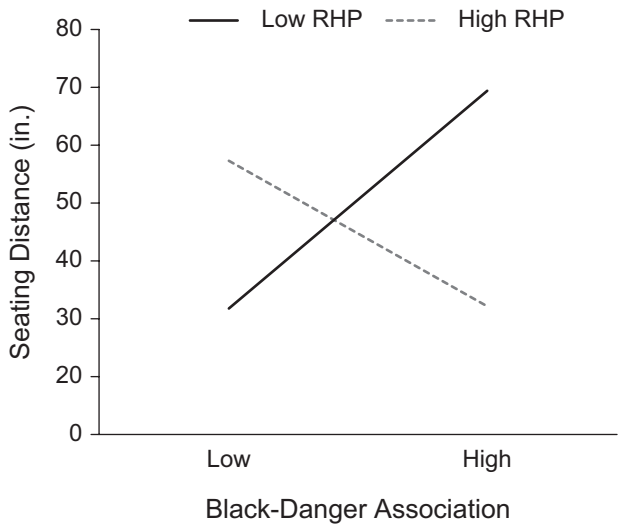

Fig. 3. Seating distance between the participant and target after Black-male priming in Study 2b. Higher values on the *x*-axis indicate stronger associations between Black men and danger. Results are shown separately for participants low (–1.5 *SD*) and high (+1.5 *SD*) in resource-holding potential (RHP), which is a measure of a person's assessment of his or her ability to counter threats.

General Discussion

Our ecological approach to automaticity complements current work in situated social cognition that emphasizes that basic cognitive and behavioral processes are intimately bound by situations (e.g., Smith & Semin, 2004, 2007). Activation of action semantics (Study 1) and behavioral expression (Studies 2a and 2b) in response to social-category primes were systematically influenced by how the situation either allowed for or restricted certain behaviors. These data are consistent with other research showing flexibility in response to priming (e.g., Blair, 2002; Sinclair, Lowery, Hardin, & Colangelo, 2005), but, at the same time, our study goes beyond this earlier work by showing, for the first time, the influence of the person's physical environment.

We suggest that it is critical to appreciate the functional relevance of behavior following priming. In our account, the relevance of a behavioral response is not determined by the degree of feature overlap between that behavior and the information contained in the primed category. Instead, relevance is determined by the degree to which a behavior fulfills a person's interaction goal (Plaks & Higgins, 2000). This means that any behavior similarly functional for goal fulfillment could be executed following priming (see Lewin, 1951). Similarly, different social-category primes could produce an identical behavioral response if the motivational significance of the categories is the same (e.g., people to distance myself from).

Our hope is that the present research represents a step in advancing integrative social-psychological approaches informed by natural- and social-science traditions (see also D.C. Blanchard et al., 2001). By drawing on overlap between these functionalist approaches, we hope to contribute to an understanding of social behavior that is rooted in an analysis of the relationship between a person's goals and his or her environment.

Acknowledgments

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Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

Notes

1. These accounts do posit a role for the situation, which acts as a gateway for behavioral expression. (Aggression is not expressed randomly, but is expressed only when applicable.) However, the situation cannot change the expressed behavior in any way; it only influences whether the activated behavior, which is based on stereotype content, is expressed. This reasoning is different from an ecological analysis.
2. Error trials (4.57%) were excluded; 2 participants with excessive errors (> 50% of trials within a target-word type) were also excluded.
3. Interactions with sex were observed. However, given the small number of males, we could not reliably probe these interactions. (For example, predicting simple-slope lines of the Sex × Prime × Black-Danger Association interaction involved approximately 10 males across the entire range of the continuous variable.) Our solution was to partial out the sex effect from the predicted variables and then compute regressions on these residuals. It is important to note that significance testing of regression terms did not differ whether we used residualized or original dependent variables. For ease of comprehension, Figure 3 plots the original scales.
4. There was also an unpredicted Black-Danger Association × RHP interaction, $\beta = -0.40$, $t(79) = -2.57$, $p = .012$.

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