Stimulus pairing and statement target information have equal effects on stereotype-relevant evaluations of individuals

Rachel S. Rubinstein and Lee Jussim

Rutgers University—New Brunswick

Paper in press at *Journal of Theoretical Social Psychology*

Abstract

The present research tested a series of theoretically derived competing hypotheses regarding the extent to which different ways of learning about others influence stereotype-relevant impression formation and reliance on stereotypes in stereotype-relevant target evaluations. First, we examined the extent to which stimulus pairing or statement information about novel White (Study 1) and Black (Study 2) targets’ intelligence influenced implicit and explicit impressions of the targets’ competence. In both studies, we found that the two modes of information presentation produced equal effects on impression formation at both the implicit and the explicit levels. In a third study, we compared the effectiveness of stimulus pairing and statement information at reducing or eliminating the influence of stereotypes on implicit and explicit person perception. We found that stereotyping in implicit person perception was completely eliminated by both types of information, but found no evidence of explicit stereotype bias even in the absence of individuating information. Together, the results of the three studies suggest that stimulus pairing and statement target information are equally influential in the formation of stereotype-relevant impressions of novel targets and in eliminating the influence of stereotypes on stereotype-relevant target evaluations. These findings provide support for propositional models of implicit evaluations and for dual-process theories allowing for interaction between different learning systems, but do not support dual-systems theories.

*Keywords:* Social learning; association; verbal learning; social perception; stereotyping; group processes; social theory

Stimulus Pairing and Statement Target Information Have Equal Effects on Stereotype-Relevant Evaluations of Individuals

What types of information do we use when evaluating other people? Social information may come in the form of heuristic information such as stereotypes (general beliefs about social groups and their individual members; Ashmore & Del Boca, 1981), or it may be information relevant to specific individuals. For instance, when a college admissions officer evaluates a Black applicant, he or she has at hand both the societal stereotype that Black people are less intelligent than Whites (e.g., Devine, 1989; Wittenbrink, Judd, & Park, 1997), and a wealth of information specific to the applicant, such as the student’s grades, SAT scores, and extracurricular involvement. And within the domain of information specific to individuals, sometimes we may judge others based on verbal information, such as when we read a job applicant’s cover letter or a friend tells us about an acquaintance. Other times, co-occurrences between a target and social information may influence our evaluations. For example, if we see the same well-dressed stranger at a soup kitchen and an animal shelter, we may infer that the stranger is volunteering and therefore evaluate the stranger as kind.

We conducted three experiments to compare the extents to which different ways of learning about members of stereotyped groups influence the formation of stereotype-relevant impressions and reduce the influence of stereotypes on evaluations of individuals. The types of learning we investigated were that which results from processing verbal information and that which results from observing co-occurrence between targets and social information. We addressed our research questions in both implicit and explicit person perception with a focus on implicit person perception.

**Processes Underlying Social Cognition**

**Dual-process vs. single-process models.** Currently, there is a debate regarding the processes underlying implicit and explicit social cognition (for reviews, see Cone, Mann, & Ferguson, 2017; Ferguson, Mann, & Wojnowicz, 2014). A common distinction made in this literature is that between propositional, fast-learning processes and associative, slow-learning processes (e.g., Gawronski & Bodenhausen, 2006, 2011, 2018; McConnell & Rydell, 2014; Rydell & McConnell, 2006; Smith & DeCoster, 2000). Propositions are statements about the world that have truth values (Gawronski & Bodenhausen, 2006, 2011, 2018) and explicitly state the relationship between target concepts (e.g., “The sky is blue”; De Houwer, 2014a, 2014b). Associations have been conceptualized as links between nodes in a mental network that can be activated or inhibited by stimulus information (e.g., Collins & Loftus, 1975; Kunda & Thagard, 1996), and some perspectives posit that these connections can be excited regardless of whether perceivers personally endorse the link between the two concepts (e.g., Devine, 1989; Gawronski & Bodenhausen, 2006, 2011, 2018).

Dual-process and dual-systems theories propose that propositional processes or systems underlie explicit social cognition, whereas associative processes or systems provide the foundation for implicit social cognition (Gawronski & Bodenhausen, 2006, 2011, 2018; McConnell & Rydell, 2014; Rydell & McConnell, 2006; Smith & DeCoster, 2000). However, there is disagreement regarding the extent to which these processes interact. One dual-systems theory, the Systems of Evaluations Model (SEM; McConnell & Rydell, 2014; Rydell & McConnell, 2006) argues that the two systems are independent—that they usually do not influence one another. Others propose that that it is relatively common for associative and propositional processes to influence one another and delineate the circumstances under which such interaction occurs (Gawronski & Bodenhausen, 2006, 2011, 2018).

In contrast with dual-process and dual-systems perspectives are propositional models of implicit evaluations (De Houwer, 2014a, 2014b; Hughes, Barnes-Holmes, & De Houwer, 2011). These single-process models posit that, instead of associative processes, a propositional process underlies implicit evaluations. Moreover, they propose that what dual-process models argue are two separate learning processes, associative learning and propositional learning, actually consist of a single propositional learning process.

Due to their fundamental differences, single- and dual-process models also differ in terms of how they explain dissociations between results of implicit and explicit measures. Single-process models propose that such discrepancies emerge when differences in automaticity of responses lead to the activation of different propositions (see Cone, Mann, & Ferguson, 2017). Dual-process models, on the other hand, explain such discrepancies in terms of the two separate underlying processes that are capable of operating completely independently (Gawronski & Bodenhausen, 2006, 2011, 2018; Rydell & McConnell, 2006; McConnell & Rydell, 2014).

**Associative versus propositional learning.** Associative learning is proposed by dual-process and dual-systems models to mediate learning that results from evaluative conditioning procedures (e.g., Olson & Fazio, 2001), which involve repeated exposure to pairings of unconditioned and conditioned stimuli (US and CS, respectively; De Houwer, Thomas, & Baeyens, 2001). According to associative accounts of such learning, these pairings cause unqualified links to form between the US and CS, resulting in an evaluative response to the CS (e.g., Gawronski & Bodenhausen, 2006, 2011, 2018). In contrast, according to propositional perspectives, upon exposure to repeated stimulus pairings, simple associations do not form. Instead, propositions that contain relational information about the stimuli are formed, and the formation and automatic retrieval of these propositions underlie implicit evaluations (De Houwer, 2014).

When dual-process and dual-systems models (e.g., Gawronski & Bodenhausen, 2006, 2011, 2018; McConnell & Rydell, 2014; Rydell & McConnell, 2006) discuss propositional or rule-based learning, this can be conceptualized as the “formation of new associations on the basis of evaluative information that is considered valid” (Gawronski & Bodenhausen, 2011, p. 87). This information usually is presented in statement format. From this view, because statements specify the relationship between target concepts, such information causes propositions to form, and these propositions influence evaluations. Propositional models (De Houwer, 2014a, 2014b; Hughes et al., 2011) do not challenge this claim; rather, they specify that a similar process underlies all forms of learning.

In this paper, consistent with previous research comparing the effects of different learning manipulations (Kurdi & Banaji, 2017), we refrain from describing specific learning paradigms as “associative” or “propositional” learning manipulations because of the disagreement regarding the processes underlying these different learning paradigms. Instead, we use terms descriptive of the mode of presentation (“stimulus pairing information” and “statement information”).

**Past Empirical Research Comparing the Relative Effects of Stimulus Pairings and Statement Information on Immediate[[1]](#endnote-1) Implicit Evaluations**

The exclusive influence of stimulus pairing information (e.g., Olson & Fazio, 2001) and the exclusive influence of statement information (e.g., De Houwer, 2006) on implicit evaluations have been shown repeatedly in past studies that have investigated the effects of only one of these learning paradigms on implicit evaluations. However, most relevant to the present studies is research that has compared the relative effectiveness of these two learning manipulations.

**Separate administrations of stimulus pairing information and statement information[[2]](#endnote-2).** In a series of experiments, Kurdi & Banaji (2017a) compared the independent effects of stimulus pairing information with those of statement information on implicit attitude formation and change. The stimulus pairing manipulation in this research was experience-based evaluative conditioning, in which participants were actually exposed to stimulus pairings. In the statement information manipulation, participants underwent instruction-based evaluative conditioning (e.g., De Houwer, 2006), in which they were simply instructed that upcoming stimuli would be paired with positive or negative images; they did not actually experience these pairings. Results showed that this statement information was at least as effective as—and, in most cases, more effective than—the stimulus pairing information in forming and changing implicit attitudes toward social and nonsocial groups. This outcome was somewhat inconsistent with predictions derived from existing theoretical perspectives, but was more compatible with propositional models of implicit evaluations (De Houwer, 2014a, 2014b; Hughes et al., 2011) than with strictly associative models (e.g., Rydell & McConnell, 2006; Rydell et al., 2006).

In addition, in one study, Gast & De Houwer (2013) administered experience-based evaluative conditioning to test the effect of stimulus pairings on implicit evaluations of initially neutral stimulus words. In a separate experiment, instruction-based evaluative conditioning was used to assess the effect of statement information on initially neutral stimulus words. Pooling the data across both studies, they found no differences in implicit evaluations based on the learning manipulation, showing that the statement information and stimulus pairings had an equally strong influence on implicit evaluations. This result was consistent with propositional models of implicit evaluations (De Houwer, 2014a, 2014b; Hughes et al., 2011) because if a single process underlies all forms of learning, the effects of different learning manipulations should be the same. However, because the data were taken from two separate studies, this analysis was performed on evaluations made by participants who were not randomly assigned to experimental condition, which weakens the inferences that can be drawn from these findings.

In addition, Gregg, Seibt, & Banaji (2006, Study 1) assigned participants to one of three conditions in which they were either supraliminally primed with positive or negative traits associated with novel target groups (a stimulus pairing condition), instructed to read a story that conveyed positive or negative acts in which groups had engaged (a statement information condition), or were told to imagine that the groups were characterized by positive or negative traits (similar to a statement information condition). Significant implicit preferences were acquired from priming and from imagining that the groups were characterized by positive or negative traits, but not from reading the stories. These results provided some support for propositional models of implicit evaluations in that implicit preferences were acquired both in the stimulus pairing condition and in one of the two statement information conditions. However, the results from the other statement information condition showed no acquisition of implicit preferences. The results of this study should be taken with caution because sample sizes in each condition were small (8 to 12 participants).

**Opposing statement and stimulus pairing information.** Another method of comparing the relative effectiveness of stimulus pairing and statement information at inducing or changing implicit evaluations is to present each participant with stimulus pairing and statement information that have opposing content before evaluations are made. If implicit evaluations are found to be in the direction of one of these two types of information, then that type of information presumably dominated implicit evaluations. Under these circumstances, most research shows that stimulus pairings exert a greater influence than statement information on implicit evaluations (DeCoster, Banner, Smith, & Semin, 2006; Hu, Gawronski, & Balas, 2017a; Moran & Bar Anan, 2013; Rydell & McConnell, 2006; Rydell et al., 2006; see also Hu, Gawronski, & Balas, 2017b; Whitfield & Jordan, 2009). However, some research suggests that this effect depends in part on factors such as the timing of the presentation of statement information (Zanon, De Houwer, Gast, & Smith, 2014). Overall, this body of research supports dual-process perspectives (Gawronski & Bodenhausen, 2006, 2011; Rydell & McConnell, 2006).

**Limitations to Previous Assessments of the Relative Effects of Stimulus Pairing and Statement Information**

 Studies investigating the relative effects of stimulus pairing and statement information mostly follow one of two paradigms: (1) instruction-based evaluative conditioning is compared with experience-based evaluative conditioning, or (2) opposing stimulus pairing and statement information are presented prior to evaluations and researchers assess whether implicit evaluations are consistent with the stimulus pairings or the statement information. Each of these methods and associated empirical evidence has limitations.

**Limitations to comparing instruction-based with experience-based evaluative conditioning.** The strength of this method is that it is capable of assessing the independent power of statement and stimulus pairing information to shape implicit evaluations (Gast & De Houwer, 2013; Kurdi & Banaji, 2017, Studies 1-5). However, it relies in part on instruction-based evaluative conditioning, and instruction-based evaluative conditioning does have a limitation. Specifically, instruction-based evaluative conditioning is meant to assess learning of statement information that specifies relationships between concepts. Yet, in this procedure, the statement relating the target with a concept is indirect. Stating that “Target X will be paired with positive photos” is not as clear a relationship as simply stating that “Target X is good.” Thus, if the purpose of instruction-based evaluative conditioning is to assess the effect of learning direct relationships between targets and attributes, it may not accomplish its aim optimally. Instead, the learning of direct relationships would be better tested by a manipulation that explicitly links the target to the attribute (“Target X is good”).

This limitation has been addressed in one study (Kurdi & Banaji, 2017, Study 6c) that compared two statement learning manipulations—one stating that targets would be paired with positive or negative stimuli (the standard instruction-based evaluative conditioning manipulation), and the other that the targets were “good” or “bad.” The two manipulations exerted equal effects on implicit evaluations. However, in this study, there were no stimulus pairing conditions with which the effects of each statement learning condition could be compared. In addition, across Kurdi & Banaji’s five main studies, three experiments showed that statement information exerted larger effects on implicit evaluations than did stimulus pairings, but in two studies, the effects of the two learning manipulations did not significantly differ. Given this fluctuation in the relative effects of statement information, it is possible that the effect of one of the statement information conditions in either of the studies that addressed the aforementioned methodological limitation would have differed with other stimuli, target groups, or target concepts.

**Limitations to comparing the influence of competing stimulus pairing and statement information on implicit evaluations.** A shortcoming of the literature assessing the effects of opposing stimulus pairing and statement information on implicit evaluations is that, in the vast majority of these studies (cf. Hu et al., 2017b), both stimulus pairing and statement information were provided to participants prior to assessment of implicit evaluations. Evaluations consistent with the content of one of the two types of information do provide evidence that this learning manipulation was more effective than the other. However, the administration of both types of information before evaluations are made allows for the possibility that the two sets of information interact and thus influence one another in ways that are not assessed. It also means that, when the order of the presentation is not counterbalanced, such studies may measure attitude change rather than attitude formation. In addition, the magnitude of the separate effects of stimulus pairing and statement information are not measurable using this method.

**Open Questions**

Although abundant previous research has assessed the effects of statement or stimulus pairing information about individuals on purely affective, attitudinal implicit evaluations of these targets (e.g., Cone & Ferguson, 2015; Mann & Ferguson, 2015, 2017; Rydell & McConnell, 2006; Whitfield & Jordan, 2009), only two previous programs of research have investigated the effects of information about individuals on implicit *stereotype-relevant* target evaluations (Cao & Banaji, 2016; Rubinstein et al., 2018). Such evaluations are conceptually distinct from attitudinal evaluations despite having an affective component because they involve cognitive beliefs about members of social groups (Ashmore & Del Boca, 1981). One of these past investigations found that individuating information (i.e., information specific to an individual member of a stereotyped group) presented in statement form reduced implicit stereotyping of individuals (Cao & Banaji, 2016), and the other found that highly diagnostic statement individuating information eliminated implicit stereotyping of individuals (Rubinstein et al., 2018). Both found substantial effects of statement target information on stereotype-relevant implicit impression formation.

However, neither of these programs of research presented perceivers with stimulus pairing information about targets. The lack of research assessing the effects of stimulus pairing information on implicit stereotype-relevant evaluations of individuals also means that, to our knowledge, no previous research has compared the effects of statement and stimulus pairing information on implicit stereotype-relevant evaluations. This is an important gap to address because co-occurrence between targets and social information (as is the case with stimulus pairing information) is common in everyday life (e.g., coincidentally seeing the same stranger in different places), and because stereotype bias can be a precursor to other forms of bias (e.g., Wilder, 1986).

In addition, in the domain of comparing the effects of stimulus pairing and statement information on implicit attitudes, there is exiguous previous empirical literature that has employed existing social groups or members of social groups as targets. The research that has been done found that, although counterattitudinal associative and propositional learning resulted in diminished implicit preferences in the domain of social groups, these preferences were not eliminated or reversed (Kurdi & Banaji, 2017). This, to our knowledge, leaves open the question of whether stimulus pairing information can completely override existing social implicit preferences (attitudinal or stereotypic).

**The Present Research**

The present research derived from dual-process, dual-systems, and single-process theories, as well as from past empirical evidence, a series of competing hypotheses regarding (a) the comparative influence of stimulus pairing and statement stereotype-relevant trait information on impressions of novel targets, and (b) the relative effectiveness of these two types of information at reducing or eliminating the influence of stereotypes on person perception. However, although our research was relevant to this theoretical debate, our aim was not to test the actual processes that mediate the effects of stimulus pairing and statement target information on implicit and explicit stereotype-relevant evaluations. Instead, it was to assess whether the effects of these two types of information on stereotype-relevant person perception were equal or different.

**Research Questions and Hypotheses**

 The present experiments addressed two research questions. For each of the two questions, we specified three competing hypotheses: one that predicted stronger effects of statement information than stimulus pairing information on implicit stereotype-relevant evaluations, another that predicted a stronger influence of stimulus pairing than statement information, and a third that predicted equal effects of these two learning manipulations.

The first of these categories of hypotheses was derived from the results of previous research comparing the separate effects of stimulus pairing and statement information on implicit attitudinal evaluations (Kurdi & Banaji, 2017), as the present research does in the domain of stereotype-relevant evaluations. These previous studies mostly found stronger effects of statement information than stimulus pairing information. Thus, our hypotheses consistent with this previous empirical evidence posited that statement information would exert greater effects on implicit stereotype-relevant evaluations than would stimulus pairing information. These hypotheses are labeled “a” in our list of hypotheses (e.g., Hypothesis 1a).

The second category of hypotheses was derived from both the traditional and more recent versions of the SEM (McConnell & Rydell, 2014; Rydell & McConnell, 2006). The older model does not allow for interaction between the associative and propositional systems. This strictly associative perspectives on implicit evaluations is consistent with the notion that stimulus pairing information should have a larger effect on stereotype-relevant implicit evaluations than should a small amount of statement information, or even with no effect of this statement information on implicit stereotype-relevant evaluations. The more recent version of the SEM (McConnell & Rydell, 2014) specifies that implicit evaluations should be more sensitive to associative cues, whereas explicit evaluations should be more sensitive to propositional cues; according to McConnell & Rydell, “The SEM proposes that each system becomes more fully engaged with information to which it is most sensitive and neglects (at least in part) information to which it is less sensitive” (2014, p. 213).  Because our stimulus pairing information would be considered associative information by this model and our statement information would be considered propositional information, the updated SEM also is consistent with the prediction of greater effects of stimulus pairing information than statement information. Hypotheses derived from this perspective are labeled “b” in our list of hypotheses.

The final category of hypotheses, labeled “c,” specified equal effects of stimulus pairing and statement information. These hypotheses were consistent with two theoretical perspectives. The first is the associative-propositional evaluation (APE) model (Gawronski & Bodenhausen, 2006, 2011, 2018). This theory specifies that statement information influences implicit evaluations of novel targets when this new information is considered valid. This condition is consistent with the circumstances of our statement information manipulations, which stated an affirmative relationship between novel targets and traits and behaviors, and provided no reason for participants to question its validity. In addition, the APE model asserts that evaluative conditioning, which was the basis for our stimulus pairing information condition, will always influence implicit evaluations, regardless of whether propositions are formed on the basis of the stimulus pairings. Thus, the APE model predicts effects of both our stimulus pairing information manipulation and our statement information manipulation on implicit stereotype-relevant evaluations, which is broadly consistent with the prediction of comparable effects of these two learning paradigms.

This category of hypotheses also is compatible with propositional models of implicit evaluations (De Houwer, 2014a, 2014b, Hughes et al., 2011) because such models posit that a single propositional process underlies all forms of learning. If associative and propositional learning are encompassed by a single learning process, then statement and stimulus pairing information should have equal effects on immediate implicit stereotype-relevant evaluations.

*Research question 1: What are the relative effects of stimulus pairing and statement information on implicit stereotype-relevant trait impressions of novel targets?*

Hypothesis 1a. Statement information should have a stronger effect on implicit stereotype-relevant trait impressions of novel targets than should stimulus pairing information.

Hypothesis 1b. Stimulus pairing information should exert a stronger influence on implicit stereotype-relevant trait impressions of novel targets than should statement information.

Hypothesis 1c. Stimulus pairing and statement information should have comparable effects on implicit stereotype-relevant trait impressions of novel targets.

*Research question 2: How comparatively effective are stimulus pairing and statement individuating information at reducing or eliminating the influence of stereotypes on implicit person perception?*

Hypothesis 2a. Statement individuating information should be more effective at overcoming reliance on stereotypes in implicit person perception than should stimulus pairing individuating information.

Hypothesis 2b. Stimulus pairing individuating information should be more effective at overcoming reliance on stereotypes in implicit person perception than should statement individuating information.

Hypothesis 2c. Stimulus pairing and statement individuating information should be equally effective at overcoming reliance on stereotypes in implicit person perception.

**Overview**

To address our research questions, we first examined the effects of statement or stimulus pairing information relevant to intelligence on perceptions of the competence of two novel White targets (Study 1) and two novel Black targets (Study 2). In each of these studies, one target was portrayed as intelligent and the other was depicted as unintelligent. Although intelligence is a racially stereotyped trait (e.g., Devine, 1989; Wittenbrink et al., 1997), each pair of targets belonged to the same racial group and the photos were pilot tested to be perceived as equally neutral in perceived intelligence. Therefore, there was no basis for pre-existing differences between the targets in each pair in perceived intelligence. Thus, Studies 1 and 2 allowed us to draw inferences about the relative power of stimulus pairing and statement information in the domain of stereotype-relevant impression formation.

In Study 3, we presented participants with one novel Black target and one novel White target who were portrayed as equally intelligent by stimulus pairing or statement individuating information, or with one novel Black target and one novel White target about whom no individuating information was provided. We then assessed the influence of racial stereotypes on perceptions of these individuals’ competence. Thus, Study 3 provided an avenue to compare the independent abilities of stimulus pairing and statement individuating information to reduce or eliminate existing stereotypes.

**Pilot Study**

Before conducting our experiments, we collected pilot data to identify stimulus faces that were perceived as equally neutral in intelligence in the absence of individuating information and that were readily identified by participants as Black or White (see Supporting Information for pilot data). Stimulus faces were taken from the Eberhardt Face Database (<http://www.stanford.edu/group/mcslab/cgi-bin/wordpress/examine-the-research/>).

**Study 1**

 Study 1 compared the effects of stimulus pairing and statement information on impression formation when perceptions of two White targets were expected to differ based on information provided about the targets (instead of on the basis of their racial background). In the statement information condition of our presentation mode manipulation, participants memorized descriptions of one intelligent and one unintelligent target. In the stimulus pairing information condition, the descriptions from the statement information condition were translated into images, which were presented in stimulus pairings with photos of the targets. After reviewing the target information, participants completed implicit and explicit measures of their beliefs about the targets’ competence. This study addressed competing predictions regarding the relative effects of stimulus pairing and statement information on impression formation (Hypotheses 1a-1c).

**Method**

 For all three studies in this program of research, we report all measures, manipulations, and data exclusions. Sample size was determined before any data analysis.

**Participants**. In all three studies, power analyses were based on the implicit experimental design because this was the focus of the research. The power analysis for Study 1, which specified an effect size of *f* = .15 to ensure that we could detect even a small presentation mode effect, a within-subjects correlation of *r* = .5, and 80% power, indicated that the necessary sample size was *N* = 90 (see Supporting Information for more details on the power analysis). We collected more participants than was necessary in anticipation of discarding data. Participants were 161 Infant and Child Development students at a large northeastern state university who participated in exchange for extra credit.

Data were discarded for participants who had incomplete data according to either of two criteria: either (1) they did not complete the majority of dependent measures (two out of three), or (2) their *D* scores were excluded due to excessive fast responses[[3]](#endnote-3) (total incomplete data *n* = 27). In addition, data were excluded for participants who participated in Studies 1 and 2 and who completed Study 2 prior to Study 1 (*n* = 2), and for Black (*n* = 10) and biracial (*n* = 3) participants[[4]](#endnote-4). Data from Black and biracial students were discarded from all three studies because Black perceivers’ implicit racial preferences generally differ from those of other perceivers (e.g., Nosek et al., 2007; Nosek, Banaji, & Greenwald, 2002). This left a final sample of *N* = 119 students, 100 of whom were female, 18 of whom were male, and 1 of whom identified with another gender. There were 70 White, 26 Asian or Asian-American, and 22 Latino or Hispanic participants, and one participant identified with a different racial group. The mean age was 20.44 years.

**Experimental design.** The explicit experimental design was a 2 (information content: intelligent vs. unintelligent) X 2 (presentation mode: stimulus pairing information vs. statement information) X 2 (target pairing: Luke-intelligent/Ryan-unintelligent vs. Ryan-intelligent/Luke-unintelligent) mixed-model design. Information content was the within-subjects factor.

The implicit experimental design was a 2 (presentation mode: stimulus pairing information vs. statement information) X 2 (target pairing: Luke-intelligent/Ryan-unintelligent vs. Ryan-intelligent/Luke-unintelligent) between-subjects design. Because scores from the implicit measure that we employed are difference scores, they inherently incorporated the within-subjects information content factor from the explicit experimental design.

**Stimuli.** Stimulus material consisted of target information provided to participants.

*Statement information condition.*In the statement information condition, participants read a description of one target suggesting that the target was intelligent, and a description of a second target that depicted the target as unintelligent. Individuating information content was counterbalanced such that for approximately half of participants, the target face assigned the name Luke Eric Reed was portrayed as intelligent and the target face given the name Ryan Bradley Winkler as unintelligent, while for the other half, the reverse was true. Because the stimulus pairing information condition necessarily involved showing participants photos of the targets, these photos were presented with the target descriptions in the statement information condition so that exposure to target photos would be constant across experimental conditions. The intelligent target description was as follows:

[Luke/Ryan] is very brainy.  He loves chemistry and in his spare time, he plays chess, solves crossword puzzles, and reads in the library.

The unintelligent target description depicted the target as follows:

[Luke/Ryan] is a brainless person.  He failed his exams and dropped out of school.  He dislikes reading and enjoys watching trashy TV shows.

*Stimulus pairing information condition.*The content of the information in the stimulus pairing information condition was meant to approximate as closely as possible the information conveyed in the statement information condition; in essence, we aimed to translate the written descriptions to images that contained no words or other people. The matching of the stimulus material in the statement and stimulus pairing information conditions methodologically distinguished our research from previous studies; to our knowledge, no previous research that has separately assessed the effects of stimulus pairing and statement information has provided the same stimulus information in both presentation modes. We believe that, generally speaking, matching the content of the information in the two conditions provides the purest test of the effect of presentation mode on target evaluations.

In the stimulus pairing information condition, a photo of the intelligent target was paired one at a time with a series of images: a brain (corresponding to “brainy” from the statement information condition), beakers filled with chemicals with molecule structures diagrammed on a blackboard behind the beakers (to represent chemistry), a chess set, a crossword puzzle solved in pen, and an open book with books on bookshelves in the background (to illustrate reading in the library; see Supporting Information for intelligent and unintelligent images). A photo of the unintelligent target was paired with different images: a brain overlaid with a null symbol[[5]](#endnote-5) (consistent with “brainless”), an academic paper with an F grade on it, a mortarboard overlaid with a null symbol (to represent dropping out of school), a stack of books overlaid with a null symbol (to show a dislike of reading), and a raunchy television program being displayed on a television set with a remote control in the foreground. As in the statement information condition, individuating information content was counterbalanced; for approximately half of participants, Luke was portrayed as intelligent and Ryan as unintelligent, while for the other half, the reverse was true.

**Measures.** An Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) measured differences in the perceived intelligence of Ryan and Luke at the implicit level. This measure was chosen because of its superior psychometric properties (e.g., Bar-Anan & Nosek, 2014). Stimulus categories included *Ryan, Luke, Intelligent, and Stupid.*  *Ryan* and *Luke* stimuli included the original photos of Ryan and Luke that were displayed during the presentation mode manipulation, a black and white version of each original photo, and a cropped version of each original photo. *Intelligent* stimuli were the words *intelligent, smart, competent,* and *capable*; *stupid* stimuli were the words *stupid, moron, dumb,* and *idiot.*

Explicit beliefs about Ryan and Luke’s competence included open-ended estimates of their IQs (with guidelines provided), and intelligence ratings made on a Likert-type scale of 1 (Very unintelligent) to 7 (Very intelligent; see Supporting Information for all explicit dependent measures). Results from explicit measures served both as dependent measures and as manipulation checks to ensure that our manipulations were successful. Additional manipulation checks were instructional manipulation checks (Oppenheimer, Meyvis, & Davidenko, 2009) to ensure that participants were reading the items in the explicit measures.

**Procedure**. Participants completed the study online using Qualtrics software. The IAT was administered using the IATGen application (Carpenter et al., 2018).

After participants provided informed consent, the presentation mode manipulation was administered. In the statement information condition, targets were introduced with a photo and the target’s full name. Participants were told that they would be provided with information about the person and were instructed to memorize the information because it would be needed to complete the remainder of the study (see Supporting Information for instructions from both experimental conditions). Presentation of target descriptions immediately followed the introduction of each target. Order of target presentation was randomized. After participants read the descriptions, the IAT was administered. Participants then proceeded to complete manipulation checks that ensured they had paid attention to the target information, explicit measures, demographic items, and suspicion checks.

In the stimulus pairing information condition, participants were again introduced to the two targets one at a time. In this condition, participants were told that they would see photos of the target paired with images and that they should learn the association between the target and the images. Consistent with Kurdi & Banaji (2017), the propositional relationship between the pairs of images was not specified, distinguishing it from the statement information condition. Following these instructions, ten trials were administered in which each of the five images was paired with the target twice. To ensure that participants would view the images, they were prevented from advancing to the next screen until two seconds had elapsed. From this point forward, the procedure was identical to that in the statement information condition.

**Results and Discussion**

**Interpretation of results in all studies.** We employed the IAT scoring algorithm recommended by Greenwald, Nosek, & Banaji (2003)[[6]](#endnote-6). However, in interpreting our results, instead of relying on statistical significance as an indication of implicit bias (the “true zero” interpretation; e.g., Stout, Dasgupta, Hunsinger, & McManus, 2011), consistent with Nosek et al. (2007, p. 10), we used a cutoff of |*D*| ≥ 0.15 as indicating a non-arbitrary implicit preference for three reasons. First, statistical significance is a function of sample size. In addition, recent evidence suggests that IAT scores are right-biased—that a lack of implicit preference is indicated by a score above zero rather than at zero (Blanton et al., 2015). Using a cutoff of |*D*| ≥ 0.15 represents a middle ground between the perspective that IAT scores are right-biased and the true zero interpretation because it equals approximately half of the magnitude of the average empirical zero point, 0.34, found for Black/White stereotype IATs by Blanton et al. (2015). In addition, computation of *D* scores is very similar to Cohen’s *d* (Cohen, 1988). If they are interpreted according to standard conventions for interpreting Cohen’s *d* (Cohen, 1988), the magnitude of any statistically significant effect that is smaller than 0.15 is below the widely accepted convention for even a small effect (*d* = .20; Cohen, 1988), rendering any such effect inconsequential. However, because our approach is untraditional, to allow readers to interpret the results through the lens of the traditional true zero interpretation if they so desire, a *t*-test comparing *D* scores to zero is reported for each *D* score that is presented. In most cases, the interpretation of results is the same regardless of which interpretation is adopted.

In addition, in all three studies, when one of the competing hypotheses predicted a null result and we found a null result, we report Bayes Factors (BF10) to quantify support for the null hypothesis. And with regard to explicit measures, BF10 are only reported for null results that directly address the comparison of the effects of statement information with those of stimulus pairing information since that is the focus of the present research. BF10 are not reported for significant effects because their narrow purpose is to provide information regarding the extent to which the effects of statement and stimulus pairing target information are similar (if they are, indeed, similar); for significant differences, this is accomplished by reporting effect sizes.

**Preliminary analyses.** In analyses of IAT data in Studies 1 and 2, *D* scores were coded so that all *D* scores represented more favorable impressions of the intelligent target’s intelligence than the unintelligent target’s intelligence. Preliminary analyses of data from implicit and explicit measures in Study 1 showed that results were essentially the same regardless of whether Luke or Ryan was paired with intelligent or unintelligent. Therefore, analyses are reported with the target pairing factor removed from analyses for implicit and explicit measures (see Supporting Information for results with target pairing factor included). In addition, when block order (stereotype inconsistent pairings first versus stereotype consistent pairings first) was included in the analysis of *D* scores, the known IAT block order effect (in which the first pairing task is oftentimes performed more quickly than the second; e.g., Nosek, Greenwald, & Banaji, 2005) was not found. Therefore, this factor is also omitted from the analyses reported below (see Supporting Information for results with block order factor included).

**Relative effects of stimulus pairing and statement information on implicit impression formation.** Both stimulus pairing information and statement information had substantial effects on impression formation, *M*StimulusPairing = 0.45 (> 0.15[[7]](#endnote-7)), *SD*StimulusPairing = 0.25, *t*(57) = 13.47, *p* < .001, *M*statement = 0.45 (> 0.15), *SD*statement = .24, *t*(61) = 14.66, *p* < .001[[8]](#endnote-8). We performed an independent-samples *t­-*test to assess whether the magnitude of these effects differed based on presentation mode. This analysis showed moderate[[9]](#endnote-9) evidence of equal influence of stimulus pairing and statement information on implicit impression formation, *t*(117) = 0.02, *p* = .99, BF10 = .20. These findings were consistent with Hypothesis 1c, which predicted equal effects of stimulus pairing and statement information on implicit impression formation.

**Explicit impression formation.** We also performed one 2 (presentation mode: stimulus pairing vs. statement) X 2 (information content: intelligent vs. unintelligent) mixed-model ANOVA on IQ estimates and another on intelligence ratings. Information content was the within-subjects factor.

There was moderate evidence that there was no effect of presentation mode on IQ estimates, *F*(1, 109) = 0.03, *p* = .86, *η* = .01, BF10 = .16, or on intelligence ratings, *F*(1, 117) = 0.74, *p* = .39, *η* = .03, BF10 = .15 (see Table 1 for Study 1 explicit dependent measure means, standard deviations, and 95% confidence intervals). In addition to demonstrating equal effects of statement and stimulus pairing information, this indicated that the two manipulations were equal in intensity; one did not convey intelligence more strongly than the other. Moreover, both ANOVAs revealed medium to large main effects of information content, IQ estimate *F*(1, 109) = 42.24, *p* < .001, *η* = .41, intelligence rating *F*(1, 117) = 136.98, *p* < .001, *η* = .70. On both dependent measures, the intelligent target was perceived as more intelligent than was the unintelligent target. Both presentation mode X information content interactions were nonsignificant, IQ estimate *F*(1, 109) = .31, *p* = .58, *η* = .04, intelligence rating *F*(1, 117) = 0.20, *p* = .66, *η* = .03. Thus, at both the explicit and implicit level, there were no differences in assessments of targets’ competence when stimulus pairing, compared with statement, information was provided, and intelligent targets were judged as more intelligent than unintelligent targets, though correlations between implicit and explicit measures were nonsignificant (see Supporting Information).

**Study 2**

One limitation of Study 1 is that it only assessed implicit impressions of White targets, whose racial group is stereotyped as intelligent (e.g., Wittenbrink et al., 1997). Study 2 therefore measured implicit impressions of Black targets, whose racial group is stereotyped as unintelligent (e.g., Devine, 1989; Wittenbrink et al., 1997). Like Study 1, Study 2 addressed competing predictions regarding the relative effects of stimulus pairing and statement information on impression formation (Hypotheses 1a-1c).

**Method**

The experimental design, stimuli, measures, and procedure in Study 2 were identical to those in Study 1 with the exception of the actual targets. Two Black target faces were used instead of the two White target faces, and the targets’ names were Jamal Tyrone Robinson and DeShawn Darnell Jackson instead of Luke Eric Reed and Ryan Bradley Winkler. The experimental stimuli and the IAT were modified accordingly.

**Participants.** The power analysis for this study was identical to that for Study 1. We again collected more data than was necessary in anticipation of discarding data. Participants were 147 students in a Memory class who were given extra credit in exchange for their participation. Data from participants who had incomplete data—i.e., those who did not complete the majority of dependent measures (two out of three) or whose IAT scores were removed due to excessive fast responses (using the same criterion as in Study 1)—were discarded (*n* = 23). In addition, data from Black (*n* = 5) and biracial (*n* = 4) participants were excluded, as were data from four participants who participated in both studies and completed Study 1 before Study 2 and from one research assistant involved in the project who completed the study[[10]](#endnote-10). This left a final sample of *N* = 110 participants included in the analyses, 72 of whom were female and 37 of whom were male. There were 65 White, 23 Asian or Asian-American, and 20 Latino or Hispanic participants, and two participants identified with a different racial group. The mean age was 21.24.

**Results and Discussion**

 **Preliminary analyses.** Analyses that were performed including the target pairing factor indicated that, with the exception of one statistically significant effect involving this factor in analyses of explicit measures, results did not differ based on which target was portrayed as intelligent and which was depicted as unintelligent (see Supporting Information). Moreover, this one effect was diminutive in magnitude. Thus, analyses of implicit and explicit measures reported below exclude this factor. In addition, as in Study 1, when block order (stereotype inconsistent pairings first versus stereotype consistent pairings first) was included in the analysis of *D* scores, the block order effect (e.g., Nosek et al., 2005) was not found, so this factor is excluded from the results reported below (see Supporting Information for results with block order factor included).

**Relative effects of stimulus pairing and statement information on implicit impression formation.** Hypotheses 1a-1c made predictions regarding the relative effects of stimulus pairing and statement information on implicit impression formation. An independent-samples *t­-*test compared *D* scores in the stimulus pairing information condition to those in the statement information condition. Consistent with Hypothesis 1c, which predicted equal effects of stimulus pairing and statement information on implicit impression formation, the difference between the effects of stimulus pairing information, *M* = 0.33 (> .15), *SD* = .35, *t*(55) = 7.18, *p* < .001, and statement information, *M* = 0.40 (> .15), *SD* = 0.31, *t*(53) = 9.43, *p* < .001, was nonsignificant, *t*(108) = 1.04, *p* = .30. A BF10 of 0.328 showed that the evidence in support of the null hypothesis was moderate in strength, but approached the lower criterion for anecdotal evidence in favor of the null hypothesis (BF10 ≥ 0.33).

**Explicit impression formation.** We also performed one 2 (presentation mode: stimulus pairing vs. statement) X 2 (information content: intelligent vs. unintelligent) mixed-model ANOVA on IQ estimates and another on intelligence ratings. There was moderate evidence that explicit impressions did not differ based on presentation mode, IQ estimates, *F*(1, 108) = 0.44, *p* = .51, *η* = .02, BF10 = 0.17, intelligence ratings, *F*(1, 108) = 1.60, *p* = .21, *η* = .05, BF10 = 0.19 (see Table 2 for Study 2 explicit dependent measure means, standard deviations, and 95% confidence intervals). As in Study 1, in addition to showing equal effects of information presented in the two presentation modes, this indicated that the two presentation mode manipulations were equal in intensity. Moreover, both ANOVAs showed large main effects of information content, IQ estimate *F*(1, 108) = 139.34, *p* < .001, *η* = .55, intelligence rating *F*(1, 108) = 197.77, *p* < .001, *η* =.75. In both analyses, the intelligent target was perceived as far more intelligent than was the unintelligent target. Both presentation mode X information content interactions were nonsignificant, IQ estimate *F*(1, 108) = 1.05, *p* = .31, *η* = .05, intelligence rating *F*(1, 108) = 0.02, *p* = .90, *η* = .01.

Thus, as in Study 1, although implicit and explicit measures were uncorrelated (see Supporting Information), on both implicit and explicit measures, there were no differences in impressions when stimulus pairing, compared with statement, information was provided. Moreover, intelligent targets were perceived as more intelligent than were unintelligent targets on both types of measures.

**Analyses and Conclusions across Studies 1 and 2**

**Comparing Impressions of Black and White Targets**

We performed an ancillary analysis to assess whether the magnitudes of the differences between the perceived competence of the intelligent and unintelligent targets were similar regardless of target race. To do so, we pooled IAT data from Studies 1 and 2 to compare *D* scores for White targets with those for Black targets. We found that *D* scores for White targets, *M* = 0.45, *SD* = .25, were significantly greater than those for Black targets, *M* = 0.38, *SD* = .33, *t*(227) = 2.28, *p =* .02, 95% CIdifference = (-0.16, -0.01), *d* = .30. Although the strength of the impressions differed, the effect size was small, indicating that the difference was slight, and this result did not have any bearing on the focal hypotheses tested in the present research.

**Summary**

Across Studies 1 and 2, we found that stimulus pairing and statement information about intelligence affected implicit stereotype-relevant trait impressions similarly, though to a slightly greater extent for White than for Black targets. This was consistent with predictions derived from the APE model (Gawronski & Bodenhausen, 2006, 2011) and from propositional models of implicit evaluations (De Houwer, 2014a, 2014b; Hughes et al., 2011). Our results ran counter to hypotheses derived from the earlier and updated versions of the SEM (McConnell & Rydell, 2014; Rydell & McConnell, 2006), which predicted that implicit impressions would be more sensitive to stimulus pairing information than to statement information. They were somewhat inconsistent with some previous empirical evidence showing mostly greater changes in implicit evaluations in the presence of statement information than stimulus pairing information (Kurdi & Banaji, 2017), though the two sets of results were similar in that they found no support for the SEM.

**Study 3**

In Studies 1 and 2, impressions were about two targets of the same racial background. Therefore, there was no reason for perceivers to expect differences between the two targets in their level of intelligence prior to learning relevant information. It is possible that it is more difficult to eliminate a firmly established, preexisting expected difference between targets that is based on their racial backgrounds than it is to create perceived differences between two targets of the same racial background. This possibility was assessed in Study 3 by examining the effects of stimulus pairing and statement individuating information on reliance on implicit and explicit stereotypes in person perception. To do this, we had participants implicitly and explicitly assess one Black and one White target about whom no individuating information was provided or one Black and one White target whom they learned were equally intelligent either from stimulus pairing or statement individuating information. We compared *D* scores in the two individuating information conditions with those in the no information condition to assess the extent to which each type of information reduced the influence of stereotypes on implicit person perception. This study tested hypotheses relevant to the effects of stimulus pairing and statement individuating information on stereotypes in implicit person perception (Hypotheses 2a-2c).

**Method**

**Participants.**  A power analysis using a specified effect size of *f* = .15, 80% power, and a correlation between repeated measures of *r* = .50 showed that the necessary sample size was 111. We collected data from more participants than necessary to ensure adequate statistical power after data cleaning. Data were collected from 289 General Psychology and Social Psychology students who participated in exchange for extra credit in their courses[[11]](#endnote-11). Data were eliminated from participants whose data were considered incomplete either because did not complete the majority of dependent measures (two out of three) or whose because their IAT scores were not used due to excessive fast responding (according to the same criterion as in the previous studies; total incomplete data *n* = 26). Data were also discarded from the 21 Black and 17 biracial participants[[12]](#endnote-12). This left a final sample of *N* = 225 participants included in our analyses, 127 of whom were female, 96 of whom were male, and two of whom identified with another gender. There were 118 White, 63 Asian or Asian-American, and 36 Latino or Hispanic participants, and eight participants identified with a different racial group. The mean age was 19.42 years.

**Experimental design.** The explicit experimental design was a 3 (individuating information: no information vs. stimulus pairing information vs. statement information) X 2 (target race: Black vs. White) mixed-model design[[13]](#endnote-13). Target race was the within-subjects factor. The implicit experimental design was a one-way (individuating information: no information vs. stimulus pairing information vs. statement information) between-subjects design; the IAT scores inherently incorporated the within-subjects target race factor.

**Stimuli.** In this study, when individuating information was available, both targets were portrayed as intelligent. Thus, in the statement information condition, there was one additional intelligent target description that replaced the unintelligent target description from Studies 1 and 2. This new description was:

[Target] enjoys using his brain.  He loves physics and in his spare time he solves Rubik's cubes, does sudoku, and goes to bookstores to read.

 In the stimulus pairing information condition, images that were paired with one target matched this new written description; these images included a different image of a brain, the equation E = MC2 written on a blackboard, an unsolved and a solved Rubik’s cube side-by-side connected by an arrow pointing to the solved puzzle, a blank and solved sudoku puzzle side-by-side, and a different image of an open book with more books in the background (see Supporting Information for stimuli). We counterbalanced which information was assigned to which target, and analyses indicated that across both presentation modes, the two sets of information conveyed equal intelligence (see Supporting Information), suggesting they were equal in intensity.

 There was no stimulus material provided in the no information condition; participants completed dependent measures in the absence of any individuating information about Jamal and Luke[[14]](#endnote-14). Without individuating information, perceivers tend to rely on stereotypes as the basis of stereotype-relevant evaluations of individuals (e.g., Kunda & Thagard 1996; Locksley, Borgida, Brekke, & Hepburn, 1980), which allowed us to assess reliance on racial stereotypes in person perception in this condition.

 **Measures.** Measures were identical to those used in the previous two studies except that the IAT was modified to include Jamal and Luke as targets instead of two targets of the same racial background.

 **Procedure.** The procedure for the two conditions in which participants reviewed individuating information was the same as that in Studies 1 and 2. In the no information condition, participants started by immediately completing the IAT. From that point, the procedure was identical to that in the other two conditions.

**Results and Discussion**

 **Preliminary analysis.** Before the main analyses were performed, the block order factor (stereotype inconsistent pairings first versus stereotype consistent pairings first) was included in the analysis of *D* scores to assess whether there was a block order effect (e.g., Nosek et al., 2005). Unlike Studies 1 and 2, in the present study there was a significant block order effect; *D* scores in the stereotype consistent pairings first condition, *M* = 0.21, *SD* = 0.36, 95% *CI =* (0.15, 0.28), were higher than those in the stereotype inconsistent pairings first condition, *M* = 0.07, *SD* = 0.36, 95% *CI =* (0.00, 0.12), *F*(1, 219) = 10.84, *p* = .001, *η* = .21. However, the interaction between individuating information X block order interaction was nonsignificant (see Supporting Materials), indicating that the block order effect did not moderate results relevant to our experimental manipulations (and, therefore, relevant to tests of our hypotheses) in any way. Therefore, we report the main analysis below excluding the block order factor (see Supporting Materials for analyses including block order factor).

**Comparing the effects of stimulus pairing and statement individuating information on implicit stereotypes.** IAT data were scored such that positive *D* scores indicated stereotype consistent implicit target perceptions (i.e., perceiving the White target as more intelligent) and negative *D* scores showed stereotype inconsistent implicit target perceptions (i.e., perceiving the Black target as more intelligent). In the absence of individuating information, implicit perceptions of Jamal and Luke were stereotype consistent, *D* = 0.27 (> 0.15), *SD* = .33, 95% CI = (0.20, 0.35), *t*(77) = 7.23, *p* < .001. We performed a one-way between-subjects ANOVA (individuating information: no information vs. stimulus pairing information vs. statement information) to test Hypotheses 2a-2c, which made competing predictions regarding how stimulus pairing or statement individuating information might change these stereotypic perceptions.

The individuating information main effect was significant, *F*(2, 224) = 8.81, *p* < .001, *η* = .27. Cell means revealed that implicit stereotyping was eliminated by both stimulus pairing individuating information, *M* = 0.07 (< .15), *SD* = .34, 95% CI = (0.00, 0.15), *t*(73) = 1.90, *p* = .06, and statement individuating information, *M* = 0.06 (< .15), *SD* = .37, 95% CI = (-0.03, 0.14), *t*(72) = 1.31, *p* = .20. A series of independent-samples *t*-tests was performed to assess differences in *D* scores between individuating information conditions, and a Bonferroni’s correction was applied to *p*-values to adjust for multiple comparisons. Means differed both between the stimulus pairing information condition and the no information condition, *D*difference = 0.20, *t*(150) = 3.61, *p* < .001, *d* = .60, and between the statement information and no information condition, *D*difference = 0.21, *t*(149) = 3.71, *p* < .001, *d* = .60. There was moderate evidence that means in the stimulus pairing and statement information conditions did not differ, *Ddifference =* 0.01, *t*(145) = 0.17, *p =* .86, BF10 = 0.19. These results supported Hypothesis 2c, which predicted equal effectiveness of stimulus pairing and statement individuating information at reducing or eliminating implicit stereotyping.

**Explicit person perception.** IQ estimates were negatively correlated with *D* scores, *r*s(177) < - .18, *p*s < .02. However, intelligence ratings were not correlated with *D* scores (see Supporting Materials for all correlations).

Our main explicit analyses were 2 (target race: Black vs. White) X 3 (individuating information: no information vs. stimulus pairing information vs. statement information) mixed-model ANOVAs on the explicit dependent measures to assess the effects of statement and stimulus pairing individuating information on explicit stereotype bias. Target race was the within-subjects factor.

We found significant race of target main effects on IQ estimates, *F*(1, 174[[15]](#endnote-15)) = 15.55, *p* < .001, *η* = .09, and on intelligence ratings, *F*(1, 222) = 7.72, *p* = .006, *η* = .06. The direction of the means revealed contrast effects (Jussim, Coleman, & Lerch, 1987); Jamal was perceived as more intelligent than Luke (see Table 3 for means, standard deviations, and 95% CIs), though the magnitudes of these effects were diminutive. The nonsignificant target race X individuating information interactions, *F*IQestimate(2, 174) = 0.11, *p* = .90, *η* = .01, *F*Intelligence(2, 222) = 0.08, *p* = .92, *η* = .01, revealed that this contrast effect was present regardless of the individuating information condition. However, especially in the no information condition, the contrast effects may have been attributable to social desirability bias.

We also found significant individuating information main effects for both dependent measures, *F*IQestimate(2, 174) = 17.74, *p* < .001, *η* = .39, *F*Intelligence(2, 222) = 31.75, *p* < .001, *η* = .45. Applying Bonferroni’s correction for multiple comparisons, we found that for both measures, targets were perceived as more competent in the stimulus pairing information condition than in the no information condition, IQ estimate *t*(116) = 7.87, *p* < .001, *d* = 0.77, intelligence rating *t*(150) = 4.54, *p* < .001, *d* = 0.74, and as more competent in the statement information condition than in the no information condition, IQ estimate *t*(116) = 6.48, *p* < .001, *d* = 1.19, intelligence rating *t*(149) = 8.39, *p* < .001, *d* = 1.36. Means in the stimulus pairing and statement information condition did not differ for IQ estimates to a moderate extent, *t*(116) = 0.45, *p* = .32, *d* *=* 0.09, BF10 = 0.20, but the mean intelligence rating in the statement information condition was higher than that in the stimulus pairing information condition, *t*(129) = 2.27, *p* = .01, *d* = .37.However, with post hoc removal of three outliers (more than 2.5 standard deviations lower than the mean), this difference became nonsignificant, *t*(142) = 1.59, *p* = .11, *d* = 0.27, BF10 = 0.19, indicating that a few very low intelligence ratings in the stimulus pairing information condition accounted for this difference. There were no high-scoring outliers. As in Studies 1 and 2, in addition to its tests of the changes in perceptions of targets brought about by stimulus pairing and statement target information, this indicated that the stimulus pairing and statement information manipulations were equal in intensity when outliers were excluded from analysis.

**Summary.** Overall, the results of Study 3 supported Hypothesis 2c, derived from propositional models of implicit evaluations (De Houwer, 2014a, 2014b; Hughes et al., 2011) and the APE model (Gawronski & Bodenhausen, 2006, 2011), which predicted that stimulus pairing and statement individuating information would be equally effective at reducing implicit stereotyping in person perception. Results were incompatible with Hypothesis 2b, which was drawn from the SEM (McConnell & Rydell, 2014; Rydell & McConnell, 2006) and did not support Hypothesis 2a, which predicted greater effects of statement information than stimulus pairing information on implicit stereotyping. In addition, on explicit measures, Jamal was perceived as more intelligent than Luke regardless of whether there was individuating information available and regardless of the presentation mode of available information. Moreover, when outliers were removed, there were no differences between explicit judgments made in the presence of stimulus pairing individuating information and explicit judgments made in the presence of statement individuating information.

 **General Discussion**

The present studies comprise the first program of research of which we are aware to provide evidence that implicit stereotype-relevant evaluations are equally sensitive to stimulus pairing and statement information, and it did so in two domains. First, implicit stereotype-relevant trait impressions of pairs of novel targets of the same racial background were influenced to the same extent by stimulus pairing and statement information; the two types of information resulted in equal perceived differences between the intelligence of a target portrayed as intelligent and the intelligence of a target depicted as unintelligent. Second, both stimulus pairing and statement individuating information eliminated preexisting implicit stereotypic beliefs that a Black target was less intelligent than a White target; in the absence of individuating information, there was anti-Black implicit stereotyping that was small to moderate in magnitude, but in the presence of either stimulus pairing or statement individuating information indicating that the targets were equally intelligent, this stereotyping was eliminated.

**Comparison With Past Empirical Literature**

Our findings were consistent with those of Gast & De Houwer (2013) and Gregg et al. (2006, Study 1), who separately assessed the effects of statement and stimulus pairing information on implicit evaluations. In all three programs of research, stimulus pairing and statement information affected responses on implicit measures at least somewhat similarly. However, in our experiments, instead of purely assessing attitudes, we assessed stereotype-relevant impression formation and stereotype-relevant target evaluations. In addition, these previous studies lacked random assignment to condition (Gast & De Houwer, 2013) or utilized a small sample (Gregg et al., 2006, Study 1), whereas ours employed random assignment and were adequately powered.

Our findings were also similar to those of Kurdi & Banaji (2017) in that (1) neither set of findings supported the SEM (McConnell & Rydell, 2014; Rydell & McConnell, 2006), and (2) two of their five main studies and all of ours found equal effects of statement and stimulus pairing information. However, our findings did diverge from those of Kurdi & Banaji (2017) in that in their remaining three main studies, statement information exerted a greater influence on implicit evaluations than did stimulus pairing information. This discrepancy is particularly surprising because the statement learning manipulation employed by Kurdi & Banaji in their main studies (informing participants that a target would be paired with pleasant or unpleasant images) was arguably less direct in connecting the target with a concept than was ours; our manipulation directly linked the target with synonyms for intelligence or unintelligence (e.g., “Jamal is very brainy”) and with information that further illustrated the trait (e.g., “…in his spare time, he plays chess…”).

One possible explanation is that in our research, the stimulus pairing information was intended to match the statement information as closely as possible, whereas in Kurdi & Banaji’s studies, the information in the two conditions differed to a greater extent. We essentially translated the statements about traits and hobbies into images, which were used in the stimulus pairing information condition. In contrast, there was no reference to specific pleasant or unpleasant stimuli in Kurdi & Banaji’s statement information manipulation in their main studies. If the information content is more similar across presentation modes, observed effects across presentation modes may be more likely to be equal. Although this may partially explain the discrepancy, it likely does not fully account for it because the pattern we obtained was consistent with other previous research (Gast & De Houwer, 2013) that employed manipulations similar to that of Kurdi & Banaji (2017) and because further studies meant to address this issue (e.g., Kurdi & Banaji, Study 6c) were inconsistent with this explanation.

Our results are inconsistent with those of several lines of research that have pitted opposing statement information and stimulus pairing information against one another (DeCoster et al., 2006; Moran & Bar Anan, 2013; Rydell & McConnell, 2006; Rydell et al., 2006). In these studies, stimulus pairing information usually has been found to exert a greater influence on implicit evaluations than statement information (but see Zanon et al., 2014). This discrepancy is likely attributable to the considerable methodological differences between these studies and ours; participants in those studies were exposed to both types of information prior to making their evaluations, while in our studies, they were only exposed to one type of information. Administering both types of information prior to the dependent measures may have allowed the two types of information to commingle and interact in untested and therefore unknown ways.

**Theoretical Implications**

The present research tested hypotheses derived from several alternative theoretical accounts of the processes underlying implicit and explicit evaluations. It provided consistent patterns of support or lack of support for these perspectives.

**Propositional models of implicit evaluations.** Propositional models of implicit evaluations were supported by the results of our research in the domains of both implicit impression formation and implicit stereotyping. If people essentially translate stimulus pairings into propositions, as proposed by these models (De Houwer, 2014a, 2014b; Hughes et al., 2011), this would produce the observed equal effects of stimulus pairing and statement information on implicit stereotype-relevant evaluations.

**Associative-propositional evaluations model.** The APE model (Gawronski & Bodenhausen, 2006, 2011, 2018) predicts that statements about novel targets or concepts will affect implicit target evaluations when this information is perceived as valid. In addition, it argues that stimulus pairing information invariably exerts an influence on implicit evaluations. Thus, it predicted effects of target information on implicit stereotype-relevant evaluations in both of our presentation mode conditions, which was consistent with our findings.

**Systems of evaluations model.** Our findings showing rapid formation of implicit impressions and elimination of implicit stereotyping both in the presence of either stimulus pairing information or a small amount of statement information were incompatible with both the older and updated versions of the SEM (McConnell & Rydell, 2014; Rydell & McConnell, 2006). These perspectives would predict that small amounts of statement information should not influence implicit stereotype-relevant evaluations.

**Implications for the Malleability of Implicit Preferences**

Previous research has shown the effectiveness of highly diagnostic individuating information in reducing (Cao & Banaji, 2016) or eliminating (Rubinstein et al., 2018) the influence of stereotypes on implicit person perception, but this information was exclusively statement information. The present research extended this finding to diagnostic stimulus pairing information and is the first research of which we are aware to find that stimulus pairing individuating information eliminated the influence of stereotypes on implicit person perception. This suggests that merely observing consistent co-occurrence between a target and counterstereotypic information may be adequate to override stereotype biases in person perception. This notion is inconsistent with longstanding assertions that stereotype biases are pervasive and recalcitrant (e.g., Allport, 1954; Brewer, 1988; Fiske & Neuberg, 1990; LaPiere, 1936).

In addition, only one previous program of research of which we are aware has assessed whether stimulus pairing information and statement information administered separately change implicit evaluations of existing social groups or members of these groups (Kurdi & Banaji, 2017). That research showed that prejudice against these groups was reduced by stimulus pairing and statement information but was not eliminated. Thus, the present research is the first that we know of in either the domain of attitudes or stereotypes to find the elimination of implicit preferences by both types of information in perceptions of existing social group members. This represents an important step toward identifying further avenues of changing stereotypic implicit evaluations.

**Limitations and Future Directions**

**Procedural limitations.** Several aspects of our procedures may limit the generalizability of our findings. One procedural limitation was that we exclusively used the IAT as our implicit dependent measure. Given that there is controversy about the interpretation of IAT scores (e.g., Blanton et al., 2015; Blanton & Jaccard, 2006), future research should test the hypotheses addressed by the current research using other measures.

Moreover, explicit measures were always administered after implicit measures. It is possible that the results of explicit measures would have differed if they were administered first. Therefore, future research should counterbalance the order of implicit and explicit measures.

In addition, there are limitations involved in any study that makes direct comparisons between the effects of statement and stimulus pairing information because it is difficult in a single study to eliminate all confounds between the two presentation modes due to their inherent differences. For instance, the number of learning trials that perceivers complete is confounded with the presentation mode in the present research and in all other studies that have made direct comparisons between the effects of stimulus pairing and statement information on immediate implicit evaluations (Gast & De Houwer, 2013; Gregg et al., Study 1; Kurdi & Banaji, 2017). Specifically, in stimulus pairing manipulations, perceivers have completed anywhere from 10 (the present research and Gast & De Houwer, 2013) to 240 (Gregg et al., 2006, Study 1) learning trials, whereas statement information manipulations have included one (Gast & De Houwer, 2013; Gregg et al., Study 1) or two (Kurdi & Banaji, 2017) learning trials. By extension, whether the attribute or valence information is presented all at once or presented over the course of multiple trials is oftentimes confounded with the presentation mode (cf. Kurdi & Banaji, 2017); in statement information conditions, participants usually see all of the information that is presented in one trial, whereas in stimulus pairing conditions, because there are multiple stimuli and they are presented one at a time, the information is spread across multiple trials. Confounds such as these make it difficult to determine what any observed differences or similarities across conditions actually represent; are the differences or similarities attributable to the way in which the information is mentally represented, or to procedural variables? For instance, it is possible that in these studies, stimulus pairing information would have had a weaker effect than was observed if there were only one learning trial rather than multiple learning trials because there would not have been multiple reinforcements of the pairing of the target and the concept. Although recent empirical research has shown that manipulating the number of trials in evaluative conditioning procedures has no effect on implicit attitude acquisition (Kurdi & Banaji, 2019, Study 1), the stimulus pairings in that research still always included at least four trials rather than one (and, by extension, the research did not experimentally manipulate whether the information was presented all at once or distributed over the course of multiple trials), and there was no statement information condition for comparison.

Moreover, there may have been aspects of the particular stimuli we chose that may have influenced the results. One is that the information in the statement information condition was words, whereas in the stimulus pairing information condition it was images, and images tend to engage more affect than do words (e.g., De Houwer & Hermans, 1994; Kensinger & Schacter, 2006). In addition, the images were color images whereas the text was black and white. It is possible that the color stimuli in the stimulus pairing condition commanded greater attention than did the black and white text. It is unclear whether results would have been different in the absence of these discrepancies, so future research should address whether these types of differences meaningfully impact the results of similar studies.

Another direction for future research is to more systematically investigate the effects of the similarity of the content of the information provided in the two presentation modes on semantic evaluations; to the extent that the content of the stimuli is more similar than different across presentation mode conditions, implicit semantic evaluations should be more similar. One way in which stimuli may be more or less similar is the extent to which they are matched in their level of specificity. If, in a hypothetical statement information condition, participants are provided with high SAT scores for a target, but in a stimulus pairing information condition in the same study, the target is paired with words such as “intelligent,” this may result in less similar implicit evaluations across the two conditions. Future research should investigate this question in the domain of semantic (rather than affective) evaluations.

**Other limitations and future directions.** Another limitation of this research was that it was not possible to assess processes underlying implicit or explicit stereotype-relevant evaluations. For instance, we did not assess whether contingency awareness mediated the effects of the stimulus pairings on stereotype-relevant evaluations (see Bar-Anan, De Houwer, & Nosek, 2010). Although we derived our hypotheses from models that address these processes, this was not the goal of the experiments; instead, the present research assessed whether stimulus pairings and statements affect implicit and explicit impressions of social targets to an equal or different extent.

Moreover, there was no baseline measure of implicit beliefs about the intelligence of the pairs of targets used in Studies 1 and 2; our pilot data only examined explicit judgments. In the absence of information about intelligence, perceivers may have implicitly judged one target as more intelligent than the other (for instance, Jamal as more intelligent than DeShawn). However, the fact that target impressions were statistically similar regardless of which target was portrayed as intelligent and which was depicted as unintelligent (see Supporting Information for full report) suggests that this is unlikely. Nonetheless, future research could include a condition in which evaluations are made in the absence of any information.

 In addition, recent evidence investigating the relationship between implicit stereotypes and implicit attitudes suggests that these two constructs may not be entirely distinct (Kurdi, Mann, Charlesworth, & Banaji, 2019). Thus, the present research likely measured both implicit stereotypes and implicit attitudes. However, the specific implicit stereotype measured by our research (the relative intelligence of Black and White people) was shown in Kurdi et al.’s research to not be completely redundant with implicit attitudes toward Black and White people; the study showed that, among White participants, there was variance in implicit stereotypes of Black and White targets’ intelligence that was not explained by attitudes toward Black and White people. The researchers concluded that, in that particular IAT, “automatic intelligence attributions to these targets were related to, but not fully explained by, implicit attitudes” (p. 5866). This was not the case for other racial target groups, but was true for the specific target groups that we employed. Thus, IAT scores in the present research likely were related to implicit attitudes, but also distinct from them. In addition, research shows that, although prejudice is generally reduced by positive intergroup contact, changes in stereotypes are generally smaller and less consistent (Pettigrew & Tropp, 2000; Wolsko, Park, Judd, & Bachelor, 2003). This suggests that attitudes and stereotypes generally may respond differently to individuating information because individuation is one of the mechanisms underlying attitude change resulting from positive intergroup contact (e.g., Brewer & Miller, 1984). This further justifies the conceptual distinction between attitudes and stereotypes in the domain of investigating individuation effects, as we did in Study 3.

**Conclusion**

 The present research revealed that new implicit stereotype-relevant evaluations can be formed and entrenched stereotypes changed rapidly when people obtain either stimulus pairing or statement target information. These findings are broadly consistent with previous research showing sensitivity of implicit social evaluations to valid social information (e.g., Cone & Ferguson, 2015; Rubinstein et al., 2018), and extends it by showing that such sensitivity occurs when perceivers learn about others in different ways. This suggests that there may be additional as-yet unexplored avenues to eliminating the role of implicit stereotypes in biasing person perception and producing the injustices that stem from discrimination.

**Open Practices**

Data and materials for all three studies are available at <https://osf.io/pd2ht/>. Preregistration for Study 2 is available at <https://osf.io/mw38p/register/5771ca429ad5a1020de2872e> and preregistration for Study 3 is available at <https://osf.io/ymebw/register/5771ca429ad5a1020de2872e>.

References

Allport G. W. (1954). *The nature of prejudice.* Reading, MA: Addison-Wesley.

Ambady, N., & Rosenthal, R. (1992). Thin slices of expressive behavior as predictors of interpersonal consequences: A meta-analysis. *Psychological Bulletin, 111*, 256–274.

Ashmore, R. D., & Del Boca, F. K. (1981). Conceptual approaches to stereotypes and stereotyping. In D. L. Hamilton (Ed.), *Cognitive processes in stereotyping and intergroup behavior* (pp. 1–35). Hillsdale, NJ: Erlbaum.

Bar-Anan, Y., & Nosek, B. A. (2014). A comparative investigation of seven indirect attitude measures. *Behavior Research Methods, 46,* 668-688.

Bar-Anan, Y., De Houwer, J., & Nosek, B. A. (2010). Evaluative conditioning and conscious knowledge of contingencies: A correlational investigation with large samples. *Quarterly Journal of Experimental Psychology, 63,*2313-2335.

Blanton, H., & Jaccard, J. (2006). Arbitrary metrics in psychology. *The American Psychologist, 61*, 27–41. http://doi.org/10.1037/0003-066X.61.1.62

Blanton, H., Jaccard, J., Strauts, E., Mitchell, G., Tetlock, P. E., Blanton, H., … Tetlock, P. E. (2015). Toward a meaningful metric of implicit prejudice. *Journal of Applied Psychology, 100,* 1468-1481.

Brewer, M. B. (1988). A dual process model of impression formation. In R. S. Srull, T. K., & Wyer Jr. (Ed.), *Advances in Social Cognition* (1st ed., pp. 1–36). Hillsdale, NJ.

Brewer, M. B., & Miller, N. (1984). Beyond the contact hypothesis: Theoretical perspectives on desegregation. In N. Miller & M. B. Brewer (Eds.), Groups in contact: The psychology of desegregation (pp. 281-302). San Diego, CA: Academic.

Cao, J., & Banaji, M. R. (2016). The base rate principle and the fairness principle in social judgment. *Proceedings of the National Academy of Sciences, 113*, 7475-7480. http://doi.org/10.1073/pnas.1524268113

Carpenter, T., Pogacar, R., Pullig, C., Kouril, M., LaBouff, J.,… Chakroff, A. (2018, April 3). Conducting IAT Research within Online Surveys: A Procedure, Validation, and Open Source Tool. http://doi.org/10.17605/OSF.IO/6XDYJ

Collins, A. M., & Loftus, E. F. (1975). A spreading-activation theory of semantic processing. *Psychological Review, 82,* 407–428.

Cone, J., & Ferguson, M. J. (2015). He Did What? The Role of Diagnosticity in Revising Implicit Evaluations. *Journal of Personality and Social Psychology, 108,* 37–57.

Cone, J., Mann, T. C., & Ferguson, M. J. (2017). Changing Our Implicit Minds: How, When, and Why Implicit Evaluations Can Be Rapidly Revised. *Advances in Experimental Social Psychology* (1st ed.). Elsevier Inc. http://doi.org/10.1016/bs.aesp.2017.03.001

De Houwer, J. (2006). Using the Implicit Association Test does not rule out an impact of conscious propositional knowledge on evaluative conditioning. *Learning and Motivation, 37*, 176–187. http://doi.org/10.1016/j.lmot.2005.12.002

De Houwer, J. (2014a). A Propositional Model of Implicit Evaluation. *Social and Personality Psychology Compass, 7,* 342–353.

De Houwer, J. (2014b). Why a propositional single-process model of associative learning deserves to be defended. In Y. Sherman, Jeffrey W, Gawronski, B., & Trope (Ed.), *Dual-Process Theories of the Social Mind* (pp. 530–541). New York: Guilford Press.

De Houwer, J., & Hermans, D. (1994). Differences in the affective processing of words and pictures. *Cognition & Emotion*, *8*(1), 1-20.

De Houwer, J., Thomas, S., & Baeyens, F. (2001). Associative learning of likes and dislikes: A review of 25 years of research on human evaluative conditioning. *Psychological Bulletin, 127,* 853–869.

DeCoster, J., Banner, M. J., Smith, E. R., & Semin, G. R. (2006). On the inexplicability of the implicit: Differences in the information provided by implicit and explicit tests. *Social Cognition,* *24*, 5–21. http://doi.org/10.1521/soco.2006.24.1.5

Devine, P. G. (1989). Stereotypes and prejudice: Their automatic and controlled components. *Journal of Personality and Social Psychology,* *56,* 5–18. http://doi.org/10.1037//0022-3514.56.1.5

Ferguson, M. J., Mann, T. C., & Wojnowicz, M. T. (2014). Rethinking duality: Criticisms and ways forward. In Y. Sherman, Jeffrey W, Gawronski, B., & Trope (Ed.), *Dual-Process Theories of the Social Mind* (pp. 578–594). New York: Guilford Press.

Fiske, S. T., & Neuberg, S. L. (1990). A continuum of impression formation, from category-based to individuating processes: Influences of information and motivation on attention and interpretation. In *Advances in Experimental Social Psychology* (pp. 1–74). New York: Academic Press.

Gast, A., & De Houwer, J. (2013). The influence of extinction and counterconditioning instructions on evaluative conditioning effects. *Learning and Motivation, 44*(4), 312–325. <http://doi.org/10.1016/j.lmot.2013.03.003>

Gawronski, B., & Bodenhausen, G. V. (2006). Associative and propositional processes in evaluation: an integrative review of implicit and explicit attitude change. *Psychological Bulletin, 132,* 692–731. <http://doi.org/10.1037/0033-2909.132.5.692>

Gawronski, B., & Bodenhausen, G. V. (2011). The associative-propositional evaluation model. Theory, evidence, and open questions. In M. P. Zanna (Ed.), *Advances in Experimental Social Psychology* (Vol. 38, pp. 59–127). San Diego, CA: Academic Press. <http://doi.org/10.1016/B978-0-12-385522-0.00002-0>

Gawronski, B., & Bodenhausen, G. V. (2018). Evaluative conditioning from the perspective of the associative-propositional evaluation model. Social Psychological Bulletin, 13(3), e28024.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology, 74*, 1464–1480.

Greenwald, A. G., Nosek, B. A., & Banaji, M. R. (2003). Understanding and using the Implicit Association Test: I. An improved scoring algorith. *Journal of Personality and Social Psychology*, *85*(2), 197–216. http://doi.org/10.1037/0022-3514.85.2.197

Greenwald, A. G., Poehlman, T. A., Uhlmann, E. L., & Banaji, M. R. (2009). Understanding and using the Implicit Association Test: III. Meta-analysis of predictive validity. *Journal of Personality and Social Psychology*, *97*, 17–41. http://doi.org/10.1037/a0015575

Gregg, A. P., Seibt, B., & Banaji, M. R. (2006). Easier done than undone: asymmetry in the malleability of implicit preferences. *Journal of Personality and Social Psychology, 90,* 1–20. <http://doi.org/10.1037/0022-3514.90.1.1>

Hu, X., Gawronski, B., & Balas, R. (2017a). Propositional versus dual-process accounts of evaluative conditioning: I. The effects of co-occurrence and relational information on implicit and explicit evaluations. Personality and Social Psychology Bulletin, 43, 17-32.

Hu, X., Gawronski, B., & Balas, R. (2017b). Propositional versus dual-process accounts of evaluative conditioning: II. The effectiveness of counter-conditioning and counter-instructions in changing implicit and explicit evaluations. Social Psychological and Personality Science, 8, 858-866.

Hughes, S., Barnes-Holmes, D., & De Houwer, J. (2011). the Dominance of Associative Theorizing in Implicit Attitude Research: Propositional and Behavioral Alternatives. *Psychological Record, 61*, 465–496. <http://doi.org/10.1073/pnas.0703993104>

Jeffreys, H. (1961). *The Theory of Probability.* Oxford University Press: Oxford, UK.

Jussim, L., Coleman, L. M., & Lerch, L. (1987). The nature of stereotypes: A comparison and integration of three theories. *Journal of Personality and Social Psychology, 52*, 536–546.

Kensinger, E. A., & Schacter, D. L. (2006). Processing emotional pictures and words: Effects of valence and arousal. *Cognitive, Affective, & Behavioral Neuroscience*, *6*(2), 110-126.

Kunda, Z., & Thagard, P. (1996). Forming impressions from stereotypes, traits, and behaviors: A parallel-constraint-satisfaction theory. *Psychological Review, 103*, 284–308.

Kurdi, B., & Banaji, M. R. (2017). Repeated evaluative pairings and evaluative statements: How effectively do they shift implicit attitudes? *Journal of Experimental Psychology: General, 146,* 194–213. <http://doi.org/10.1037/xge0000239>

Kurdi, B., & Banaji, M. R. (2019). Attitude change via repeated evaluative pairings versus evaluative statements: Shared and unique features. *Journal of Personality and Social Psychology, 116,* 681-703.

Kurdi, B., Mann, T. C., Charlesworth, T. E. S., & Banaji, M. R. (2019). The relationship between implicit intergroup attitudes and beliefs. *Proceedings of the National Academy of Sciences, 116,* 5862-5871.

Lee, M. D., & Wagenmakers, E. J. (2014) *Bayesian Cognitive Modeling: A Practical Course.* Cambridge University Press: Cambridge, England.

LaPiere, R. T. (1936). Type-rationalizations of group antipathy. *Social Forces, 15*, 232-254.

Locksley, A., Borgida, E., Brekke, N., & Hepburn, C. (1980). Sex stereotypes and social judgment. *Journal of Personality and Social Psychology, 39*, 821–831. http://doi.org/10.1037//0022-3514.39.5.821

Mann, T. C., & Ferguson, M. J. (2015). Can we undo our first impressions? The role of reinterpretation in reversing implicit evaluations. *Journal of Personality and Social Psychology, 108,* 823–849. http://doi.org/10.1037/pspa0000021.

Mann, T. C., & Ferguson, M. J. (2017). Reversing implicit first impressions through reinterpretation after a two-day delay. *Journal of Experimental Social Psychology, 68*, 122–127. <http://doi.org/10.1016/j.jesp.2016.06.004>

Monroe, B. M., Koenig, B. L., Wan, K. S., Laine, T., Gupta, S., & Ortony, A. (2018). Re-examining dominance of categories in impression formation: A test of dual-process models. Journal of Personality and Social Psychology, 115, 1-30. <http://dx.doi.org/10.1037/pspa0000119>

Moran, T., & Bar Anan, Y. (2013). The effect of object-valence relations on automatic evaluation. *Cognition and Emotion, 27,* 743–752.

Nosek, B. A., Banaji, M. R., & Greenwald, A. G. (2002). Harvesting implicit group attitudes and beliefs from a demonstration website. *Group Dynamics: Theory, Research, and Practice, 6,* 101–115. <http://doi.org/10.1037//1089-2699.6.1.101>

Nosek, B. A., Greenwald, A. G., & Banaji, M. R. (2005). Understanding and using the Implicit Association Test: II. Method variables and construct validity. *Personality and Social Psychology Bulletin, 31,* 166-180.

Nosek, B. A., Smyth, F. L., Hansen, J. J., Devos, T., Lindner, N. M., Ranganath, K. A., … Banaji, M. R. (2007). Pervasiveness and correlates of implicit attitudes and stereotypes. *European Review of Social Psychology, 18*, 36–88. http://doi.org/10.1080/10463280701489053

Olson, M. A., & Fazio, R. H. (2001). Implicit attitude formation through classical conditioning, *Psychological Science, 12,* 413–417.

Oswald, F. L., Mitchell, G., Blanton, H., Jaccard, J., & Tetlock, P. E. (2013). Predicting ethnic and racial discrimination: a meta-analysis of IAT criterion studies. *Journal of Personality and Social Psychology*, *105*(2), 171–92. http://doi.org/10.1037/a0032734

Pettigrew, T. F, & Tropp, L. R. (2000). Does intergroup contact reduce prejudice: Recent meta-analytic findings. In S. Oskamp (Ed.), Reducing prejudice and discrimination (pp. 93-114). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Platt, J. R. (1964). Strong inference. *Science, 146,* 347-353.

Reyna, C. (2018). Scale creation, use, and misuse: How politics undermines measurement. In J. T. Crawford & L. Jussim (Eds.), *The Politics of Social Psychology*. Psychology Press: London.

Rubinstein, R. S., Jussim, L., & Stevens, S. T. (2018). Reliance on individuating information and stereotypes in implicit and explicit person perception. *Journal of Experimental Social Psychology, 75,* 54–70. http://doi.org/10.1016/j.jesp.2017.11.009

Rudman, L. A., & Glick, P. (2001). Prescriptive gender stereotypes and backlash toward agentic women. *The Journal of Social Issues, 57*, 743–762. http://doi.org/10.1111/0022-4537.00239

Rydell, R. J., & McConnell, A. R. (2006). Understanding implicit and explicit attitude change: a systems of reasoning analysis. *Journal of Personality and Social Psychology, 91,* 995–1008. <http://doi.org/10.1037/0022-3514.91.6.995>

Rydell, R. J., McConnell, A. R., Mackie, D. M., & Strain, L. M. (2006). Of two minds: Forming and changing valence-inconsistent implicit and explicit attitudes. *Psychological Science, 17,* 954–958. <http://doi.org/10.1097/00004703-200612000-00009>

Rydell, R. J., McConnell, A. R., Strain, L. M., Claypool, H. M., & Hugenberg, K. (2007). Implicit and explicit attitudes respond differently to increasing amounts of counterattitudinal information. *European Journal of Social Psychology, 37,* 867-878.

Smith, E. R., & DeCoster, J. (2000). Dual-process models in social and cognitive psychology: Conceptual integration and links to underlying memory systems. *Personality and Social Psychology Review, 4*, 108–131. <http://doi.org/10.1207/S15327957PSPR0402_01>

Stout, J. G., Dasgupta, N., Hunsinger, M., & McManus, M. A. (2011). STEMing the tide: using ingroup experts to inoculate women's self-concept in science, technology, engineering, and mathematics (STEM). *Journal of Personality and Social Psychology*, *100*, 255-270. 10.1037/a0021385

Washburn, A. N., Morgan, G. S., & Skitka, L. J. (2015). A checklist to facilitate objective hypothesis testing in social psychological research. *Behavioral and Brain Sciences, 38,* 42-43.

Whitfield, M., & Jordan, C. H. (2009). Mutual influence of implicit and explicit attitudes. Journal of Experimental Social Psychology, 45, 748-759. <http://dx.doi.org/10.1016/j.jesp.2009.04.006>

Wilder, D. A. (1986). Social categorization: Implications for creation and reduction of intergroup bias. In *Advances in Experimental Social Psychology* (19th ed., pp. 291–355).

Wittenbrink, B., Judd, C. M., & Park, B. (1997). Evidence for racial prejudice at the implicit level and its relationship with questionnaire measures. *Journal of Personality and Social Psychology, 72*, 262–274. http://doi.org/10.1037/0022-3514.72.2.262

Wolsko, C., Park, B., Judd, C. M., & Bachelor, J. (2003). Intergroup contact: Effects on group evaluations and perceived variability. *Group Processes & Intergroup Relations*, *6*(1), 93-110.

Zanon, R., De Houwer, J., Gast, A., & Smith, C. T. (2014). When does relational information influence evaluative conditioning ? *The Quarterly Journal of Experimental Psychology, 67,* 2105–2122. http://doi.org/10.1080/17470218.2014.907324

Table 1

|  |  |  |
| --- | --- | --- |
|  | Information content | Presentation mode |
|  | Intelligent | Unintelligent | Stimulus pairingsa | Statementsb |
|  | M | SD | 95% CI | M | SD | 95% CI | M | SD | 95% CI | M | SD | 95% CI |
| IQ estimatec | 107.63 | 17.07 | (104.40, 110.83) | 91.91 | 17.74 | (88.61, 95.32) | 99.99 | 16.10 | (96.68, 103.30) | 99.58 | 18.43 | (96.47, 102.69) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intelligence rating | 5.68 | 1.47 | (5.41, 5.95) | 3.03 | 1.41 | (2.77, 3.28) | 4.29 | 1.39 | (4.10, 4.49) | 4.41 | 1.49 | (4.22, 4.60) |

*Main effect cell means, standard deviations, and 95% confidence intervals, Study 1*

*Note.* Intelligence ratings were on a scale of 1 (Very unintelligent) to 7 (Very intelligent). *N* = 119. Information content was within-subjects and presentation mode was between-subjects.

a*n* = 58.

b*n* = 61.

c*N* = 111.

Table 2

*Main effect cell means, standard deviations, and 95% confidence intervals, Study 2*

|  |  |  |
| --- | --- | --- |
|  | Information content | Presentation Mode |
|  | Intelligent | Unintelligent | Stimulus pairingsa | Statementsb |
|  | M | SD | 95% CI | M | SD | 95% CI | M | SD | 95% CI | M | SD | 95% CI |
| IQ estimate | 110.82 | 9.48 | (109.01, 112.58) | 91.00 | 11.14 | (88.89, 93.12) | 101.25 | 9.83 | (99.80, 102.69) | 100.56 | 10.76 | (99.08, 102.03) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intelligence rating | 5.91 | 1.22 | (5.68, 6.14) | 2.94 | 1.42 | (2.67, 3.20) | 4.51 | 1.30 | (4.32, 4.70) | 4.33 | 1.33 | (4.14, 4.53) |

*Note.* Intelligence ratings were on a scale of 1 (Very unintelligent) to 7 (Very intelligent). *N* = 110. Information content was within-subjects and presentation mode was between-subjects.

a*n* = 56.

b*n* = 54.

Table 3

*Main effect cell means, standard deviations, and 95% confidence intervals, Study 3*

|  |  |  |  |
| --- | --- | --- | --- |
|  | Race of target |  | Individuating information |
|  | Black | White |  | No informationa | Stimulus pairing informationb | Statement informationc |
|  | *M* | *SD* | *95% CI* | *M* | *SD* | *95% CI* |  | *M* | *SD* | *95% CI* | *M* | *SD* | *95% CI* | *M* | *SD* | *95% CI* |
| IQ Estimated | 107.44 | 13.09 | 105.64, 109.23 | 105.11 | 12.85 | 103.34, 106.88 |  | 99.13 | 7.25 | 96.21, 102.04 | 109.24 | 17.06 | 106.32, 112.15 | 110.45 | 11.30 | 107.54, 113.36 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intelligence Rating | 5.46 | 1.32 | 5.31, 5.62 | 5.30 | 1.36 | 5.14, 5.46 |  | 4.59 | 1.07 | 4.34, 4.84 | 5.54 | 1.47 | 5.28, 5.80 | 6.01 | 1.01 | 5.76, 6.27 |

*Note.* Intelligence ratings were on a scale of 1 (Very unintelligent) to 7 (Very intelligent). *N* = 225. Race of target was within-subjects and individuating information was between-subjects.

a*n* = 78.

b*n* = 74.

c*n* = 73.

d*N* = 177.

1. Kurdi & Banaji (2019, Study 4) compared the effects of stimulus pairing and statement information on implicit evaluations, but in all experimental conditions, these evaluations were made after a delay of 15 minutes. In Study 3 in the same paper, Kurdi & Banaji found that the effects of stimulus pairings on implicit evaluations are more stable over time than are the effects of statement information. Therefore, throughout the present paper, the results of Kurdi & Banaji’s Study 4 are not discussed in the context of previous research comparing the effects of stimulus pairing and statement information on implicit evaluations because they are not directly comparable to previous work. [↑](#endnote-ref-1)
2. The data described in this section are from experimental conditions in which only stimulus pairing or statement information conveying one idea was provided prior to evaluations; experimental conditions in which both types of information was learned before evaluations (Kurdi & Banaji, 2017) or in which counterinformation was administered prior to evaluations (Gast & De Houwer, 2013) are not described. [↑](#endnote-ref-2)
3. In accordance with Greenwald et al. (2003), these participants had greater than 10% of response latencies lower than 300 milliseconds. [↑](#endnote-ref-3)
4. Although more participants were discarded from the stimulus pairing information condition (*n* = 31) than from the statement information condition (*n* = 11), the final sample sizes for each experimental condition were approximately equal (*n* = 58 and *n* = 61, respectively) because Qualtrics was used to randomly assign participants to experimental condition and more participants were assigned to the stimulus pairing information condition than to the statement information condition. This was true in all three studies. [↑](#endnote-ref-4)
5. It can be argued that null symbols may invoke propositional processes and that this may have influenced the results of the study. However, evidence that runs counter to this notion is found in Study 3, in which results were consistent with those of Studies 1 and 2 (i.e., there were equal effects of stimulus pairing and statement information), and no null symbols were used. Although there was one image in that study (an unsolved and solved Rubik’s cube linked by an arrow) that could be considered similar to the null symbols in terms of complexity of mental processing, pooling across both targets, this was only one out of ten images that was used as stimulus information in that study. [↑](#endnote-ref-5)
6. Prior to computing *D* scores, latencies greater 10,000 milliseconds were deleted by IATGen, as were IAT data from participants with greater than 10% of response latencies less than 300 milliseconds. Participants were forced to correct their errors, resulting in a procedurally built-in error penalty. To compute the *D* scores, for each participant, the mean latency for consistent pairing blocks was subtracted from the mean latency for inconsistent pairing blocks, and this difference was divided by the standard deviation of all of that particular participant’s responses. [↑](#endnote-ref-6)
7. This notation represents whether the reported *D* score exceeds the cutoff of |*D*| ≥ .15. [↑](#endnote-ref-7)
8. We do not report effect sizes for IAT scores or for *t*-tests comparing the magnitudes of two mean *D* scores. This is because the procedure we followed to calculate *D* scores (Greenwald et al., 2003) is highly similar to the computation of Cohen’s *d*. [↑](#endnote-ref-8)
9. BF10 in all three studies were interpreted according to the following guidelines (Jeffreys, 1961; Lee & Wagenmaker, 2014): 0.33 < BF10 < 1 constitutes anecdotal evidence in favor of the null hypothesis, 0.10 < BF10 < 0.33 is moderate evidence in favor of the null hypothesis, 0.03 < BF10 < 0.10 is strong evidence in favor of the null hypothesis, 0.01 < BF10 < 0.03 is very strong evidence in favor of the null hypothesis, and BF10 < .01 is extreme evidence in favor of the null hypothesis. [↑](#endnote-ref-9)
10. As in Study 1, although more participants were discarded from the stimulus pairing information condition (*n* = 24) than from the statement information condition (*n* = 13), the final sample included approximately equal numbers in the two conditions (*n* = 56 and *n* = 54, respectively). [↑](#endnote-ref-10)
11. Data were analyzed with class as a factor in the design. No differences between classes emerged in any analyses, so results are presented excluding this factor. [↑](#endnote-ref-11)
12. As in Studies 1 and 2, although more participants were discarded from the stimulus pairing information condition (*n* = 31) than from the statement information condition (*n* = 19) or from the no information condition (*n* = 14), the final distribution across samples was approximately equal (*n* = 74, *n* = 73, *n*= 78, respectively). [↑](#endnote-ref-12)
13. The particular set of individuating information assigned to each target was counterbalanced in the two conditions in which individuating information was available, but this is not included in the experimental designs because it did not apply to the no information condition. [↑](#endnote-ref-13)
14. It can be argued that information about Jamal and Luke’s intelligence may have been conveyed by subtle cues in their photos (which were used as IAT stimuli)—that impressions may have been formed based on “thin slices” of information (e.g., Ambady & Rosenthal, 1992) and that this therefore was not a true “no individuating information” condition. However, these photos were pilot tested to ensure they did not convey that the target was either intelligent or unintelligent at the explicit level and to ensure that the two targets were explicitly perceived as equal in their level of intelligence. In addition, according to the standard of *D* ≥ .15, the implicit stereotype effect we obtained (*D* = 0.27) was similar in magnitude to those obtained in two non-Black samples to which were administered non-photo IATs that assessed implicit stereotypes of the intelligence or unintelligence of Black and White non-individuated targets (analysis of data provided in Kurdi & Banaji, 2018b, Study 1A Supplementary Material; Rubinstein et al., 2018, Study 1; *D*s = 0.38, 0.29, respectively). [↑](#endnote-ref-14)
15. Due to an investigator error, the IQ estimate measure was not administered to the first 47 participants. [↑](#endnote-ref-15)