Completing a Race IAT increases implicit racial bias

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Abstract

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all psychological testing to some degree also provides individuals with new experiences.

This is akin to Heisenburg’s observer effect, whereby the act of testing perturbs the system.

This is acknowledged in many clinical domains. We acknowledge this in ethical review proposals: just because a task is intended as a testing context, does not mean that it will not train or induce other experiences or behaviour. For example, the fields of suicide and trauma have examined whether asking about suicide increases the risk of future attempts (De Cou & Schumann, 2017), whether asking about trauma is distressing (Jaffe, DiLillo, Hoffman, Haikalis, & Dykstra, 2015).

The implications of these results for future research of course depend on any learning effects direction and magnitude. (e.g., lowering the risk of suicide would be desirable, raising it would be problematic).

Less attention has been paid to iatrogenic effects – whereby one induces the thing that one attempts to measure - in domains of social psychology/the implicit measures such as the IAT.

[or more broadly to implicit measures – check muhlenkamp and the cha studies]

The Race IAT is used to assess racial biases, millions tested [Xu studies].

Implicit racial attitudes can be intentionally manipulated in several ways, such as via evaluative conditioning and other ways of arranging the environment (Lai et al., 2014). No work has examined iatrogenic effects for the IAT itself. [tone down the Lai references and keep it about the measure]

Importantly,

A single block of IAT categorisations can induce learning (ebert)

the act of completing an IAT has recently been shown to be capable of establishing attitudes towards novel stimuli (Hussey & De Houwer, REF).

specifically, the race IAT has also been shown to induce.

However, it’s not clear what mechanism might drive this, and/or completing the IAT changes implicit measures themselves.

We therefore examined whether the Race IAT can increase 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 materials are available on the OSF (XXX).

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 by Zhou and Fishbach (2016) to prevent selective attrition when recruiting participants online, participants were informed about the duration of the experiment prior to participation. Inclusion criteiria were white ethinicity (to create a homogenous 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 were paid £1.20 and provided informed consent prior to participation. 159 individuals provided at least some data. Exclusion criteria were incomplete data on any task and more than 10% of trials on the IAT or SC-IAT with reaction times < 300 ms. 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 gave no data).

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, either the Race IAT or Flowers-Insects IAT, and 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 preregistered covariate in all models and in all experiments.

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; see supplementary materials for details). 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, Nosek, & Greenwald, 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. The task employed three blocks of trials (block 1: 10 trials; block 2: 70 trials; block 3: 70 trials). Blocks 2 and 3 each presented the categories an unequal number of times so as to provide a roughly equal number of left and right responses (e.g., left response: 20 black people trials & 20 good trials; right response: 30 bad trials; see supplementary materials for details). Only data from the SC-IAT’s critical blocks (2 and 3) were analyzed.

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

For the sake of clarity and brevity, 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 on the OSF [see tables 1-4 below for the moment].

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 power analytic strategy: mixed effects modeling (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 therefore employed mixed-effects models for all measures in the present article.

Reaction times on the SC-IAT test blocks (2 & 3) that deviated from the mean by > 2.5 standard deviations were removed as outliers (0.55% of trials removed). 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.

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. 232 individuals provided at least some data. Exclusion criteria were incomplete data on any task and more than 10% of trials on the IAT with reaction times < 300 ms. Nineteen individuals were excluded on this basis (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 gave 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 (see supplementary materials for details). 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 (see supplementary materials).

## 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. Again, 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, and the task therefore provides a measure of racial bias. The design was otherwise identical to the previous experiments.

## Method

Participants. 294 individuals provided at least some data. Exclusion criteria were incomplete data on any task and more than 10% of trials on the IAT with reaction times < 300 ms. Forty-eight individuals were excluded on this basis (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 gave 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 meta-analysis and methodological review (REF, see supplementary materials for details). 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

Effects on the Shooter Bias task can be quantified in a number of ways, and analyses typically include more than one metric. We therefore selected the three most common methods on the basis of a recent meta-analysis: reaction times, response sensitivity, and response bias (Correll, Hudson, Guillermo, & Ma, 2014). Each was analyzed using a linear mixed effects model. First, reaction times that deviated from the mean by > 2.5 standard deviations were removed as outliers (1.09% of trials removed) and then 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)). Our hypothesis that the Shooter Bias effects differed between the two IAT conditions referred to the interaction effect between trial type and experimental condition. This interaction effect was found to be non-significant, *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 the ability to accurately discriminate armed from unarmed individuals, referred to as sensitivity index (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 a response bias index (c) from participants’ responses within the task. 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. Differences in response bias between the IAT conditions were assessed in a third model: 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. Results from all three metrics of performance on the Shooter Bias task provided no evidence that participants’ performances on the Shooter Bias task were influenced by previously completing a Race IAT relative to a Flowers-Insects IAT.

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. Participants rated the images of black men and women more positively when they previously completed a Race IAT than a Flowers-Insects IAT. Finally, 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 the act of assessing implicit racial bias using a Race IAT also served to change that racial bias. Experiments 1 and 2 suggest that completing a Race IAT increased negative implicit negative racial bias towards black people on a subsequent implicit measure (the SC-IAT and AMP). However, Experiment 3 found no evidence for the generalizability of this effect to another behavioural measure of racial bias (the Shooter Bias task). Unexpectedly, results from Experiment 3 and a meta-analysis of all three experiments suggested 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. All analyses controlled for self-reported racism as a covariate.

Implications for the IAT

Issues raised: magnitude of the learning effect (small); persistence of effect across time (likely not); specificity of effect to the IAT (likely not); explanation of the effect (analogical, based on previous work).

All three experiments employed homogenous in- and out-groups by recruiting white participants and employing stimuli related to black people in all tasks other than the IAT. Future research might examine effects between other in- and out-groups, and their relative strength between these group pairings.

Attempts to decrease implicit racial out-group biases have been shown not to have lasting effects (Lai et al., 2014, 2016). It is likely that the effects observed here likewise have little or no long-term influence.

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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)