

(Carney et al.)

pg 7: DV = smiling at Black vs. white faces

pg 7: IAT = race attitude IAT

pg 8 EM = 1) attitude feeling thermometer
2) ~~self concept~~ inclusion of minorities (belong)



d = 4
 3, judge=4, obs=5, neuro=6, other=7
 m=2, NotReported=3
 iatsecond=2, iatthird=3
 explicitfirst=1, expsecond=2, behthird=3
 behfirst=1, behsecond=2, counter=3
 Reported=0, before=1, after=2, expsecond=2, counter=3
 NotReported=0, explicitfirst=1, expsecond=2, counter=3
 NotReported=0, different=1
 NotReported=0, different=1
 beh: same=0, different=1
 same=0, different=1
 DESIRABILITY 1-7
 DESIRABILITY 1-7
 DESIRABILITY 1-10

Carney et al Smiles at black vs. white face
race attitude
rac attitude then
belief in inclusion

(10) DOMAIN A/1= race, B/2= ethnicity C/3 = gender-sex D/4 = food or drink
E/5 = other consumer F/6= political G/7 = drugs or tobacco
H/8 = self esteem J/9= personality/self K/10 = clinical
L/11= relationships M/12= other? (not a tony category)

(1) BEHAVIOR: single=1, average=2 p. 6 (1) attitude for thermometer,
(2) IAT TYPE attitude=1, belief=2, self=3, not reported = 4 p. 7 (2) belief for inclusion
(3) EM TYPE, attitude=1, belief=2, self=3, not reported = 4 p. 8
(4) OVERALL METHOD: not=0, observed=1 p. 8
(5) METHOD: RepPast=1, future=2, emotion=3, judge=4, ~~obs=5~~, neuro=6, other=7 p. 8
(6) SCORE: millisecond=0, log=1, algorithm=2, NotReported=3 p. 7
(7) words=0, pictures=1, NotReported=2 p. 7
(8) number of IATs: 2
(9) IAT ORDER: NotReported=0, iatfirst=1, iatsecond=2, iatthird=3 p. 7
(10) EXPLICIT ORDER: NotReported=0, explicitfirst=1, expsecond=2, explthird=3 p. 8
(11) BEHAVIOR ORDER: NotReported=0, behfirst=1, behsecond=2, behthird=3 p. 6
(12) IAT vs. behavior: NotReported=0, before=1, after=2, counter=3 p. 7
(13) EXPLICIT vs. beh: NotReported=0, explicitfirst=1, expsecond=2, counter=3 p. 8
(14) IAT SESSION: same=0, different=1 p. 6
(15) EXPLICIT SESSION: same=0, different=1 p. 6
(16) IAT SOCIAL DESIRABILITY 1-7 7, p. 7
(17) EXPLICIT SOCIAL DESIRABILITY 1-7 7, p. 8
(18) BEHAVIOR CONTROLLABLE: 1-10 1, p. 5
(19) IAT SPECIFIC 1-7 2.5 p. 6 & 7
(20) EXPLICIT SPECIFIC 1-7 2.5, p. 6 & 7
(21) OPPOSITION 1-5 2.5, p. 7
(22) RACIAL, 0=not 1=racial, p. 2
(23) type of iat: single=1, dual=2, personalized=3, p. 7

Abstract

In a study investigating the influence of external cues such as others' expectations and societal norms (i.e., "correction cues") on electromyography (EMG) measured smiling to Black and White smiling faces, White participants viewed Black and White faces while smiling behavior (i.e., zygomaticus major activity) was measured. When the faces were presented subliminally, for 17 ms, implicit pro-White bias predicted smiling more at Whites. When faces were presented supraliminally, for 4000 ms, explicit pro-White bias predicted a contrast effect in which Whites smiled more at Blacks. These results provide evidence to suggest that "correction cues" trigger corrective processes that work against held attitude, can be miscalibrated and expressed in behavior that is proportionally inversely related to the held attitude. Further, this study is the first evidence to suggest that facial EMG can measure facial mimicry in an event-related paradigm.

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To test this hypothesis, we measured smiling behavior with facial EMG in response to the presentation of standardized photographs of smiling Blacks and Whites. Two photograph presentation conditions (within-participants) were used: subliminal (17 ms; no "correction cues" consciously available), and supraliminal (4000 ms; "correction cues" consciously available). Participants also completed measures of implicit and explicit race-bias.

Method

Participants and Design

Twenty-three participants from Harvard University were recruited (2 were Black and were excluded from all analyses leaving 21). The experiment took place in a sound-attenuated laboratory and participants sat in a large, comfortable recliner for the duration of the experiment.

Participants were told that the study was ostensibly called "attention and memory" in which we were interested in measuring electrical activity during picture-viewing. Facial EMG sensors were attached to the right side of the face to three muscle regions. In addition to measuring activity in the zygomaticus major ("smile" muscle that pulls the mouth laterally and slightly upward), additional EMG sensors were applied to the corrugator supercilii and obicularis oculi regions, and the middle of forehead (ground) in order to help with the cover story. Activity from the corrugator and obicularis oculi were not relevant to the current investigation and these data are not discussed.

After the EMG sensors were affixed, participants took all measures used in this study (i.e., the design was fully within-participants). Because the subliminal task required that no "correction cues" were consciously available, it was always given first and the supraliminal task was always given second. Both the subliminal and supraliminal tasks used the same photographs of smiling Black and White females and males. Then, participants completed a subliminal

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threshold sensitivity task (to gauge whether participants' perceptual threshold was below the ms unit used for the subliminal presentation), and measures of implicit (2 randomly ordered measures) and explicit (2 randomly ordered measures) Black/White race-bias.

Subliminal task. The subliminal task was always presented first. Smiling faces of Blacks ($n = 8$) and Whites ($n = 8$; equal numbers of females and males; NimStim: Tottenham, Borscheid, Ellertsen, Marcus, Nelson, 2002) were embedded in 48 additional stimuli including non-smiling faces ($n = 32$) and neutral non-face objects ($n = 16$) taken from the IAPS (Lang, Bradley, & Cuthbert, 1998).¹ All trials began with a 1000 ms fixation cross in the middle of the screen. Stimuli were shown for 17 ms and sandwich-masked between semi face-looking abstract pictures used in previous research by Cunningham et al. (2004). Masks were shown for 200 ms each. Each trial ended with a blank dark-colored screen which was shown for 3000 ms to allow facial muscle recovery time after each trial (SOA = 4417 ms). Participants were instructed to pay close attention to the images (i.e., masks were perceptible).

Supraliminal task. The supraliminal task was always presented second. All trials began with a 1000 ms fixation cross. The same stimuli used in the subliminal were used in the supraliminal task except the stimuli were unmasked and shown for 4000 ms and were also followed by a 3000 ms blank recovery screen (SOA = 8000 ms). Participants were asked to pay close attention to the images.

Sensitivity task. Following the subliminal and supraliminal tasks, a sensitivity task was administered to determine whether the subliminally presented stimuli were, indeed, below each individual participant's perceptual threshold. All face stimuli ($n = 48$) were individually presented using the same procedure as the subliminal task. Following each individual trial, participants made a simple judgment of whether the face was Black or White. By setting the

sensitivity criterion so low with an easy discrimination task, we could be sure to exclude any participants for whom the 17 ms presentation was not entirely subliminal. Because there were an equal number of Black and White faces shown, chance level of the Black-White judgment was 50%. Participants' average sensitivity was at chance, 50%, and ranged from 31 – 69% with a standard deviation of 8%. There were only 2 subjects who scored above chance (67 and 69%). Removal of these subjects did not change any effects; therefore all subjects were retained in all analyses.

Implicit measures of race-bias. The Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) was used to measure degree of implicit race-bias against Blacks. The IAT provides a measure of the strength of association between mental categories such as "Black" or "White" on the one hand and attributes such as "cold" or "warm" on the other. A race IAT of this type functions as a measure of implicit attitude. It measures strength of association between category and attribute by using the time it takes to make the pairings, and the number of errors in classifying, while respondents are trying to respond rapidly. The strength of association between categories and attributes such as *warm* and *cold* provides an attitudinal measure, and with attributes such as *self* and *other*, provides a measure of implicit affiliation of self to Blacks and Whites.

Two IATs were used in this research.² Procedure for IAT construction (e.g., 7-block design) and scoring procedures (e.g., the IAT "D" score was calculated) followed Greenwald, Nosek, and Banaji (2003; additionally, order of congruent and incongruent blocks was counterbalanced across participants). Both IATs used stock photos of Black and White faces. The two IATs used were: (1) Self / Other – Black / White ("self" items: we, us, our; "other" items: they, them, their), and (2) Warm / Cold – Black / White ("warm" items: warm,

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compassionate, kind; "cold" items: cold, distant, reserved). Order in which participants received the two IATs was randomized across participants. The average of the two IATs was taken to form a composite IAT measure with a mean D-score of .14 and a standard deviation of .25, which was significantly different from the scale midpoint of zero, $t = 2.48$, $p < .03$ showing participants, on average, preferred Whites to Blacks.

Explicit measures of race-bias. Two explicit (i.e., self-report) race-bias measures, analogous in content to the two IATs were administered in a random order (explicit tasks always followed implicit tasks). Participants indicated on a 7-point scale whether Blacks were perceived as more or less cold as Whites, and more or less affiliated with themselves as Whites. For example, the explicit warm / cold item ranged from "I feel strongly that White people are more interpersonally warm than Black people" to "I feel strongly that Black people are more interpersonally warm than White people." Likewise, the explicit self / other items began, "I strongly feel that White people are more 'one of us' than Black people." Intermediate attitude anchors were "moderately" and "slightly" and the mid-point was, "I feel that White and Black people are equally 'one of us' [interpersonally warm]." The explicit measures were averaged to form a composite measure with a mean score of 4.00 and a standard deviation of .89, which was not significantly different from 4.00, the midpoint of the 7-point scale ($p = 1.00$) showing participants, on average, did not explicitly report a preference for Blacks or Whites.

Facial EMG. Skin was cleaned and abraded and then a female experimenter attached 4mm paired Ag-AgCl electrodes placed on zygomaticus muscle regions to record surface EMG activity. Locations of sensor placement were guided by previous recommendations and guidelines (Fridlund & Cacioppo, 1986). EMG signals were relayed through shielded cable to

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DV

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Biopac EMG amplifiers (Santa Barbara, CA), where signals were amplified 5,000x. Signals were digitized at 2000 Hz, then recorded and displayed on a computer in a separate control room.

Offline, the data were examined and scored using MindWare EMG 2.1 scoring module, with low and high filter cutoffs set to 3Hz and 30Hz, respectively. We examined EMG activity using the event-related trigger option, which allowed us to determine the temporal windows in which the muscle activity would be assessed. For both subliminal and supraliminal data we used the same time window (5s after stimulus onset) so comparable contrasts could be made across the presentation conditions. The scoring program produces filtered and rectified EMG, and the spectral output. Zygomaticus peak amplitude was used for all subsequent analysis and was z-scored within subject. We calculated EMG reactivity as the difference between EMG activity when presented with White faces minus EMG activity when presented with Black faces, so higher scores indicate greater zygomaticus region activity to White faces.

Results

Consistent with our hypothesis, Figure 1 shows that implicit race-bias against Blacks predicted more smiling toward Whites in the subliminal (17 ms) condition when "correction cues" were not consciously available. In contrast, when "correction cues" were consciously available in the supraliminal (4000 ms) condition, explicit white preference predicted more smiling toward Blacks, $z = 2.41, p < .02$ (test for difference between correlated correlations; Meng, Rosenthal, & Rubin, 1992). Specifically, in the subliminal condition in which no "correction cues" were present, implicit (but not explicit) White preference was expressed through more smiling to White and less smiling to Black smiling faces, $r(19) = .41, p < .08$. In contrast, when correction cues were present, explicit (but not implicit) White preference predicted more smiling toward Black and less toward White, $r(19) = -.38, p < .09$.³