Completing a Race IAT changes racial bias

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Abstract

The Race Implicit Association Test has been used in online studies to assess implicit racial biases in over four million participants. Results from three pre-registered experiments (*N* = 685) demonstrated that completing a Race IAT serves to change the racial attitudes that it seeks to assess. Increases in negative implicit racial attitudes were observed on two different implicit measures, but did not generalize to a behavioural measure of racial bias. Increases in positive explicit racial attitudes were also observed when meta-analyzed across experiments. Results highlight an important caveat for many forms of psychological assessment: that by measuring, we often perturb the system that we wish to understand.

Keywords: Implicit racial bias; implicit social cognition; implicit association test

Completing a Race IAT changes racial bias

All psychological testing to some degree also provides individuals with new experiences that influences their subsequent behaviour: just because a task is intended as a testing context does not mean that it will not induce behaviour. This is akin to Heisenberg’s observer effect in physics, where the act of measuring perturbs the system that we are interested in understanding. For example, there is significant literature on the question of whether asking individuals about suicidality increases the risk of future suicidal behaviour (De Cou & Schumann, 2017). The implications of these results for future research of course depend on any learning effect’s direction and magnitude. For example, lowering the risk of suicide merely by asking about it would be desirable, whereas raising it would be problematic.

In contrast, the study of implicit biases and implicit social cognition has paid relatively little attention to the question of whether assessing implicit attitudes also serves to change those attitudes. This question gains increased importance given the sheer scale of use of implicit measures: more than forty million participants have now completed an Implicit Attitudes Test in online studies at Project Implicit (https://implicit.harvard.edu/; Xu, Nosek, & Greenwald, 2014), and measures of implicit attitudes are used to predict behaviour in a wide range of clinical and socially domains such as self-harmful behaviour and racial bias (Green et al., 2007; Nock et al., 2010).

Recent research has demonstrated that implicit racial attitudes can be intentionally changed in several ways, such as via evaluative conditioning and learning paradigms (Lai et al., 2014). However, no work has examined changes in implicit attitudes due to the act of measurement. While a small number of studies have examined whether individual blocks of categorizations can change attitudes (Ebert, Steffens, Von Stülpnagel, & Jelenec, 2009), or whether completing a Race IAT influences more distal behaviours such as interpersonal warmth (Vorauer, 2012), no work to date has examined whether merely completing an IAT serves to change the very attitudes it seeks to assess. Recent evidence shows that the IAT can establish implicit attitudes towards novel stimuli, and specifies that it does this through a known learning pathway: analogical learning due to the relational structure among the IAT’s four concept categories (two pairs of opposites, e.g., “white:black::positive:negative”: Hussey & De Houwer, 2017). We therefore examined whether completing a Race IAT increased negative implicit biases against the racial out-group.

# Experiment 1

## Method

We report how we determined our sample size, all data exclusions, all manipulations, and all measures in the study, and all studies in this article (Simmons, Nelson, & Simonsohn, 2012). All inclusion and exclusion criteria, data collection stopping rules, analytic strategies and code for their implementation were pre-registered. All data and code are available in supplementary materials the OSF (<https://osf.io/7pbjq/?view_only=95883ad70c624ee780351e8aaf8044cc>), along with detailed descriptions of each measure and the full results of all models.

Sample. Participants for all studies were recruited online using the Prolific platform ([www.prolific.ac](http://www.prolific.ac)) and the experiment was completed through participants’ internet browsers. In line with recommendations to prevent selective attrition when recruiting participants online, participants were informed about the duration of the experiment prior to participation (Zhou & Fishbach, 2016). Inclusion criteiria were white ethinicity (to create a homogenous racial in- and out-groups), age 18 to 65, English as a first language, full use of both hands, normal or corrected to normal vision, and no participation in the researchers’ similar previous experiments. Participants provided informed consent prior to participation in all experiments. Sample size was selected based on availability of resources. No power analysis was conducted given the complexity of estimating power for interactions within mixed-effects models. 159 individuals provided at least some data and were paid £1.20. For all experiments, exclusion criteria were incomplete data on any task and more than 10% of trials < 300 ms on either of the behavioural tasks. Eleven individuals were excluded on this basis (6.9%). No evidence of condition-dependent attrition or exclusion was found, χ2(1, *n* = 159) < 0.001, *p* > .999. 148 participants remained in the analytic sample (*M*age = 32.1, *SD* = 11.1; 47 women, 98 men, 3 identified using a non-binary category or provided no response).

Procedure and measures. Participants were randomly assigned to the Race IAT condition or the Flowers-Insects IAT condition when they began the experiment. Participants completed the Modern Racism Scale, then either the Race IAT or Flowers-Insects IAT, then the black faces SC-IAT and ratings scales. IAT and SC-IAT block order was counterbalanced between participants, as was the order of the SC-IAT and ratings scales.

Modern racism scale. This seven-item self-report measure includes items such as “Black people are getting too demanding in their push for equal rights” and uses a five-point response scale (strongly disagree to strongly agree: McConahay, 1986). Sum scores on this scale were entered as a covariate in all models.

Implicit Association Tests. The IAT assesses the relative speed with which participant can categorize two target categories (black people and white people) and two attribute categories (good and bad). It does so by comparing how quickly participants respond when one set of targets and attributes share a response key (e.g., press left for black people or bad, press right for white people or good) with how quickly they respond when intersections are reversed (e.g., press left for black people or good, press right for white people or bad). All task parameters followed the recommendations of a methodological review the IAT (Nosek, Greenwald, & Banaji, 2005). Two versions of the IAT were employed that differed in their target stimuli. The Race IAT used the same stimuli that have been employed in the task hosted on the well-known Project Implicit website since 2002 (Xu et al., 2014). This employed the target categories “black people” (six pictures of black men and women’s faces) and “white people” (six pictures of white men and women’s faces), and the attribute categories “good” (joy, happy, laughter, love, glorious, pleasure, peace, and wonderful) and “bad” (evil, agony, awful, nasty, terrible, horrible, failure, and hurt). The Flowers-Insects IAT was identical other than changing the target categories to “Flowers” (six pictures of flowers) and “Insects” (six pictures of insects; Greenwald, McGhee, & Schwartz, 1998).

Single-Category Implicit Association Test. A variant of the IAT, the SC-IAT contains only one target category so as to provide a procedurally non-relative measure of bias towards one category (black people) without a contrast category (e.g., white people; Karpinski & Steinman, 2006). The presence of any learning effects between the groups could therefore be attributed to the IAT condition.

Ratings scale. Participants rated the six images of black men and women’s faces used in the race IAT using a seven-point scale (1 very negative to 7 very positive).

## Results

Typically, responses on the SC-IAT are quantified using a variant of the *D* scoring algorithm (Greenwald, Nosek, & Banaji, 2003) to control for general responding speed between participants. We expected to observe relatively small effect sizes, and therefore chose to employ an alternative, more mixed effects modeling as a more power analytic strategy (Bates, Mächler, Bolker, & Walker, 2015). These provide greater power by considering all data points generated by each participant (e.g., 140 reaction times within the SC-IAT’s critical blocks) while still controlling for differences in general responding speed between participants and acknowledging the non-independence of the multiple reaction times generated by each participant. We employed mixed-effects models for all measures in the present article. For the sake of clarity, only results of main or interaction effects testing our pre-registered hypotheses will be reported for each experiment. Full results of each mixed model are included in the supplementary materials.

Reaction times on the SC-IAT test blocks that deviated from the mean by > 2.5 standard deviations were removed as outliers (0.55% of trials removed). This approach was also applied for the AMP and Shooter bias task in subsequent experiments. Data were then entered into a linear mixed-effects model. Reaction time was entered as the dependent variable, SC-IAT block, IAT condition and their interaction were entered as fixed effects, racism was entered as a fixed-effect covariate, and participant was entered as a random effect (Wilkinson notation: RT ∼ block \* condition + racism + (1 | participant)). Results demonstrated that SC-IAT effects differed significantly between IAT conditions, *B* = 4.459, 95% CI = [1.030, 7.887], β = 0.017, 95% CI = [0.004, 0.029], *p* = .011. Inspection of the estimated marginal means revealed that participants who completed the Race IAT demonstrated more negative implicit bias towards black people on the subsequent SC-IAT than did participants who completed the Flowers-Insects IAT, as hypothesized. For illustrative purposes, differences in SC-IAT effects between groups can be quantified using traditional *D*1 scoring. This corresponds to a small difference of between the two groups, *M*diff = 0.03, 95% CI = [-0.02, 0.08], Cohen’s *d* = 0.18, 95% CI = [-0.15, 0.51].

Self-report ratings data were analyzed using a similar linear mixed-effects model, with rating as the dependent variable, IAT condition as a fixed effect, racism as a fixed-effect covariate, and participant as a random effect (rating ∼ condition + racism + (1 | participant)). Contrary to our hypothesis, no evidence was found for differences in ratings between the IAT conditions, *B* = -0.04, 95% CI = [-0.18, 0.10], β = -0.04, 95% CI = [-0.17, 0.09], *p* = .560.

# Experiment 2

In order to examine the robustness of the effect observed in Experiment 1, we conducted a close replication using a different implicit measure as a dependent variable: the Affective Misattribution Procedure (AMP: Payne, Cheng, Govorun, & Stewart, 2005). This served to decrease the procedural similarities the training task (IAT) and testing task, and therefore remove the possibility that the effects in Experiment 1 were merely a carryover effect from the training task. The design was otherwise identical to the previous experiment.

## Method

Sample. Sample size was selected by increasing relative to Experiment 1 to allow for a potentially higher attrition rate in the AMP. 232 individuals provided at least some data and were paid £0.90, 19 were excluded (8.2%)[[1]](#footnote-1). No evidence of condition-dependent attrition or exclusion was found, χ2(1, *n* = 232) = 1.64, *p* = .200. 213 participants remained in the analytic sample (*M*age = 35.8, *SD* = 12.1; 103 women, 108 men, 2 identified using a non-binary category or provided no response).

Procedure and measures. These were identical to Experiment 1 other than the use of the AMP instead of the SC-IAT. This task presents participants with Chinese characters and asks them to rate them either as positive or negative. Prime stimuli are flashed briefly on screen before each Chinese character. However, participants are instructed to ignore these primes and rate the valence of the Chinese characters only. Previous research demonstrates that participants unintentionally misattribute the valence of the primes for that of the Chinese characters, providing a measure of automatic evaluations of the primes (Payne & Lundberg, 2014). In this case, a single-category version of the AMP was employed so as to provide a measure of implicit racial bias towards black people in the absence of a racial contrast category (e.g., white people). Two forms of prime were used: images of black people (black primes) and grey squares (neural primes: see Payne et al., 2010). All other details of the AMP followed typical practices for this widely used implicit measure. Participants also provided an exploratory single-item self-report measure of stimulus awareness after the AMP. This asked whether the images that were presented in the AMP were of a) black people, b) white people, c) both, or d) I don’t know.

## Results

Trials on the AMP where reaction time deviated from the mean by > 2.5 standard deviations were removed as outliers (1.09% of trials removed). A binary logistic mixed-effects model was constructed with AMP ratings as the dependent variable, AMP prime type (black faces vs. neutral grey square), IAT condition and their interaction as fixed effects, racism as a fixed-effect covariate, and participant as a random effect (rating ∼ prime \* condition + racism + (1 | participant)). As hypothesized, AMP effects differed between the two IAT conditions, OR = 0.92, 95% CI = [0.90, 0.95], *p* < .001. Inspection of the estimated marginal means indicated participants who completed the Race IAT demonstrated more negative implicit bias towards images of black people on the subsequent AMP than did participants who completed the Flowers-Insects IAT.

The self-report ratings data were analyzed using an identical model to Experiment 1. Results revealed no evidence for differences in self-report ratings between IAT conditions, *B* = 0.10, 95% CI = [-0.02, 0.22], β = 0.10, 95% CI = [-0.01, 0.21], *p* = .089.

# Experiment 3

In a third experiment, we examined the generalizability of this learning effect to other behavioural tasks that assess racial bias: the Shooter Bias task (or Police Officer’s Dilemma Task: Correll et al., 2007). This task presents participants with images of men who are either armed or unarmed and requires them to make “shoot” or “don’t shoot” responses under time pressure. Previous studies have demonstrated a greater propensity to shoot images of black men relative to white, therefore providing a measure of racial bias. The design was otherwise identical to the previous experiments.

## Method

Participants. Sample size was selected by increasing the sample relative to the previous experiments. 294 individuals provided at least some data and were paid £2, 48 were excluded (16.3%). Some evidence of condition-dependent attrition or exclusion was found, χ2(1, *n* = 294) = 4.21, *p* = .040, with greater attrition in the Flowers-Insects IAT condition (31/147) than the Race IAT condition (17/147). 246 participants remained in the analytic sample (*M*age = 36.1, *SD* = 11.5; 152 women, 91 men, 3 identified using a non-binary category or provided no response).

Procedure and measures. These were identical to Experiment 1 and 2, with the exception of the use of a Shooter Bias task as a dependent variable. All parameters of the Shooter bias task followed the recommendations of a recent methodological review (Correll, Hudson, Guillermo, & Ma, 2014). In contrast to previous research that manipulated presenting images of black and white men within-participants, we adopted an entirely between-groups design. A single-category version of the Shooter Bias task was used to provide a measure of bias towards black people in the absence of a contrast category (e.g., white people) between the two IAT conditions.

## Results

Analyses of Shooter Bias task data typically include multiple metrics of performance within the task. We selected the three most common metrics on the basis of a recent meta-analysis: differential reaction times between trial types (armed vs. not armed), response sensitivity, and response bias (Correll et al., 2014). Each was analyzed using a linear mixed effects model. 1.09% of trials were first removed as outliers. Reaction time was entered as the dependent variable, trial type (armed vs. unarmed), IAT condition and their interaction were entered as fixed effects, racism as a fixed-effect covariate, and participant as a random effect (RT ∼ trial\_type \* condition + racism + (1 | participant)). No interaction between trial type and IAT condition was found, *B* = 0.983, 95% CI = [-0.298, 2.264], β = 0.010, 95% CI = [-0.003, 0.023], *p* = .133.

Second, we calculated an index of sensitivity, or the ability to accurately discriminate armed from unarmed individuals (d'). Differences in sensitivity between the IAT conditions were assessed in a second model: sensitivity was entered as the dependent variable, trial type (armed vs. unarmed), IAT condition as a fixed effect, racism as a fixed-effect covariate, and participant as a random effect (d' ∼ condition + racism + (1 | participant)). Our hypothesis that the Shooter Bias effects differed between the two IAT conditions referred to the main effect for experimental condition, which was found to be non-significant, *B* = 0.02, 95% CI = [-0.10, 0.14], β = 0.02, 95% CI = [-0.10, 0.15], *p* = .741.

Third, we calculated an index of response bias (c). This refers to participants’ biases towards proving a “shoot” response relative to a “don’t shoot” response, regardless of whether the image presented an individual who was armed or unarmed. Response bias was entered as the dependent variable, trial type (armed vs. unarmed) and experimental condition as a fixed effect, racism as a fixed-effect covariate, and participant as a random effect (c ∼ condition + racism + (1 | participant)). No differences in response bias was found between IAT conditions, *B* = 0.004, 95% CI = [-0.034, 0.042], β = 0.013, 95% CI = [-0.113, 0.139], *p* = .840.

The self-report ratings data were analyzed using the same model to previous experiments. In this case, differences in self-report ratings were found between the IAT condition, *B* = 0.19, 95% CI = [0.08, 0.31], β = 0.18, 95% CI = [0.08, 0.28], *p* < .001. Inspection of marginal estimated means indicated that participants rated the images of black men and women more positively when they previously completed a Race IAT than a Flowers-Insects IAT. Finally, given their similarity across the three experiments, self-report ratings from all three experiments were submitted to a random effects meta-analysis. This model was identical to the previous analyses of self-report ratings other than also including experiment as a random effect, but was not pre-registered. Results were consistent with those from Experiment 3: participants ratings of images of black people’s faces were more positive when they previously completed a Race IAT than a Flowers-Insects IAT, *N* = 603, *B* = 0.10, 95% CI = [0.03, 0.17], β = 0.10, 95% CI = [0.03, 0.16], *p* = .004.

# Discussion

Results from three pre-registered studies demonstrated that merely completing a Race IAT served to change the attitudes it intends to assess. Experiments 1 and 2 found that completing a Race IAT increased negative implicit negative racial bias towards black people on a subsequent implicit measure (the SC-IAT and AMP) compared to a non-race (flowers-insects) IAT. However, Experiment 3 found no evidence for the generalizability of this effect to another behavioural measure of racial bias (Shooter Bias task). The direction of the effects on the implicit measures was consistent with previous work suggesting that the IAT can serve as an analogical learning context due to the relational structure among its four categories (pairs of opposites, e.g., white:black::positive:negative). Unexpectedly however, results from Experiment 3 and a meta-analysis of all three experiments demonstrated the opposite pattern of effect on the self-report measures: completing a Race IAT increased positive explicit evaluations of black people relative to completing a non-racial Flowers-Insects IAT. These opposing results may be due to a decreased willingness to self-disclose racial biases (Vorauer, 2012).

These learning effects provide an important caveat for the use of the Race IAT as a measure of implicit attitudes: if changes in implicit attitudes due to the Race IAT are detectable on subsequent tasks, it is possible that to some degree the effects on the Race IAT itself are influenced by the task during the act of measurement. However, the magnitude of this learning effect is relatively small. Importantly, learning effects due to assessment are likely to be a more general phenomenon in psychological measurement, where it is unlikely that a task can function purely as an act of measurement without also providing some degree of new learning for the individual. Future research should attempt to quantify the magnitude and direction of learning effects within assessment tasks in order to understand their influence on the results of a given study. Rather than categorizing measures as being either training or testing tasks, it may be more useful to understand the learning-effects associated with any given task along a continuum.

Future research should examine whether these learning effects due to competing the Race IAT persist across time. Recent evidence demonstrates that even interventions intended to change implicit attitudes do not show sustained changes over time (Lai et al., 2014, 2016). It may be the case that the learning effects observed here are also temporary in nature. Nonetheless, the relative susceptibility to these learning effects may also be a useful variable. Future research might therefore also examine whether the relative status of racial in- and out-group pairs influences Race IAT learning effects. In the current experiments, all three experiments employed homogenous in- and out-groups by recruiting white participants assessing evaluations black people. Previous research has demonstrated that implicit in-group bias is related to relative group status (cf. Rudman, Feinberg, & Fairchild, 2002). It is therefore plausible learning effects due to the Race IAT are also influenced by the relative status of racial in- and out-groups. Any such differences in the malleability of racial biases could help direct future effects to change such biases, either by providing a new metric of particularly rigid implicit attitudes or by highlighting particularly amenable targets for intervention.

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Table 1. *SC-IAT effects (Experiment 1).*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 95% CI | |  | 95% CI | |  |
|  | *B* | lower | upper | β | lower | upper | *p* |
| Intercept | 662.79 | 601.30 | 724.28 |  |  |  | <.001 |
| SCIAT block | -0.99 | -4.42 | 2.44 | 0.00 | -0.02 | 0.01 | .571 |
| IAT condition | -7.60 | -24.30 | 9.11 | -0.03 | -0.09 | 0.03 | .373 |
| SCIAT block \* IAT condition | 4.46 | 1.03 | 7.89 | 0.02 | <0.01 | 0.03 | .011 |
| Racism | 0.72 | -2.57 | 4.00 | 0.01 | -0.05 | 0.08 | .669 |

Table 2. *AMP effects (Experiment 2).*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | 95% CI | |  |
|  | OR | lower | upper | *p* |
| Intercept | 5.18 | 2.09 | 12.87 | <.001 |
| Prime type | 1.04 | 1.00 | 1.07 | .029 |
| IAT condition | 1.12 | 0.91 | 1.36 | .282 |
| Prime type \* condition | 0.92 | 0.90 | 0.95 | <.001 |
| Racism | 0.96 | 0.91 | 1.01 | .099 |

Table 3. *Shooter Bias effects (Experiment 3).*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | 95% CI | |  | 95% CI | |  |
|  |  | *B* | lower | upper | β | lower | upper | *p* |
| *Reaction time* | |  |  |  |  |  |  |  |
|  | Intercept | 633.16 | 609.60 | 656.71 |  |  |  | <.001 |
|  | Trial type | -28.85 | -30.13 | -27.57 | -0.29 | -0.30 | -0.28 | <.001 |
|  | IAT condition | -6.00 | -10.93 | -1.08 | -0.06 | -0.11 | -0.01 | .017 |
|  | Trial type \* IAT condition | 0.98 | -0.30 | 2.26 | 0.01 | >-0.01 | 0.02 | .133 |
|  | Racism | -0.09 | -1.45 | 1.27 | 0.00 | -0.05 | 0.05 | .901 |
| *Sensitivity (d')* | |  |  |  |  |  |  |  |
|  | Intercept | 2.65 | 2.09 | 3.22 |  |  |  | <.001 |
|  | IAT condition | 0.02 | -0.10 | 0.14 | 0.02 | -0.1 | 0.15 | .741 |
|  | Racism | <0.01 | -0.03 | 0.04 | 0.01 | -0.11 | 0.14 | .823 |
| *Response bias (c)* | |  |  |  |  |  |  |  |
|  | Intercept | 0.07 | -0.11 | 0.25 |  |  |  | .446 |
|  | IAT condition | <0.01 | -0.03 | 0.04 | 0.01 | -0.11 | 0.14 | .840 |
|  | Racism | >-0.01 | -0.01 | 0.01 | -0.03 | -0.15 | 0.10 | .673 |

Table 4. *Self-reported evaluations (All experiments).*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | 95% CI | |  | 95% CI | |  |
|  |  | *B* | lower | upper | β | lower | upper | *p* |
| *Experiment 1* | |  |  |  |  |  |  |  |
|  | Intercept | 5.77 | 5.26 | 6.28 |  |  |  | <.001 |
|  | IAT condition | -0.04 | -0.18 | 0.10 | -0.04 | -0.17 | 0.09 | .560 |
|  | Racism | -0.08 | -0.11 | -0.06 | -0.40 | -0.52 | -0.27 | <.001 |
| *Experiment 2* | |  |  |  |  |  |  |  |
|  | Intercept | 4.99 | 4.45 | 5.52 |  |  |  | <.001 |
|  | IAT condition | 0.10 | -0.02 | 0.22 | 0.10 | -0.01 | 0.21 | .089 |
|  | Racism | -0.04 | -0.07 | -0.01 | -0.14 | -0.25 | -0.03 | .013 |
| *Experiment 3* | |  |  |  |  |  |  |  |
|  | Intercept | 5.01 | 4.48 | 5.54 |  |  |  | <.001 |
|  | IAT condition | 0.19 | 0.08 | 0.31 | 0.18 | 0.08 | 0.28 | <.001 |
|  | Racism | -0.03 | -0.06 | >-0.01 | -0.11 | -0.22 | -0.01 | .034 |
| *Meta-analysis* | |  |  |  |  |  |  |  |
|  | Intercept | 5.3 | 4.99 | 5.61 |  |  |  | <.001 |
|  | IAT condition | 0.1 | 0.03 | 0.17 | 0.10 | 0.03 | 0.16 | .004 |
|  | Racism | -0.05 | -0.07 | -0.04 | -0.21 | -0.28 | -0.15 | <.001 |

1. Our original pre-registered criteria also excluded participants with 10% of trials on the AMP with reaction times < 300 ms. However, this criterion failed to take in to account the distribution of reaction times on the AMP and resulted in an unacceptably high attrition rate (47.9% of remaining sample). As such, this exclusion criterion was dropped. This analytic decision was made before the any hypothesis tests were run. [↑](#footnote-ref-1)