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Reducing Implicit Prejudice

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Abstract

Implicit prejudices are social preferences that exist outside of conscious awareness or control. In this review, we summarize evidence for three mechanisms that influence the expression of implicit prejudice: associative change, contextual change, and change in control over implicit prejudice. We then review the evidence (or lack thereof) for answers to five open issues in implicit prejudice reduction research: (1) what shows effectiveness in real-world application; (2) what *doesn't* work for implicit prejudice reduction; (3) what interventions produce long-term changes in implicit prejudice; (4) measurement diversity in implicit prejudice reduction research; and (5) the relationship between implicit prejudice and behavior. Addressing these issues provides an agenda for clarifying the conditions and implications of reducing implicit prejudice.

Gordon Allport memorably defined prejudice as a "feeling, favorable or unfavorable, toward a person or thing, prior to, or not based on, actual experience" (Allport, 1954, p. 6). The conceptualization of prejudice has evolved since with a focus on intergroup relations – evaluations of others based on social categories such as race, ethnicity, gender, social class, sexual orientation, nationality, religion, or disability (Brewer, 1999; Dovidio, Glick, & Rudman, 2005; Tajfel, 1982; Yzerbyt & Demoulin, 2010). One important shift in the understanding of prejudice was the recognition that the "feeling" need not be deliberate, intentional, endorsed, or even available to conscious awareness (Banaji, Nosek, & Greenwald, 2004; Fazio, Jackson, Dunton, & Williams, 1995; Greenwald & Banaji, 1995). People can have implicit prejudices – feelings, favorable or unfavorable, toward persons or groups that they did not endorse or even realize that they possessed (Gawronski & Payne, 2010; Nosek, Hawkins, & Frazier, 2011, 2012).

Implicit prejudice is distinct but related to explicit prejudice (Nosek & Smyth, 2007). For example, self-reported attitudes toward Blacks compared to Whites are moderately, positively correlated with the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998; Nosek, Greenwald, & Banaji, 2007) measuring associations for the same racial groups (zero-order correlation $r \sim .30$; latent variable correlation $r \sim .45$; see Nosek, 2007 for a review). But, the strength of the relationship between implicit and explicit attitudes varies across social categories, with age and disability attitudes eliciting particularly weak relationships (r's $< .15$), for example, and sexual orientation and political attitudes eliciting comparatively strong ones (r's $> .45$; Nosek, Smyth, et al., 2007). This variation may be explained in part by the social pressures against holding negative attitudes toward some groups and how much people have elaborated on those attitudes (Nosek, 2005). Further, implicit and explicit evaluations predict behavior – jointly and independently (Greenwald, Poehlman, Uhlmann, & Banaji, 2009). Finally, implicit and explicit evaluations are understood to be subject to distinct formative experiences (Ranganath & Nosek, 2008; Ratliff & Nosek, 2011; Rydell & McConnell, 2006), operate via distinct psychological

mechanisms (De Houwer, Teige-Mocigemba, Spruyt, & Moors, 2009), and, as a consequence, have distinct routes for change (Gawronski & Bodenhausen, 2006).

One question of theoretical and practical interest is how to reduce implicit prejudices (Dasgupta, 2009; Gawronski & Bodenhausen, 2006; Sritharan & Gawronski, 2010). There are two driving factors of this research interest. The first is a basic research question: What are the mechanisms for change in implicit prejudice? Here, the focus is on the independent variable – manipulations designed to identify and isolate a single psychological process responsible for change. The second is a practical research question: How can implicit prejudice be reduced? Here, the focus is on the dependent variable – implicit prejudice, and how much it shifts as a function of the intervention. In this review, we summarize the present evidence for mechanisms of change and for practical effectiveness and chart a path toward a comprehensive understanding of reducing implicit prejudice and its influence on behavior.

Mechanisms for Reducing Implicit Prejudice

For this review, we organized interventions based on their presumed mechanism of change: retraining the underlying associations, shifting the context of evaluation, and controlling the activation or application of associations (Gawronski & Sritharan, 2010).[1]

Retraining associations

Evaluative conditioning. Implicit attitudes, of which implicit prejudice is a special case, are understood to reflect associations between concepts (e.g., Black/White, old/young) and evaluations (e.g., good/bad, smart/dumb; Greenwald et al., 2002). Perhaps the most direct method to change implicit attitudes is evaluative conditioning (Bar-Anan, De Houwer, & Nosek, 2010; De Houwer, Thomas, & Baeyens, 2001; Karpinski & Hilton, 2001; Olson & Fazio, 2006). Evaluative conditioning provides experience linking concepts with attributes that differ from their preexisting attitudes to retrain or create alternative attitudes. For example, Olson and Fazio (2006) briefly presented participants with positive images and words paired with Black faces, and negative images and words paired with White faces. Exposure to these pairings reduced implicit racial prejudice immediately, and this change persisted at a follow-up assessment two days later.

The logic of retraining associations appears in other approaches as well. On the assumption that people tend to approach things that are good and avoid things that are bad, a computer exercise reduced implicit prejudice using 480 trials of initiating approach toward Black faces and avoidance of White faces (Kawakami, Phills, Steele, & Dovidio, 2007; see also Wennekers, Holland, Wigboldus, & van Knippenberg, 2011). This change may have been due to the self – a concept strongly associated with good (Greenwald et al., 2002) – becoming more associated with the approached faces (Kawakami, Steele, Cifa, Phills, & Dovidio, 2008; Phills, Kawakami, Tabi, Nadolny, & Inzlicht, 2011). Another approach is to practice responding "Yes" to pairings of Black people with counterstereotypical words (e.g., "intelligent"; Kawakami, Dovidio, Moll, Hermsen, & Russin, 2000). The complementary approach of saying "No" to pairings of Black targets with stereotypical words does not appear to be effective, however (Gawronski, Deutsch, Mbirkou, Seibt, & Strack, 2008). Negations require first representing the association and then invalidating it; since invalidating an association requires additional processing (Gilbert, Tafarodi, & Malone, 1993), negations may be particularly difficult to process implicitly (Gawronski et al., 2008).

Intergroup contact Intergroup contact is the most well-studied means of reducing explicit prejudice (Allport, 1954; Pettigrew & Tropp, 2006), and it also appears to reduce implicit prejudice (Aberson, Porter, & Gaffney, 2008; Dasgupta & Rivera, 2008). Shook and Fazio (2008), for instance, took advantage of a natural experiment of college roommate assignments where White students were randomly assigned to live with a Black roommate or a White roommate. After one semester, they found that Whites assigned to live with a Black roommate exhibited less implicit prejudice than Whites assigned to live with a White roommate.

Notably, some evidence suggests that intergroup contact affects explicit and implicit prejudice differently. Intergroup contact's effect on explicit prejudice is mediated through increased self-disclosure and reduced intergroup anxiety, suggesting that quality of contact is important for reducing explicit prejudice. In contrast, the quantity of intergroup contact has a direct effect on implicit prejudice, suggesting that mere exposure to out-group members is sufficient for reducing implicit prejudice (Tam, Hewstone, Harwood, Voci, & Kenworthy, 2006; Turner, Hewstone, & Voci, 2007).

Persuasion. Persuasive appeals have been studied extensively for changing explicit attitudes (Eagly & Chaiken, 1993; Petty & Wegener, 1998), but not implicit attitudes. One exception found that an argument in favor of a policy about racial/ethnic issues that elicited high cognitive elaboration reduced implicit prejudice relative to the same basic argument eliciting low cognitive elaboration (Briñol, Petty, & McCaslin, 2009). Degree of cognitive elaboration may influence implicit attitudes through deliberative reasoning, whereby newly-gained knowledge leads to the activation of positive associations with attitude objects. Further, persuasion cues such as personal relevance, source expertise, and source trustworthiness can influence the impact of persuasive messages on implicit attitudes (Marini, Rubichi, & Sartori, 2012; Smith, De Houwer, & Nosek, 2013), and theoretically, their influence on prejudice-relevant messages.

Shifting the context

A common assumption of the associative changes reviewed in the prior section is that the reductions in implicit prejudice are long-lasting. However, some manipulations may induce temporary shifts by changing the social or emotional context. These shifts could have considerable influence in the specific contexts in which they occur but fade rapidly.

Activating counterstereotypical associations. One approach to context-shifting is to elaborate on the counterstereotypical associations of positive exemplars of disliked groups and negative exemplars of liked groups (Dasgupta & Asgari, 2004; Dasgupta & Greenwald, 2001; Dasgupta & Rivera, 2008; Gonsalkorale, Allen, Sherman, & Klauer, 2010). For example, Dasgupta and Greenwald (2001; see also Joy-Gaba & Nosek, 2010) demonstrated that exposing participants to images of admired Black exemplars and disliked White exemplars reduced implicit prejudice. Similarly, representing the Black and White social categories with counterstereotypical exemplars during implicit measurement reduces implicit prejudice (Govan & Williams, 2004). Reductions in implicit prejudice can even occur by imagining counterstereotypical exemplars (Turner & Crisp, 2010; Vezzalli, Capozza, Giovannini, & Stathi, 2011), or by considering negative and positive events associated with the in-group and out-group (Brauer, Er-rafiy, Kawakami, & Phills, 2012; Sassenberg & Wieber, 2005).

A similar approach shifts the representation of the target group by focusing the target of evaluation on a subtype of the out-group or by reframing the identity of the out-group.

For example, exposing participants to *positive* stereotype-consistent features of an out-group elicits less implicit prejudice (Rodriguez-Bailon, Ruiz, & Moya, 2009). Likewise, Black targets are evaluated more positively when categorized by occupation rather than by race (Mitchell et al., 2003). Presenting targets within particular social roles and environments also influences implicit evaluations. Showing a prison context with a Black target dressed as a lawyer elicited more positive evaluations compared to when that same Black target was in the role of prisoner (Barden, Maddux, Petty, & Brewer, 2004; see also Maddux, Barden, Brewer, & Petty, 2005). Similarly, Black targets are evaluated more positively when the targets are placed in front of positive backgrounds (e.g., a family barbeque) rather than negative backgrounds (a gang incident; Wittenbrink, Judd, & Park, 2001).

Affect. Emotional states interact with prejudiced attitudes through mood-based regulation of automatic processing or through the association of specific emotions with groups. Consistent with evidence that negative affect downregulates automatic processing of stimuli (Clore & Huntsinger, 2007; Clore et al., 2001), people in negative moods exhibit reduced activation of implicit prejudice relative to people in positive moods (Huntsinger, Sinclair, & Clore, 2009). However, positive moods can sometimes lead to decreased implicit prejudice because it encourages pursuit of accessible goals. For example, Huntsinger and Sinclair (2010) found that participants who were in a positive mood exhibited reduced implicit prejudice when they wanted to get along with an interaction partner with ostensibly egalitarian views. When participants were not motivated to affiliate with the partner or did not infer that their partner held egalitarian views, positive mood did not reduce implicit prejudice relative to negative mood.

Some social groups are associated with particular emotions (Cottrell & Neuberg, 2005; Fiske, Cuddy, Glick, & Xu, 2002; Mackie & Smith, 2002). Anger and disgust can increase implicit prejudice for groups associated with those emotions (i.e., anger for Arabs, and disgust for gay people; Dasgupta, DeSteno, Williams, & Hunsinger, 2009). No published research demonstrates evidence for a specific emotion that directly reduces implicit prejudice, however. One exception may be a recent paper where the administration of Propranolol, a medication used to lower blood pressure and anxiety, also elicited less implicit prejudice compared to a placebo group, perhaps because it reduces threat-based responses to out-group members (Terbeck et al., 2012).

Goals, motivations, and behavioral strategies

A person may possess strong implicit prejudices but nonetheless not show evidence for it behaviorally if they alter the activation or application of the prejudicial associations (Conrey, Sherman, Gawronski, Hugenberg, & Groom, 2005). Situational goals, motives, or behavioral strategies may not affect the existence of implicit prejudice but instead alter its expression.

Egalitarian goals. Motivations to be egalitarian can have significant influence over the expression of implicit prejudice. Chronic motivations to avoid prejudiced responding are related to decreased bias on implicit measures (Allen, Sherman, & Klauer, 2010; Legault, Green-Demers, & Eadie, 2009; Maddux et al., 2005; Moskowitz, Gollwitzer, Wasel, & Schaal, 1999), and experimental evidence suggests that intrinsic motivations to regulate prejudice are effective for reducing implicit prejudice (Legault, Gutsell, & Inzlicht, 2011). However, in some conditions, the use of motivational interventions can backfire: Inducing extrinsic motivations to regulate prejudice (Legault et al., 2011) or giving feedback

suggesting that one is progressing on egalitarian goals (Mann & Kawakami, 2012) can lead to *greater* implicit racial prejudice.

Interpersonal motives. People may preconsciously adapt their self-concepts, beliefs, and attitudes to the demands of the interpersonal context (Lowery, Hardin, & Sinclair, 2001; Lun, Sinclair, Whitchurch, & Glenn, 2007; Sinclair, Lowery, Hardin, & Colangelo, 2005). For example, participants who first interacted with a Black experimenter later exhibited lower implicit prejudice relative to participants who interacted with a White experimenter, suggesting that automatic responses shifted to facilitate smooth interaction with the Black experimenter (Lowery et al., 2001). The mere presence of other people in the same room can even decrease implicit prejudice (Castelli & Tomelleri, 2008) through the activation of affiliative motives and appraisals of egalitarian norms (Richeson & Ambady, 2001, 2003; Sechrist & Stangor, 2001; Sinclair et al., 2005).

Behavioral plans. Setting plans can be an effective route for blocking the expression of implicit prejudices. One such method is giving instructions to avoid prejudice (Lowery et al., 2001; Wallaert, Ward, & Mann, 2010), and another is setting implementation intentions (Mendoza, Gollwitzer, & Amodio, 2010; Stewart & Payne, 2008; Webb, Sheeran, & Pepper, 2012). Implementation intentions are "if-then" plans that link a situational cue to a behavioral response (Gollwitzer, 1999), increasing the automaticity of behavior by increasing the consistency between goal-directed intentions and behavior. For example, establishing a plan to think "good" after seeing a Black face can decrease implicit racial prejudice compared to a plan to think "quickly" after seeing a Black face (Stewart & Payne, 2008).

Faking or other alterations of implicit measurement. Finally, participants may adopt behavioral strategies that interfere with implicit measurement itself by ignoring task instructions and appearing to have different implicit prejudices than people who follow task instructions. For example, participants directly evaluating the target concepts instead of categorizing them in the personalized Implicit Association Test (Nosek & Hansen, 2008) and Affect Misattribution Procedure (Bar-Anan & Nosek, 2012) compromise the interpretation of the method as an implicit measure. Further, while participants do not appear to spontaneously fake the Implicit Association Test or the evaluative priming task easily (Banse, Seise, & Zerbes, 2001; Kim, 2003), providing experience and specific instructions is effective for facilitating faking behavior (Czellar, 2006; Degner, 2009; Fiedler & Bluemke, 2005; Teige-Mocigemba & Klauer, 2008). What appears to be change in the construct could be change in the measurement.

Evidence for change without clarity for what is responsible for change

The prior sections imply that associative change, contextual shifts, and behavioral strategies are clearly distinct and that every manipulation fits neatly into one of these categories. This is not an accurate implication. Much of the reviewed research theorizes about which mechanism is operating but does not have definitive evidence for the operation of that specific mechanism. As such, the categorization of manipulations into their operative mechanisms is done via plausibility given the present empirical evidence.

Moreover, any manipulation could leverage multiple mechanisms at once. Part of investigating the mechanisms of implicit prejudice reduction is to translate the operational features of manipulations into the theoretical psychological processes that they influence. In our review, we encountered several findings that did not clearly fit in the three

routes to implicit prejudice malleability we described. Manipulations that decrease implicit prejudice without clear mechanisms include taking the perspective of out-group members (Galinsky & Moskowitz, 2000; Todd, Bodenhausen, Richeson, & Galinsky, 2011), priming participants with multicultural or colorblind ideologies (Correll, Park, & Smith, 2008; Richeson & Nussbaum, 2004), and blurring boundaries between groups (Hall, Crisp, & Suen, 2009). Experimental ingenuity, analytic techniques like QUAD modeling (Conrey et al., 2005), and improvements in the taxonomy of psychological processes will help further clarify the mechanisms underlying implicit prejudice reduction.

What works for reducing implicit prejudice? Findings and open questions

Can implicit evaluations be changed? The evidence from the preceding section demonstrates that the answer is yes. However, saying whether something *can be* true is a small claim. From a perspectivist approach to science, all claims are true – if only in very limited circumstances (McGuire, 1973). For practical interests, the question is not "*Can* an effect occur?" The question is "*Does* the effect occur?" Is the intervention actually effective, to what degree, and under what conditions? Identifying mechanisms of change does not provide insight on its own, primarily because the emphasis is on isolating mechanisms for theoretical purposes, not examining effectiveness for practical purposes. Compared to the identification of mechanisms, much less is known about the effectiveness of interventions to reduce implicit prejudice. In this section, we summarize the evidence from a practical perspective by asking five questions that do not yet have clear answers but are the substance of the emerging trends in this research area.

What is effective? The limitations of null hypothesis significance testing (NHST) have been well documented (Bakan, 1966; Cohen, 1994; Frick, 1996; Oakes, 1986), but it remains a dominant practice throughout many sciences because of its strength – establishing that "sufficient evidence has been presented to support a claim, with sufficient defined as $p < .05$" (Frick, 1996, p. 380). In prejudice reduction research specifically, NHST answers questions about whether or not an intervention elicits less implicit prejudice than a control condition. However, NHST is not sufficient for estimating the magnitude of effects (Cohen, 1969); knowing that an effect is statistically significant does not indicate that it is practically significant (Cohen, 1994). For this, estimates of effect size are important for transforming findings about mechanism into effective interventions.

Further, effect magnitude estimates for interventions in highly-controlled experimental contexts may bear little relationship to their effectiveness *in vivo*. The moderating effects of sample, setting, and eliciting conditions can reduce or enhance the impact of manipulations exported from the laboratory (Willingham, 2012). Often, basic research on prejudice reduction targets application of the theoretical mechanism rather than the manipulation itself (Mook, 1983), but – of course – there is no guarantee that the mechanism or the intervention itself will have an impact in naturalistic contexts.

While most research on clarifying the mechanisms of changing implicit prejudice is laboratory based, several examples demonstrate that implicit prejudice can be reduced in naturalistic environments (e.g., Dasgupta & Asgari, 2004; O'Brien, Puhl, Latner, Mir, & Hunter, 2010; Rudman, Ashmore, & Gary, 2001; Shook & Fazio, 2008; Stout, Dasgupta, Hunsinger, & McManus, 2011). A notable example examining implicit stereotypes, the twin sibling of implicit prejudice, took advantage of a natural experiment in Indian politics (Beaman, Chattopadhyay, Duflo, Pande, & Topalova, 2008). In India, village council leadership positions were randomly selected by law to be "reserved for women." Men in

villages that were required to have female council leaders held weaker implicit gender-leader stereotypes compared to men living in villages where no gender quota was established.

What is ineffective? To understand psychological change, it is just as important to clarify the conditions that do not elicit change as it is to clarify the conditions that do. While there are many demonstrations of implicit prejudice change based on distinct mechanisms, little is known about the constraints and boundary conditions of their effectiveness. A partial explanation for this is a general phenomenon of scientific publishing norms. Achieving a positive result – i.e., demonstrating that a manipulation changes implicit evaluation – is a *de facto* requirement for publication (Fanelli, 2010, 2012; Greenwald, 1975; Meehl, 1978; Nosek, Spies, & Motyl, 2012; Sterling, Rosenbaum, & Weinkam, 1995). The consequence is that the published literature contains much less evidence of the conditions that do not elicit change in implicit prejudice, even though they are sure to exist – if only in the file drawer (Rosenthal, 1979). Of the 134 studies from articles cited that sought evidence for change in implicit associations in this review, just 12 (9%) reported evidence of no change on implicit evaluations. Furthermore, a meta-analysis conducted on malleability in implicit gender stereotyping found that published articles tended to report considerably larger effects than unpublished articles, suggesting a publishing bias (Lenton, Bruder, & Sedikides, 2009).

A common rationalization for the positivity bias in publishing is that there are many reasons for a study to go "wrong" – i.e., show no difference where one exists – other than the intervention being ineffective. Of course, rote application of this rationalization prevents learning about boundary conditions and guarantees that the published literature is an inaccurate reflection of reality. Further, there are also many reasons for a study to falsely go "right" – i.e., show a difference where there is not one (Greenwald, 1975; Simmons, Nelson, & Simonsohn, 2011). Developing knowledge for when interventions are ineffective is important for creating interventions that are exportable to real-world contexts. Now that there is demonstrated evidence for effectiveness, future research will begin to refine knowledge of the conditions under which those mechanisms and interventions will and will not be effective.

Malleability or change? Malleability refers to shifts in evaluation that are limited to the immediate situational context; change refers to shifts in evaluation that persist across multiple situational contexts (Nosek , Frazier, & Hawkins, 2012). For many practical applications, interventions must have lasting consequences beyond the immediate circumstance of administering the intervention. The three categories in the prior section imply demonstration of malleability versus change: Altering associations would presumably have general, long-term consequences, while contextual changes and behavioral strategies altering expression would have specific, short-term consequences. But, the evidence for malleability versus change of particular interventions is lacking. Of the 134 studies from articles cited in this paper that sought evidence for change in implicit associations, just 13 (9.7%) assessed implicit evaluations at a time other than the original intervention session. Most studies assessed change immediately following the manipulation in the same experimental context. This prevents drawing inferences about whether the effects reflect situational, short-term malleability or general, long-term change.

Nonetheless, there is some evidence for long-term change in implicit prejudice. In the laboratory, mechanisms such as counterstereotypical exemplar exposure (Dasgupta & Greenwald, 2001), evaluative conditioning (Olson & Fazio, 2006), and approach-avoidance training (Kawakami et al., 2000) reduce implicit prejudice for at least one to two days later in the same context. Outside of the laboratory, a seminar on prejudice and intergroup conflict

was associated with reduced implicit prejudice at the end of a semester (Rudman et al., 2001), and having an out-group roommate was related to decreased implicit prejudice after one school quarter (Shook & Fazio, 2008). Related research on stereotype reduction by Dasgupta and Asgari (2004) extended laboratory findings on counterstereotypical exemplars in a natural experiment, showing that undergraduate women who had more contact with female instructors during their first year at college held weaker implicit stereotypes associating leadership with men than did women who had less contact with female instructors, one year after the exposure. However, Stout et al. (2011) found that being assigned to female math professors and teaching assistants led to more positive implicit attitudes toward math and greater identification with math, but *not* reduced implicit stereotypes associating math with men over the course of a semester. Notably, for all of the studies described in this section that tested interventions outside of the laboratory, measurement of prejudice over time occurred while the intervention was still ongoing. The intervention was long-term; the assessment was not. Consequently, the degree to which prejudice reduction persists after completion of the interventions is unknown.

As far as we are aware, the studies described in this article comprise every demonstration of implicit prejudice change across an extended period of time (see Marini et al., 2012; O'Brien et al., 2010, for examples of lack of change over time). In sum, the existing literature provides solid evidence for implicit prejudice malleability, but little and mixed evidence for "long-term" implicit prejudice change. With the relatively compelling theoretical rationale and evidence from other domains (e.g., Teachman, Marker, & Smith-Janik, 2008), we speculate that the paucity of evidence is a function of the feasibility challenges for conducting longitudinal research rather than the unchangeability of implicit prejudice.

What can we learn from different implicit measures? Most of the studies reviewed in this paper used the IAT as the outcome measure. This was not by design. The literature on implicit prejudice reduction is dominated by the IAT (Nosek et al., 2011). Lack of measurement diversity can constrain theory-building on implicit prejudice reduction. As the IAT is a relative measure of attitudes, it is limited to demonstrating an implicit preference between two categories (e.g., Blacks and Whites; Nosek, Greenwald, & Banaji, 2005). It cannot distinguish increases in pro-Black liking from decreases in pro-White liking. Further diversification of implicit measures, such as using ones that rely less on contrasting groups (e.g., Brief IAT, Sriram & Greenwald, 2009; Go/No-Go Association Task, Nosek & Banaji, 2001; or Single-Target IAT, Karpinski & Steinman, 2006) or ones that do not rely on explicit categories at all (e.g., evaluative priming, Fazio, Sanbonmatsu, Powell, & Kardes, 1986) could reveal insights about the specific associations that interventions change and ensure that findings are not just a function of idiosyncratic features of a single method.

How do we break the link between implicit prejudice and behavior? Is it necessary to reduce implicit prejudice to reduce discrimination? Surely the answer is no, at least under some conditions. The link between implicit prejudice and behavior can be disrupted with a variety of methods, such as changing the relevance of a prejudiced attitude to the situation or by reducing the accessibility of a prejudiced attitude.

Changing the mental context in which people think of a decision can alter the connection between implicit prejudice and behavior. Providing objective criteria to guide decision-making, such as listing job requirements immediately prior to selecting a candidate, can constrain opportunities to use subjective criteria in candidate selection (Uhlmann & Cohen, 2005). Further, providing insight that one's behavior could be influenced by implicit biases can instigate efforts to control the expression of such biases without affecting the biases themselves

(Bartlett, 2009; Monteith, Ashburn-Nardo, Voils, & Czopp, 2002; Monteith & Mark, 2005). Ironically, changing mindsets can sometimes *increase* discrimination. For instance, instructing people to assert that they are objective decision-makers prior to a hiring decision increases gender (Uhlmann & Cohen, 2007) and age discrimination (Lindner, Nosek, & Graser, 2012). This emphasizes the delicacy of inducing mindsets to alter behavior. Whereas the motivation to be non-prejudiced may lead to reduced discrimination (Bartlett, 2009; Plant, Devine, & Peruche, 2010), thinking of oneself as non-prejudiced may ironically increase discrimination (Monin & Miller, 2001).

Another approach to reducing implicit prejudice is to eliminate the accessibility of prejudiced attitudes by removing information about age, race, or sexual orientation from the decision-making context, making it difficult to use biases about those categories in judgment. For example, gender discrimination in orchestral hiring is reduced by instituting blind auditions (Goldin & Rouse, 1997). Blind evaluation does not change the perceiver's thoughts or feelings about gender; rather, it eliminates the possibility of using gender as a basis of evaluation. As such, interventions need not change prejudices – they can just address their expression.

If the potential effects of implicit prejudice on behavior can be addressed without changing it, why investigate ways to reduce implicit prejudice? For one, reducing implicit prejudice may be more effective than many of the other strategies and – for some circumstances – may be the only available strategy. In many intergroup interactions, for example, it is not feasible to hide information about an interaction partner's group membership. It is also plausible that implicit prejudice reduction is more effective as a long-term, general intervention strategy, particularly when there is little control of the daily decision-making processes. In any case, identifying the comparative effectiveness and boundary conditions for interventions that target prejudice versus the expression of prejudice will facilitate clarification of the most effective means of having the desired impact on behavior.

Does changing implicit prejudice change behavior? The prior section suggests that behavior change can occur without necessarily changing implicit prejudice. A complementary question is whether implicit prejudice change causes behavior change. Practical interest for reducing implicit prejudice is based on this assumption. For practical purposes, changing implicit prejudice is just a means to mitigate its presumed consequence – discrimination. If reducing implicit prejudice did not reduce discrimination, then it is likely that applied interest in reducing implicit prejudice would fade. Policies and practices target behavior, not thoughts (Nosek & Riskind, 2012). Does *changing* implicit prejudice *change* discriminatory behavior? Surprisingly, there is little direct evidence to answer this question.

Substantial correlational evidence demonstrates that implicit prejudice predicts discriminatory behavior (Greenwald et al., 2009; Jost et al., 2009), and a few studies have found evidence for interventions that were effective at changing both implicit prejudice and discrimination concurrently (Kawakami et al., 2007, 2008; Mann & Kawakami, 2012). Of these, none reported that implicit prejudice mediated the effect of the manipulation on the behavior. Only one paper reported the analysis and there was no mediation (Mann & Kawakami, 2012). Further, we found no published paper (successful or not) that tested whether a *change* in implicit prejudice predicted a later *change* in behavior. However, there is at least one published example of this critical step outside of prejudice research. Teachman et al. (2008) tracked changes in implicit panic associations and symptoms for individuals with a panic disorder during a 12-week cognitive behavior therapy program. They found significant reductions in both panic associations and behavioral symptoms over the course of treatment and, importantly, found that the earlier change in implicit panic associations predicted later

change in panic symptoms. This provides evidence that changes in implicit associations can lead to behavior change and is a model for testing whether this occurs for prejudice and discrimination.

Conclusion

Research on implicit prejudice reduction has successfully discovered basic mechanisms for changing implicit attitudes and has provided insight into operations of the mind that escape conscious awareness or control. While there are still many open questions about the mental operation of these basic mechanisms, there are also important questions about how these routes to prejudice change influence discrimination. Looking forward, the next step is to investigate how these mechanisms can be utilized to reduce implicit prejudice for the practical interest of mitigating discrimination. The discovery of mechanisms for change provides input for the development of interventions, and evidence from effective interventions will feed back into investigations of the operative causes. Future research may find effective interventions that could leverage multiple mechanisms simultaneously, providing much greater impact than they would individually. Basic investigation of the interactive effects of multiple mechanisms on behavior is daunting because of the practical challenges of exerting systematic control over many variables at once. Applied research can simplify the process by providing interventions that work, even if we do not yet know why they work.

Short Biographies

Calvin Lai is a doctoral student in the Department of Psychology at the University of Virginia. He holds a B.A. in Psychology and Sociology from Rutgers University. His graduate research has focused on the mechanisms underlying changes in implicit attitudes, stereotypes, and identity. Calvin's work has been funded by a graduate fellowship from the National Science Foundation.

Kelly Hoffman received her B.A. in Psychology and English from Bucknell University and is currently a Ph.D. student in the Department of Psychology at the University of Virginia. She studies prejudice and discrimination, and people's perceptions of prejudice and discrimination more specifically. Her work aims to close the "perception gap" between majority and minority group members, which may in turn reduce intergroup tensions

Brian Nosek received a Ph.D. from Yale University in 2002 and is an associate professor in the Department of Psychology at the University of Virginia. In 2007, he received early career awards from the International Social Cognition Network (ISCON) and the Society for the Psychological Study of Social Issues (SPSSI). He co-founded and directs Project Implicit (http://projectimplicit.net/), an Internet-based multi-university collaboration of research and education about implicit cognition – thoughts and feelings that exist outside of awareness or control. Nosek investigates the gap between values and practices – such as when behavior is influenced by factors other than one's intentions and goals. Research applications of this interest are implicit bias, diversity and inclusion, automaticity, social judgment and decision making, attitudes, beliefs, ideology, morality, identity, memory, and barriers to innovation. Through lectures, training, and consulting, Nosek and Project Implicit apply scientific research to improve the alignment between personal and organizational values and practices. He also co-founded the Center for Open Science (http://opensciencefframework.org/) to develop infrastructure and create processes that maximize the consistency between scientific values and scientific practices.

Endnotes

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[1] These do not commit to a particular mental model of how associations are represented and which processes are involved. From a representational perspective (Petty & Briñol, 2006; Petty, Briñol, & DeMarree, 2007; Wilson, Lindsey, & Schooler, 2000), these can be understood as changing the association itself, shifting to related associations, or altering the expression of associations. From a distributed network or connectionist perspective (Conrey & Smith, 2007; Mitchell, Nosek, & Banaji, 2003; Monroe & Read, 2008; Smith, 1996, 2009), these can be understood as changing the connection weights in the network, altering the activated nodes, and altering the network output. Both perspectives can be adapted to accommodate virtually any findings.

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