

1
2
3
4
5
6
7
8 **Can we change implicit racial attitudes in the real-world?**
9 **“Yes we can!”**
10

11
12
13
14
15 Leslie Roos¹, Sophie Lebrecht¹, James W. Tanaka², & Michael J. Tarr³
16
17
18
19
20
21
22

23 ¹*Department of Cognitive & Linguistic Sciences, Brown University, Providence, RI, USA*
24

25 ²*Department of Psychology, University of Victoria, Victoria, British Columbia, Canada*
26

27 ³*Center for the Neural Basis of Cognition; Department of Psychology, Carnegie Mellon*
28 *University, Pittsburgh, PA, USA*
29
30

31 **Correspondence:**

32 Prof. Michael J. Tarr
33 Carnegie Mellon University
34 115c Mellon Institute, CNBC
35 4400 Fifth Avenue
36 Pittsburgh, PA, 15213, USA
37
38

39 michaeltarr@cmu.edu
40
41

42 **Running Title:** *Can we change implicit attitudes?*
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65

1
2
3
4
5
6 **Abstract**
7
8

9
10 Implicit attitudes about social groups persist independently of explicit beliefs and can influence
11 not only social behavior, but also medical and legal practices [1]. Although examples presented
12 in the laboratory can alter such implicit attitudes [2], it is unclear whether the same influence is
13 exerted by real-world exemplars. Following the 2008 US election, Plant et al., [3] reported that
14 the Implicit Association Test or “IAT” [4] revealed a decrease in negative implicit attitudes
15 towards African-Americans. However, a study with over 475,000 respondents also employing
16 the IAT, found little evidence for any change in implicit attitudes pre- and post-election [5]. Here
17 we present somewhat different evidence that the 2008 US election may have facilitated at least a
18 temporary change in implicit racial attitudes in the US. Our results are distinguished by the use
19 of the Affective Lexical Priming Score or “ALPS” [6] and pre- and post-election measurements
20 for *both* US and non-US participants. Caucasian US students who, pre-election, exhibited
21 *negative* associations with black faces, post-election showed *positive* associations with black
22 faces. Canadian students pre- and post-election do not show a similar shift. This pattern of results
23 cannot be attributed to Type I error: instead we posit that the socio-cognitive processes
24 underlying ALPS are different from those underlying the IAT. Acknowledging that it is
25 impossible to form a direct causal link between an intervening real-world event and laboratory-
26 measured implicit attitudes, we speculate that our findings may be driven by the fact that the
27 2008 election campaign included extremely positive media coverage of President Obama and
28 prominently featured his face in association with positive words (Fig. 1) – similar to the structure
29 of ALPS (Fig. 2). Even so, our real-world finding adds to the literature demonstrating the
30 malleability of implicit attitudes and has implications for how we understand the socio-cognitive
31 mechanisms underlying stereotypes.
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65

Introduction

Implicit biases are attitudes or preferences that are automatic and occur without conscious control [4]. Over the past decade, tests of implicit racial attitudes have found that participants (on average) possess negative associations towards black faces and African-Americans [7-11]. Critically, these findings hold across a variety of implicit measures [4,6,12], as well as the race of the participant [13]. At the same time, these attitudes are apparently malleable and can be altered at the individual level through laboratory manipulations that rely on training or priming [2,6,14,15]. However in studies without direct efforts or modifications to reduce bias, participants consistently maintain a negative association to black faces [5,10,13].

With respect to short-term changes in attitudes, recent socio-cognitive studies have elucidated many of the factors that can alter an individual participant's implicit attitudes. A comprehensive review by Blair and colleagues includes a meta-analysis of such studies and concludes there is a strong case for the short-term malleability of attitudes in response to the perceiver's motives and strategies [16]. Certain factors that can moderate bias, such as self or social motives or threatened self-esteem, provide relevant theory regarding suppression of automatic stereotypes. In particular, priming studies using salient stereotypic versus non-stereotypic social examples (e.g., African-Americans in gang setting vs. African-Americans at an outside BBQ) or salient positive versus negative individual exemplars (e.g., Bill Cosby vs. OJ Simpson) have both been shown to modulate expression of African-American stereotypes, [2,17]. Such findings point to the potential of exposure for modulating implicit attitudes over the short-term. Moreover, the fact that examples of prominent individuals have some efficacy hints at the long-term factors that may be able to influence implicit attitudes within real-world populations given the right confluence of conditions (e.g., saliency, degree of counter-stereotypicality, widespread awareness of the exemplar, etc.).

In this paper we build on such results in describing a recent change in implicit attitudes that apparently arose naturally within the general population. Because of the real-world nature of our findings, it is impossible for us to definitively identify any causal relationship between changes observed in the laboratory over time and real-world events. Indeed, there has been some debate in the literature as to whether such effects exist at all [5]. At the same time, our data is strengthened by the fact that it was coincidentally collected *prior to* and *following* a highly-salient and widely-publicized social milestone in US history – the 2008 election of the first African-American US President. As such, we base our speculative interpretation of our results on recent socio-cognitive studies have attempted to address the impact of this event [18]. To help account for why a singular counter-stereotypic exemplar might have a significant impact on implicit racial attitudes, we propose a cognitive-process account for how implicit attitudes are both initially anchored and how they may change over time. As one component, we posit that racial attitudes implicitly develop in conjunction with the automatic evaluation of human faces along many non-perceptual dimensions. That is, when observers visually perceive a face they unconsciously assign it a positive or negative valence based on their prior associations with that face and faces of a similar category (e.g., faces of the same race, age, sex, etc.). This evaluation of visual input and valence association occurs very early and ubiquitously in visual processing

1
2
3
4 [19,20]. Consequently, the resultant associations, including valence, have ample opportunity to
5 influence processing within other social and cognitive systems.
6

7
8 Faces, as well as objects more generally, accumulate affective information both from
9 environmental factors (e.g., context and the opinions of others; [19]) and from one's affective
10 reactions (e.g., one's somatic responses; [20]). Furthermore, these affective associations directly
11 generalize to the interpretation of new objects or new faces that are perceptually similar to
12 familiar valenced objects or faces. This model is supported by the recent finding that participants
13 are able to (a) learn that particular valences go with particular faces and (b) (more interestingly)
14 generalize these valences to novel faces that are morphed to look like the learned-valence faces.
15 In particular, novel faces morphed with positive exemplars were judged more positively than
16 novel faces morphed with neutral or negative exemplars [21].
17
18

19
20 Such effects may be particularly strong with respect to other-race attitudes given the well-
21 established visual other-race effect, in which other-race faces are judged to be more perceptually
22 similar to one another as compared to own-race faces [22-24]. Given that implicit attitudes can
23 arise from the automatic evaluation of a face, and that observers transfer the resultant valence to
24 novel faces that are visually similar [21], we posit that implicit racial attitudes persist because
25 *once a particular association or stereotype arises for one face, it is generalized to other,*
26 *perceptually-similar faces.* Supporting this conjecture, we recently found that reducing the visual
27 other-race effect through perceptual expertise training – so that post-training other-race faces
28 look perceptually more different from one another – concomitantly reduced implicit racial biases
29 within individual participants [6].
30
31
32

33
34 With respect to the shift in implicit attitudes we report here, it is our speculation that the
35 extensive media coverage surrounding Barack Obama's presidential campaign and election
36 generated a positive counter-stereotype that generalized to other black faces. Throughout the
37 2008 US presidential campaign images of President Obama's *face* were consistently presented
38 alongside written messages of optimism such as "HOPE" and "CHANGE" (using salient and
39 unique facial imagery; Fig. 1). For the most part, the media coverage associated with President
40 Obama has continued to be counter-stereotypic from that often associated with African-
41 Americans. As but one example, a study of US news broadcasts in the 1990s found that 46% of
42 news stories involving African-Americans presented them as a "threat to or non-contributing
43 victims of American society" [25]. Similarly, Eberhardt et al. found that media portrayals are
44 strongly reflected in individual participant's associations with African-Americans [26]. For
45 instance, exposing participants to black faces lowered the perceptual threshold for detecting
46 images of crime-relevant objects (e.g., guns, knives) and exposing participants to crime-relevant
47 objects primed attention to black faces. Thus, it appears plausible that the departure from the
48 norm in media coverage associated with Obama's election campaign may have altered the
49 generic valences US residents associate with black faces and, in turn, altered the affective
50 evaluation of black faces as measured in laboratory assessments of implicit racial bias.
51
52
53
54

55
56 Of note, election campaign coverage was particularly prominent in the US college environment
57 in that much of President Obama's campaign targeted a younger voting population with new
58 media [27]. Furthermore, Shepard Fairey's (a Rhode Island artist) iconic images were highly
59 present on Brown's college campus in the form of posters, t-shirts, and stickers. A poll by the
60 Brown Daily Herald on November 3rd, 2008 found that 86.1% of Brown University students
61
62
63
64
65

1 supported Barack Obama and over 85% of these individuals were registered to vote [28]. The
2 Herald further reported that on election night the campus „exploded in jubilant spontaneous
3 celebration“ with students pouring onto the main green, then down to the State House, while
4 students lit fireworks in victory, chanting “Yes, We Can!” on the steps of public buildings [29].
5 This same pattern was repeated throughout the US: 66% of college-age voters supported
6 President Obama (31% supported Senator McCain) and over 3.4 million more people aged 18-29
7 voted in 2008 than in the previous US presidential election [27].
8

9
10
11
12
13
14 Whether such a shift in the media portrayal of a racial group (or a prominent individual from that
15 group) may influence implicit racial attitudes in the real-world is an open question that is not
16 easily addressed using traditional laboratory methods [5]. However, by happenstance we had
17 access to the measured implicit racial attitudes of two different participant populations that most
18 likely varied in their exposure to President Obama’s presidential campaign and concomitant
19 media coverage: one group of students in the US and the other group of students in Canada. As
20 such, our study is partially a matter of chance – we had collected measures of implicit racial bias
21 towards African-Americans in *both groups* prior to the 2008 US presidential election campaign
22 and collected similar data post-election in both groups given that we had some indication that
23 there was a shift in attitudes within our US participants. That is, making the somewhat
24 controversial assumption that the popular media, encompassing both advertising and news
25 coverage, did have the capacity to alter implicit attitudes, we wondered whether participants
26 from the US were more likely to show a shift in attitudes following the presidential election,
27 while participants from Canada were more likely to maintain pre-election attitudes.
28
29
30

31
32 For both groups of participants, we measured implicit racial attitudes using the Affective Lexical
33 Priming Score (ALPS) [6]. ALPS uses response times from a lexical decision task to assess a
34 participant’s implicit racial attitudes – in many ways ALPS is similar to the Bonafide Pipeline
35 [12] and is in some ways similar to the IAT [4]. However, both of these commonly-used
36 measures of implicit attitudes make *direct reference* to valence in their tasks (e.g., in the race
37 IAT [4] participants must make categorical decisions about African-Americans and Caucasian
38 Americans while the button press is shared with the affective categories “good” and “bad”).
39
40

41
42 Critically, ALPS asks participants to perform a lexical decision task that is *unrelated to valence*
43 except indirectly via the semantic connotations of the words. Lexical decision tasks, in which
44 participants are presented with a prime and then decide whether the target letter-string is a real
45 word or a nonsense word, have been widely used to study semantic priming [30]. If the prime
46 word is *semantically related* to the target (presumably as defined by the organization of one’s
47 lexicon), participants are faster to make the word/nonsense word decision as compared to when
48 the prime word is semantically unrelated [30]. We suggest that the same basic set of
49 psychological processes underlies word priming in ALPS, except that word priming within the
50 lexicon is now occurring along an affective valence, rather than semantic, dimension. That is to
51 say, if a participant evaluates a face as negative then they are likely to be faster to make a
52 word/nonsense word decision if the target word is likewise relatively negative (as compared to
53 other words in a participant’s lexicon). In ALPS the *valence* of the prime relates to the *valence* of
54 the target, irrespective of semantics/meaning. For example, a face perceived as negative can
55 prime the target word “cancer” because they are both negative in valence; faces and cancer are
56 otherwise semantically unrelated. Also of note, in our use of ALPS positive and negative words
57 are embedded in the context of many neutral and non-words, leaving the majority of participants
58
59
60
61
62
63
64
65

1
2
3
4 naïve (by self-report) to the goals of our experiment, and arguably rendering ALPS highly
5 implicit for most participants. As will be discussed later, we view these specific features of the
6 socio-cognitive mechanisms underlying ALPS as essential in accounting for why we apparently
7 saw shifts in implicit racial attitudes post-election, but a detailed, extremely large-*N* analysis of
8 IAT results revealed no such shift [5].
9

10 11 **Materials and Methods**

12 13 *Ethics Statement*

14
15
16 All pre- and post-election participants gave informed written consent and were self-reported
17 Caucasians over the age of 18. All protocols were approved and conducted in accordance with
18 the Institutional Review Boards at either Brown University or the University of Victoria.
19

20 21 *Participants*

22
23 Pre-Election: Thirty-four participants were recruited from Brown University and Providence
24 from 08/02/07-11/05/07. Twenty-four participants were recruited at the University of Victoria,
25 Canada from (11/01/07 – 06/ 30/08).
26

27
28 Post-Election: Thirty participants were recruited from Brown University, Providence RI from
29 04/14/09-05/07/09; one participant was excluded from all reported analyses due to highly
30 variable response times that fell more than 2 standard deviations away from the group mean,
31 leaving an *N* of twenty-nine. Thirty-eight participants were recruited from the University of
32 Victoria, Canada from 06/17/09-07/17/09; one participant was excluded because they self-
33 identified as Asian following participation in the study and one participant was excluded because
34 they were identified by the experimenter as actively using an illegal, psychoactive drug during
35 testing, leaving an *N* of thirty-six.
36
37

38 39 *Stimuli*

40 41 **Pre-Election**

42
43 Pre-Election Faces (Providence): Image primes consisted of 144 gray-scale male and female face
44 images of African-American, and Caucasian individuals selected from the Tarrlab face database
45 (www.face-place.org). These faces were normalized across race for luminance using an early
46 version of the SHINE toolbox [31]. Faces displayed neutral expressions and were spatially
47 normalized to an oval template in order to remove any external cues that could influence face
48 perception (for examples see Appendix).
49

50
51
52 Pre-Election Faces (Victoria): Image primes consisted of 144 gray-scale male face images of
53 African-American, Caucasian, and Chinese individuals developed in the VizCogLab (and used in
54 [24]) taken originally from the Department of Corrections face databases from the states of
55 Florida, Arkansas, Georgia, and Kansas. Internal face features were digitally placed in a standard
56 face template with identical hairstyle, face contour, and clothing (for examples see Fig. 2 and
57 Appendix). External cues (e.g., hairstyle, clothing) were kept constant. Again, these faces were
58 normalized across race for luminance using the SHINE toolbox [31].
59
60
61
62
63
64
65

1
2
3
4
5 Pre-Election Words (Providence & Victoria): Letter-strings consisted of 144 words divided
6 equally between non-words and real-words (Fig. 2). The real-words were divided equally
7 between positive, negative, and neutral words taken from the IAT [4], the Bonafide Pipeline [12]
8 and an affective word website: www.winspiration.com (for a complete word list see the
9 Appendix). Word length and frequency were matched across all conditions, and valence across
10 relevant conditions. The experimenters generated the non-words and then a third party checked
11 to ensure they were (a) pronounceable, and (b) did not sound like any pre-existing word.
12
13

14 **Post-Election**

15
16
17 Post-Election Faces (Providence & Victoria): Image primes consisted of 630 male face images
18 randomly drawn, within race condition, from 750 gray-scale male face images of African-
19 American, Chinese, and Caucasian individuals developed in the VizCogLab (and used in [24])
20 taken originally from the Department of Corrections face databases from the states of Florida,
21 Arkansas, Georgia, and Kansas. Internal face features were digitally placed in a standard face
22 template with identical hairstyle, face contour, and clothing (for examples see Fig. 2 and
23 Appendix). External cues (e.g., hairstyle, clothing) were kept constant. Luminance was
24 normalized within each racial group. Note that although these face images were different from
25 those face images used pre-election in Providence, both stimulus sets were highly controlled with
26 respect to the presence of external cues, expression, and luminance (to compare, see Appendix).
27
28
29

30
31 Post-Election Words (Providence & Victoria): Letter-strings consisted of 630 words divided
32 equally between non-words and real words. Real-words were likewise divided equally between
33 positive, negative, and neutral words from the ANEW corpus [32]. Word length and frequency
34 were matched across all conditions, and valence across relevant conditions (for a complete word
35 list see the Appendix). Non-words were generated using the ARC non-word database
36 (<http://www.maccs.mq.edu.au/~nwdb/>), and checked by a third party to ensure they were (a)
37 pronounceable, and (b) did not sound like any pre-existing word.
38
39

40 Stimuli in all experiments were presented on an LCD monitor (1024×768 resolution)
41 approximately 60 cm from the participant. This resulted in face primes that subtended a visual
42 angle of approximately 6°-7° (horizontal) and 7°-8° (vertical).
43
44

45 *Procedure*

46
47
48 Participants completed ALPS as a measure of implicit racial bias (Fig. 2). Similar in nature to the
49 IAT [4], and the Bonafide Pipeline [12], ALPS [6] was designed to probe attitudes that are
50 automatic and exempt from conscious control. We predict that affective priming occurs in ALPS
51 as the result of participants automatically assigning each face prime with a positive or negative
52 valence, which can in turn facilitate or inhibit response speed on a subsequent lexical decision
53 containing positive and negative words. The perceptual component to ALPS – processing a
54 visually-presented face – allows us a methodological tool to link face perception with affective
55 and social cognition [6].
56
57
58

59 A trial begins by briefly presenting participants with a face for 250ms that is Black, White, or (in
60
61
62
63
64
65

1
2
3
4 some versions) Chinese. After a 200ms Inter-Stimulus Interval (ISI), participants are presented
5 with a target letter-string that is either positive (e.g., “love”), negative (e.g., “hate”), neutral (e.g.,
6 “tree”), or a nonsense word (e.g., “malk”). The participant is required to make a binary
7 word/nonsense word decision on the target letter-string by making a keyboard response. The
8 letter-string remains on the screen until the participant has made their response.
9

10 11 **Results**

12
13
14 Analyses only include response times that fell within two standard deviations of the mean for
15 each individual participant. Statistical tests were performed on the dependent measure of group
16 averages of normalized response times determined as follows: response times within a given
17 condition were computed for each individual participant by subtracting their mean response
18 times for positive or negative words from their mean response time for neutral words. For
19 example, the degree of facilitation in response time for black face primes and positive words was
20 calculated by: [black face primes/neutral word trials – black face primes/positive word trials].
21 Similar calculations were done for negative word trials and for white face primes. All analyses
22 were based on the following independent factors: Pre-/Post-Election for time of testing (between
23 subjects); US/Canada participant groups (between subjects); Race of Prime for face images
24 (black/white; within subjects); Valence of Word for lexical decision (positive/negative; within
25 subjects).
26
27
28

29
30 Pre-election both US and Canadian participants exhibited the expected pattern of responses
31 consistent with the majority of implicit racial attitudes studies: associating black faces with a
32 negative valence and white faces with a positive valence. In particular, we observed no
33 significant differences in the response times between the two participant populations pre-
34 election, as demonstrated by a non-significant 3-way interaction for Race of Prime x Valence of
35 Word x US/Canada [$F(1,56) = .909, p = 0.344$]. Given this result, we combined the data across
36 the US and Canadian participants in Fig. 3a. Critically, the Race of Prime x Valence of Word
37 interaction is significant across these two groups [$F(1,56) = 6.90, p = 0.011$]; an effect driven by
38 the fact that white faces primed positive words significantly more than black faces across these
39 two groups [$t(57) = 2.02, p = 0.048$]. When the two participant populations are considered
40 independently, the Race of Prime x Valence of Word interaction is significant for US
41 participants [$F(1,33) = 4.53, p = 0.041$] and marginally significant for Canadian participants
42 [$F(1,23) = 3.63, p = 0.070$] (possibly due to the smaller N).
43
44
45

46
47 Given that we did not expect to find differences between data collected pre- and post-election,
48 we continued to refine ALPS and, post-election, employed a new, larger word set that was
49 intended to increase the sensitivity of ALPS to implicit attitudes [32]. This new word set,
50 however, resulted much faster responses to positive words regardless of prime type. This is
51 reflected in a significant main effect of word valence in the combined Post-election, US and
52 Canadian dataset [$F(1,63) = 21.5, p = .000$]. That is, in the post-election experiments, regardless
53 of the prime, participants were faster overall to identify a word if it was positive as compared to
54 if it was negative. Although this main effect does not impact the significance of our overall
55 findings, it does make them harder to interpret. This is reflected in the different scales used for
56 plotting priming scores in the pre- and post-election graphs (Fig. 3). At the same time, the critical
57 comparison between our post-election US and post-election Canadian participants is based on
58 data collected using the same word set, and therefore measured on the same scale.
59
60
61
62
63
64
65

1
2
3
4 The central question is whether US and Canadian implicit attitudes towards black faces changed
5 over time. As already stated, before the 2008 US presidential election, participants in the US and
6 in Canada both showed a negative association with black faces. However, after the election, US
7 participants showed a *significant reversal* in the attitudes they associated with black faces
8 (Fig. 3b): for US participants, post-election, black faces primed positive words more than
9 negative words [$t(28) = 3.57, p = .001$] and, although it did not reach significance, white faces
10 showed this same pattern [$t(28) = 1.36, p = .184$]. This change in attitudes in US participants was
11 reflected in a significant 3-way interaction for Race of Prime x Valence of Word x Pre-/Post-
12 Election [$F(1,61) = 4.84, p = 0.032$].
13
14

15
16 In contrast, Canadian participants *did not* exhibit a significant reversal in attitudes post-election
17 (Fig 3c): for Canadian participants, post-election, white faces primed positive words more than
18 negative words [$t(35) = 3.29, p = 0.002$], and, although it did not reach significance, black faces
19 showed a similar pattern [$t(35) = 3.29, p = 0.15$]. Unlike data collected in the US, Canadian
20 participants did not show a significant 3-way interaction for Race of Prime x Valence of Word x
21 Pre-/Post-Election [$F(1,58) = 2.24, p = 0.140$]. That is, for Canadian participants the pattern in
22 measured attitudes did not change significantly before and after the 2008 election.
23
24

25
26 These reported differences between participants in the US and Canada pre- and post-election are
27 strengthened by the fact that the 3-way interaction for Race of Prime x Valence of Word x
28 US/Canada was not significant *before* the election [$F(1,56) = .909, p = .344$], but was significant
29 *after* the election [$F(1,63) = 4.31, p = .042$]. This latter interaction demonstrates a reliable
30 difference in the measured implicit attitudes of the US and Canadian participants post-election.
31
32

33 We can also address differences in the white face primes across times and populations. Our
34 prediction was that positive priming for white faces would remain constant. Pre-election for
35 participants in the US, white faces primed positive words significantly more than did black faces
36 [$t(33) = 2.41, p = 0.022$], while participants in Canada showed no reliable difference between
37 white and black faces in priming positive words [$p = .791$]. Post-election the results are slightly
38 harder to interpret given the main effect of word valence, which, as mentioned earlier, means that
39 participants were faster to identify positive words overall, regardless of the prime. In this
40 context, as illustrated in Figures 3b and 3c, both populations showed greater priming for positive
41 as compared to negative words for black and white face primes. More specifically, post-election
42 for participants in the US, white faces primed positive words *less* than did black faces, but this
43 effect was not significant [$p = .348$], while post-election for participants in Canada, white faces
44 primed positive words significantly more than did black faces [$t(35) = 2.67, p = 0.012$].
45
46
47
48

49 Discussion

50
51
52 Across 4 laboratory assessments of implicit racial attitudes, between 2007 and 2009, we
53 observed a reversal in the implicit attitudes associated with black faces for US participants *only*;
54 surprisingly, Canadian participants did not show a similar change in attitudes. Notably, our first
55 two experiments were run prior to November of 2008 and our second two experiments were run
56 after November of 2008. Thus, later in time, US participants implicitly associated black faces
57 with positively valenced words, whereas earlier they had implicitly associated black faces with
58 negatively valenced words. In contrast, over the same time period Canadian participants
59
60
61
62
63
64
65

1
2
3
4 continued to implicitly associate black faces with negatively valenced words. In and of itself, this
5 pattern is rather puzzling. However, as with the general population, we were personally subject
6 to the high saliency of President Obama's election in November of 2008. In this context, it
7 seemed natural for us to speculate that this historic event had some impact on the measured
8 implicit racial attitudes of our participants. Reinforcing our conjectures, in the process of
9 developing our ideas and preparing this paper, a special section assessing the impact of President
10 Obama's election appeared in the *Journal of Experimental Social Psychology* [18]. Perhaps most
11 striking among the several articles was Plant et al.'s report that they had observed a post-election
12 decrease in implicit racial bias towards African-Americans as measured by the IAT [3].
13 Similarly, another study reported that the election of President Obama influenced test-taking
14 performance of African-American and Caucasian students by chronicling performance of
15 African-American students before and after the election [33]. As such, we felt and continue to
16 feel that is reasonable to present our findings in the same context as other social cognition studies
17 addressing similar questions.
18
19
20
21

22 At the same time, we acknowledge the limitations of any hypothesis positing a specific real-
23 world event as a causal mechanism must necessarily remain speculative, in that it is impossible
24 to recreate/replay transient, historical events or precisely mimic their structure in a laboratory
25 setting. That is, there is no way we can draw a causal link between our pre- and post-election
26 measurements of implicit attitudes and any specific intervening event, highly-salient and theory-
27 relevant or not. This concern becomes even more real when we consider the recent results
28 presented in [5]. As noted earlier, these authors report that a large-*N* analysis of implicit racial
29 attitudes as measured by the IAT revealed no shift in attitudes across the time period before and
30 after the 2008 US presidential election. More fine-grained analyses also support this general
31 finding: for example, the level of accessibility to Barack Obama, as measured by the number of
32 daily news articles containing the word "Obama," did not reliably influence daily measures of
33 implicit racial attitudes. Similarly, analyses predicated on social group membership or political
34 orientation revealed only minimal shifts in implicit racial attitudes, as did analyses centering
35 around important dates in President Obama's candidacy and election [5]. With respect to Plant et
36 al.'s [3] finding of decreased levels of implicit racial bias towards African-Americans, Schmidt
37 and Nosek [5] found no evidence that targeted participant samples meant to mirror those used in
38 [3] exhibited a similar decrease in levels of implicit bias. To address this discrepancy, Schmidt
39 and Nosek offer two explanations. First, it is possible that the decrease observed in [3] is a Type
40 I error (given the large preponderance of evidence Schmidt and Nosek argue that the appropriate
41 null assumption is that participants will show positive bias towards Caucasians and negative bias
42 towards African-Americans). Second, it is possible that unknown "situational" factors may have
43 come into play in the laboratory collection of data in [3] (e.g., posters or other media in the
44 laboratory that conveyed counter-stereotypical exemplars or ideals). Acknowledging that these
45 two alternative explanations are reasonable in and of themselves, we note that our results are
46 consistent with Plant et al.'s original explanation for their observed decrease in levels of implicit
47 bias. However, in contrast to our findings, Plant et al. did not report, as we do, a significant
48 *reversal* with respect to implicit attitudes towards African-Americans. Thus, it is possible that
49 Schmidt and Nosek's alternative accounts of Plant et al.'s result remain valid, but do not
50 necessarily apply to the findings we report here.
51
52
53
54
55
56
57
58

59 What factors then, might account for our results *vis a vis* those reported in [3] and [5]? Although
60 like [3] we collected our data in a laboratory setting, we are skeptical that this factor alone is
61
62
63
64
65

1
2
3
4 sufficient to explain either a decrease or a reversal in implicit attitudes. In particular, we are
5 confident that our laboratory contexts neither implicitly or explicitly conveyed “egalitarian
6 ideals” [5]. Thus, we concur with Schmidt and Nosek’s point that “there is no reason to expect
7 that the effect of Obama’s candidacy could only be observed when participants visited a
8 laboratory”. In this light, we view the most plausible explanation for our results as a
9 concatenation of locale and measurement instrument. With regard to the former, we have already
10 noted that the Providence and Brown University populations were highly supportive of President
11 Obama and that some of the iconic imagery of his campaign originated there. With regard to the
12 latter, it is self-evident that the IAT and ALPS are different tools for assessing implicit attitudes.
13 As such, it seems likely that they tap into different cognitive mechanisms and may produce
14 discrepant results depending on a wide variety of factors. More specifically, the IAT relies on a
15 form of response competition between two active concepts that is likely related to the classic
16 “Stroop” paradigm [34], whereas ALPS relies on fluency within the lexicon that is likely related
17 to semantic priming [30]. Indeed, there is evidence that affective lexical priming instruments
18 such as ALPS rely on a prime-target relationship whereby automatic processing of the prime
19 “spreads” to other lexical entries that share the same valence direction [34,35]. In contrast,
20 instruments such as the IAT may rely on the independent evaluation of the two competing
21 potential responses and, depending on the task, valence congruency may either facilitate or
22 interfere with the participant’s actual evaluative responses [34]. Although clearly a good deal
23 more work is required to pinpoint differences in the cognitive mechanisms underlying the IAT
24 and ALPS, we speculate that because there is no overt reference to social group or affect within
25 ALPS, any effects of valence are likely to be entirely unconscious – as such ALPS may be
26 somewhat more sensitive to subtleties in some aspects of implicit attitudes. Finally, as we have
27 already noted, there is a striking congruency between the media images used in the presidential
28 campaign (Fig. 1) and the structure of ALPS (Fig. 2) – it is possible that we unintentionally
29 stumbled onto the ideal instrument for assessment the effect of this particular media.
30
31
32
33
34
35
36

37 Beyond these non-theory-relevant factors (e.g., context or different measurement instruments),
38 perhaps the most compelling aspect of our study is that we were able to compare two populations
39 that were, nominally, differentially exposed to media about President Obama both pre- and post-
40 election. Thus, we were able to establish that the changes in implicit attitudes observed in our US
41 participants were not found in a non-US population with arguably less exposure to US election
42 coverage. As mentioned earlier, several studies have shown that exposure to salient counter-
43 examples can serve as a significant moderator of racial bias in short-term training and in group-
44 level gender bias differences [15,16,36]. Insofar as our assessment of post-election behavior
45 included *no* experimenter-directed instruction or experimental construct – either implicit or
46 explicit – that would indicate that either participant population should suppress implicit negative
47 racial stereotypes, we posit that our results speak to the influence of repeated exposure to a
48 salient counter-stereotypic real-world exemplar. Put another way, in order for implicit attitudes
49 to change measurably at the group level (i.e., for a significant sample of the tested Brown
50 undergraduates), some salient event must have precipitated a considerable change in the overall
51 stereotypes associated with the racial group in question. Of course, we have no way of directly
52 measuring what might have caused this real-life change across our groups of participants.
53 However, as with others in the field, we can retrospectively theorize as to what event in the past
54 several years could be so significant, and unique to our US participants, as to produce a reversal
55 in a student population’s implicit attitudes towards African-Americans. It is our conjecture that
56
57
58
59
60
61
62
63
64
65

1
2
3
4 the election of the United States' first African-American president concomitant with extensive
5 media coverage was the primary factor.
6

7
8 Finally, in order to better understand how one exemplar, Barack Obama, might have facilitated
9 the reversal of implicit attitudes attributed to an entire race, we focus on a specific perceptual
10 mechanism: the "Other Race Effect" (ORE) [22]. The ORE is defined as an individual's superior
11 ability to *visually* individuate faces drawn from the race which that individual was most
12 frequently exposed to during development, as compared to faces drawn from a race they
13 encountered less frequently [37]. Most commonly, this effect is experienced as other-race faces
14 looking more similar to one another (despite no difference in actual image similarity relative to
15 the familiar-race faces). Along with strong evidence to suggest that the ORE is a perceptual
16 effect [24,38,39], there is evidence to suggest that it also impacts socio-cognitive mechanisms,
17 such as implicit racial attitudes [6,23,40]. We suggest that the ORE and implicit racial attitudes
18 are linked in that if observers are poorer at perceptually differentiating other-race faces, they are
19 less likely to make individual-level social attributions and more likely to make group-level social
20 attributions. This decreased likelihood of observers making individual social attributions with
21 black faces presents a challenge to breaking down group-level attributions. Stereotypes typically
22 generalize across much of a group, and perceptual processing of other-race faces may in fact
23 reinforce these broad generalizations. That is, if other-race faces are perceptually more similar to
24 one another, it is more likely that a single label will be applied across individuals of that race.
25
26
27
28

29
30 We further hypothesize that implicit attitudes arise when affective associations are reactivated
31 during face perception: faces are automatically evaluated as positive or negative. Because other-
32 race faces are perceptually more similar, the affective associations that are reactivated in
33 perception are more poorly differentiated and attitudes generated from these associations will be
34 more likely to overlap. This proposed framework is supported by [21]'s finding that participants
35 rate novel faces (20-35% morphs) more positively or negatively based on their perceptual
36 similarity to learned affective faces. In the context of a valence continuum, other-race faces will
37 then cluster within a narrower range relative to own-race faces (Fig. 4). Pre-election, we posit
38 that black faces were localized towards the negative end of the continuum due to negative racial
39 stereotypes [4,12] and the predominantly negative news coverage of African-American
40 individuals [25]. Post-election for our US participants, this cluster may be anchored around a
41 more positive location along the continuum, as black faces may have been perceived as similar to
42 President Obama's highly positive face (Fig. 4). We posit that observers typically show implicit
43 *positive* attitudes for own-race faces based on the same principles. That is, in contrast to the
44 perceptual clustering of other-race faces, most observers should have sufficient perceptual
45 expertise to accurately and automatically differentiate own-race faces [6]. As our participants
46 were Caucasian, we posit that they perceived own-race faces (i.e., Caucasian faces) to be more
47 spread out along the valence continuum (Fig. 4). Yet oddly, in our study we do not consistently
48 observe the expected positive bias for white faces. Our admittedly *post-hoc* explanation for this
49 finding may be that the faces used as stimuli (both black and white) were particularly negative in
50 appearance given that they were taken from a Department of Corrections face database (of note,
51 this bias would work against our actual observation of a shift towards positive attitudes for black
52 faces drawn from the same face database).
53
54
55
56
57

58
59 We should also acknowledge that a limitation of our present study (as well as in [3]) is that we
60 have no means for assessing media exposure (positive or negative) as experienced by students at
61
62
63
64
65

1
2
3
4 Brown University or at the University of Victoria in Canada. We speculate that while Canadian
5 news organizations certainly did cover the US election, there were a variety of factors that may
6 have contributed to change we observed: extremely positive coverage of President Obama's
7 election campaign at Brown, overwhelmingly strong support for President Obama on campus,
8 the fact that President Obama's brother-in-law was the head coach of the Brown basketball team
9 from 2006-2008 (he resigned from this position to help with the campaign), an African-
10 American president at Brown since 2001, and, finally, Providence as the home of the creator of
11 the striking Barack Obama "HOPE" images (Fig. 1). Thus, Brown – a notably liberal campus
12 with direct ties to President Obama – may have been the ideal "petri dish" for observing any shift
13 in the implicit attitudes arising from the 2008 election. Of course, although this reported shift in
14 implicit racial attitudes appears to be a positive change, we wish to reiterate that a single label,
15 positive or negative, is clearly inadequate to characterize individuals within any race. In that our
16 present results suggest that such labeling is potentially malleable even within non-laboratory
17 contexts, we should be aware that that future salient events may influence these and other
18 attitudes as expressed by real-world populations.
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65

Acknowledgements

Thanks to David Sheinberg for his helpful comments and suggestions, to Emily Ammerman for her assistance in experiment preparation and data collection, and William Heindel for his assistance during the statistical analyses.

Disclosure/Conflict-of-Interest Statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

References

- 1 Green AR, Carney DR, Pallin DJ, Ngo LH, Raymond KL, et al (2007) Implicit bias among physicians and its prediction of thrombolysis decisions for black and white patients. *J Gen Intern Med* 22: 1231-1238.
- 2 Dasgupta N, Greenwald AG (2001) On the malleability of automatic attitudes: Combating automatic prejudice with images of admired and disliked individuals. *J Pers Soc Psychol* 81: 800-814.
- 3 Plant EA, Devine PG, Cox WTL, Columb C, Miller SL, et al (2009) The Obama effect: Decreasing implicit prejudice and stereotyping. *J Exp Soc Psychol* 45: 961-964.
- 4 Greenwald AG, McGhee DE, Schwartz JL (1998) Measuring individual differences in implicit cognition: the implicit association test. *J Pers Soc Psychol* 74: 1464-1480.
- 5 Schmidt K, Nosek BA (2010) Implicit (and explicit) racial attitudes barely changed during Barack Obama's presidential campaign and early presidency. *J Exp Soc Psychol* 46: 308-314.
- 6 Lebrecht S, Pierce LJ, Tarr MJ, Tanaka JW (2009) Perceptual other-race training reduces implicit racial bias. *PLoS ONE* 4: e4215.
- 7 Phelps EA, O'Connor KJ, Cunningham WA, Funayama ES, Gatenby JC, et al (2000) Performance on indirect measures of race evaluation predicts amygdala activation. *J Cogn Neurosci* 12: 729-738.
- 8 Phelps EA (2001) Faces and races in the brain. *Nat Neurosci* 4: 775-776.
- 9 Richeson JA, Baird AA, Gordon HL, Heatherton TF, Wyland CL, et al (2003) An fMRI investigation of the impact of interracial contact on executive function. *Nat Neurosci* 6: 1323-1328.
- 10 Lieberman MD, Hariri A, Jarcho JM, Eisenberger NI, Bookheimer SY (2005) An fMRI investigation of race-related amygdala activity in African-American and Caucasian-American individuals. *Nat Neurosci* 8: 720-722.
- 11 Trawalter S, Todd AR, Baird AA, Richeson JA (2008) Attending to threat: Race-based patterns of selective attention. *J Exp Soc Psychol* 44: 1322-1327.
- 12 Fazio RH, Jackson JR, Dunton BC, Williams CJ (1995) Variability in automatic activation as an unobtrusive measure of racial attitudes: A bona fide pipeline. *J Pers Soc Psychol* 69: 1013-1027.
- 13 Nosek BA, Banaji MR, Greenwald AG (2002) Harvesting implicit group attitudes and beliefs from a demonstration web site. *Group Dynamics* 6: 101-115.

- 1
2
3
4 14 Correll J, Park B, Judd CM, Wittenbrink B, Sadler MS, Keesee T (2007) Across the thin blue
5 line: Police officers and racial bias in the decision to shoot. *J Pers Soc Psychol* 92: 1006-1023.
6
7
8 15 Kawakami K, Dovidio JF, Moll J, Hermsen S, Russin A (2000) Just say no (to stereotyping):
9 effects of training in the negation of stereotypic associations on stereotype activation. *J Pers Soc*
10 *Psychol* 78: 871-888.
11
12 16 Blair IV (2002) The malleability of automatic stereotypes and prejudice. *Personality and*
13 *Social Psychology Review* 6: 242.
14
15
16 17 Wittenbrink B, Judd CM, Park B (2001) Spontaneous prejudice in context: Variability in
17 automatically activated attitudes. *J Pers Soc Psychol* 81: 815-827.
18
19 18 Cooper J (ed) (2009) A special FlashReports section on the election of Barack Obama. *J Exp*
20 *Soc Psychol* 45: 952-969.
21
22
23 19 Bar M, Kassam KS, Ghuman AS, Boshyan J, Schmid AM, et al (2006) Top-down facilitation
24 of visual recognition. *Proc Natl Acad Sci USA* 103: 449-454.
25
26 20 Barrett LF, Bar M (2009) See it with feeling: affective predictions during object perception.
27 *Philos Trans R Soc Lond B Biol Sci* 364: 1325-1334.
28
29
30 21 Verosky SC, Todorov A (2010) Generalization of affective learning about faces to
31 perceptually similar faces. *Psychol Sci* 21: 779-785.
32
33 22 Malpass RS, Kravitz J (1969) Recognition for faces of own and other race. *J Pers Soc Psychol*
34 13: 330-334.
35
36
37 23 Ferguson DP, Rhodes G, Lee K, Sriram N (2001) 'They all look alike to me': Prejudice and
38 cross-race face recognition. *Br J Psychol* 92: 567-577.
39
40
41 24 Tanaka JW, Pierce LJ (2009) The neural plasticity of other-race face recognition. *Cogn Affect*
42 *Behav Neurosci* 9: 122-131.
43
44 25 Entman RM (1994) Representation and reality in the portrayal of blacks on network television
45 news. *Journalism Quarterly* 71: 509-509.
46
47 26 Eberhardt JL, Goff PA, Purdie VJ, Davies PG (2004) Seeing black: race, crime, and visual
48 processing. *J Pers Soc Psychol* 87: 876-893.
49
50
51 27 Cave D (2008) Generation O gets its hopes up. *The New York Times*, November 7, 2008.
52 <http://www.nytimes.com/2008/11/09/fashion/09boomers.html>
53
54 28 Liss E (2008) Students support Obama, Herald poll shows. *The Brown Daily Herald*,
55 November 3, 2008. [http://www.browndailyherald.com/campus-news/students-support-obama-](http://www.browndailyherald.com/campus-news/students-support-obama-herald-poll-shows-1.1668972)
56 [herald-poll-shows-1.1668972](http://www.browndailyherald.com/campus-news/students-support-obama-herald-poll-shows-1.1668972)
57
58
59
60
61
62
63
64
65

1
2
3
4 29 Fedor L (2008) Around the Ivies, celebrations of election. Brown Daily Herald, November
5 12, 2008. [http://www.browndailyherald.com/2.12237/around-the-ivies-celebrations-of-election-](http://www.browndailyherald.com/2.12237/around-the-ivies-celebrations-of-election-1.1668794)
6 [1.1668794](http://www.browndailyherald.com/2.12237/around-the-ivies-celebrations-of-election-1.1668794)
7

8
9 30 Meyer DE, Schvaneveldt RW (1971) Facilitation in recognizing pairs of words: Evidence of a
10 dependence between retrieval operations. *J Exp Psychol* 90: 227-234.
11

12 31 Willenbockel V, Sadr J, Fiset D, Horne GO, Gosselin F, Tanaka JW (2010) Controlling low-
13 level image properties: the SHINE toolbox. *Behav Res Methods* 42: 671-684.
14

15
16 32 Bradley MM, Lang PJ (1999) Affective norms for English words (ANEW): Stimuli,
17 instruction manual, and affective ratings. Technical Report C-1, The Center for Research in
18 Psychophysiology: Gainesville, Florida.
19

20
21 33 Marx DM, Ko SJ, Friedman RA (2009) The “Obama Effect”: How a salient role model
22 reduces race-based performance differences. *J Exp Soc Psychol* 45: 953-956.
23

24 34 Klauer KC (1997) Affective priming. *European Review of Social Psychology* 8: 67-103.
25

26
27 35 Wentura D (2000) Dissociative affective and associative priming effects in the lexical
28 decision task: yes versus no responses to word targets reveal evaluative judgment tendencies. *J*
29 *Exp Psychol: Learn Mem Cogn* 26: 456-469.
30

31 36 Dasgupta N, Asgari S (2004) Seeing is believing: Exposure to counterstereotypic women
32 leaders and its effect on the malleability of automatic gender stereotyping. *J Exp Soc Psychol* 40:
33 642-658.
34

35
36 37 Bar-Haim Y, Ziv T, Lamy D, Hodes RM (2006) Nature and nurture in own-race face
37 processing. *Psychol Sci* 17: 159-163.
38

39
40 38 Tanaka JW, Kiefer M, Bukach CM (2004) A holistic account of the own-race effect in face
41 recognition: evidence from a cross-cultural study. *Cognition* 93: B1-B9.
42

43 39 McGugin RW, Tanaka JW, Lebrecht S, Tarr MJ, Gauthier I (2010) Race-specific perceptual
44 discrimination improvement following short individuation training with faces. *Cog Sci* 35: 330-
45 347.
46

47
48 40 Hugenberg K, Miller J, Claypool HM (2007) Categorization and individuation in the cross-
49 race recognition deficit: Toward a solution to an insidious problem. *J Exp Soc Psychol* 43: 334-
50 340.
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65

Figure Legends

Figure 1: Sample media from Barack Obama’s 2008 US presidential campaign. The visual pairing of Barack Obama’s face with highly positive words was ubiquitous during the campaign and may have contributed to the observed change in US participants’ valence associations with black faces. There is an interesting similarity between the face-word pairings used in the campaign posters and the positive word trials in the ALPS measure of implicit bias.

(a) Campaign poster presenting the face of Barack Obama above “HOPE” (which has a positive word rating score of 7.05, where 0 = most negative, and 9 = most positive – as measured by the ANEW corpus); (b) Barack Obama next to “CHANGE” (ANEW does not have a rating for “Change”); (c) Barack Obama’s face above “PROGRESS” (which has a positive word rating score of 7.73). [(a) and (c) are Barack Obama 2008 campaign posters created by Rhode Island artist Shepard Fairey <<http://obeygiant.com/>>. (b) is in the public domain and was provided via <http://commons.wikimedia.org/wiki/File:Barack_obama_houston.JPG>].

Figure 2: ALPS (Affective Lexical Priming Score). On each trial participants were initially presented with either a black or white face image prime displayed for 250 ms. Following a 200 ms inter-stimulus interval (ISI), a letter-string was presented that was either a real word or a nonsense word. Participants were instructed to decide whether the letter-string was a real word or a nonsense word (i.e., they were naïve to the true goals of the experiment). The real words were positive (e.g., “love”), negative (e.g., “hate”), or neutral (e.g., “tree”). Each letter-string remained on the screen until the participant responded word/non-word using one of two computer keys.

Figure 3: Pre-election versus Post-election results. Before the 2008 US presidential election participants in Providence, RI and Victoria, Canada, (combined) showed a significant crossover interaction whereby black and white faces differentially primed positive and negative words [$F(1,57) = 6.91, p = 0.011$]. (a) Illustrates that white faces primed positive words significantly more than black faces [$t(57) = 2.02, p = 0.048$]. Critically, this pattern was reversed in the US post-election as shown in (b), where black faces primed positive words more than negative words [$t(28) = 3.57, p = .001$]. This difference was not observed for white face primes. Conversely, participants in Canada failed to show this positive association to black faces; that is, as shown in (c), there was no reliable difference in reaction times for positive and negative words following a black face prime [$t(35) = 4.47, p = 0.15$]. Canadian participants did however show significant priming for positive words when they were preceded by white faces [$t(35) = 2.67, p = 0.012$]. We also found a main effect of word valence [$F(1,63) = 21.8, p = .000$], reflecting the fact that, post-election, participants were overall faster to respond to positive words. However, Canadian participants only showed significant priming for positive words when they are preceded by *white* faces For all graphs, error bars depict between-subject standard error of the mean.

Figure 4: The Valence Continuum. The valence continuum (a) illustrates the hypothesis that faces and objects are automatically evaluated with respect to a metric of positive or negative based on affective associations. Valences for faces and objects can be organized on a continuum

1
2
3
4 that ranges from strongly positive to strongly negative. Pre-election, on average, black faces
5 elicited negative associations – supported by black faces priming negative words more so than
6 positive words. As illustrated in **(b)**, this posits that, pre-election, black faces were clustered at
7 the negative end of the valence continuum. Note that this clustering is, at least in part, a product
8 of the ORE, namely that for the majority of Caucasian participants black faces look more similar
9 to one another as compared to white faces. Thus, the affective associations and concomitant
10 implicit biases overlap for Caucasians encountering African-Americans. **(c)** Notably for US
11 participants only the position of this cluster shifts to the positive end of the continuum post-
12 election, as suggested the data reported in this paper. **(d)** Similar clustering would not be seen for
13 Caucasian participants looking at white face primes in that participants are better able to
14 perceptually discriminate between own-race faces, and so associate individual primes with lower
15 overlapping valences. This greater variability in valence for own-race individuals may help
16 account for why we observed a more consistent positive association with black faces as
17 compared to white faces for participants in Providence.
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65

Figure 1
[Click here to download high resolution image](#)



Figure 2
[Click here to download high resolution image](#)

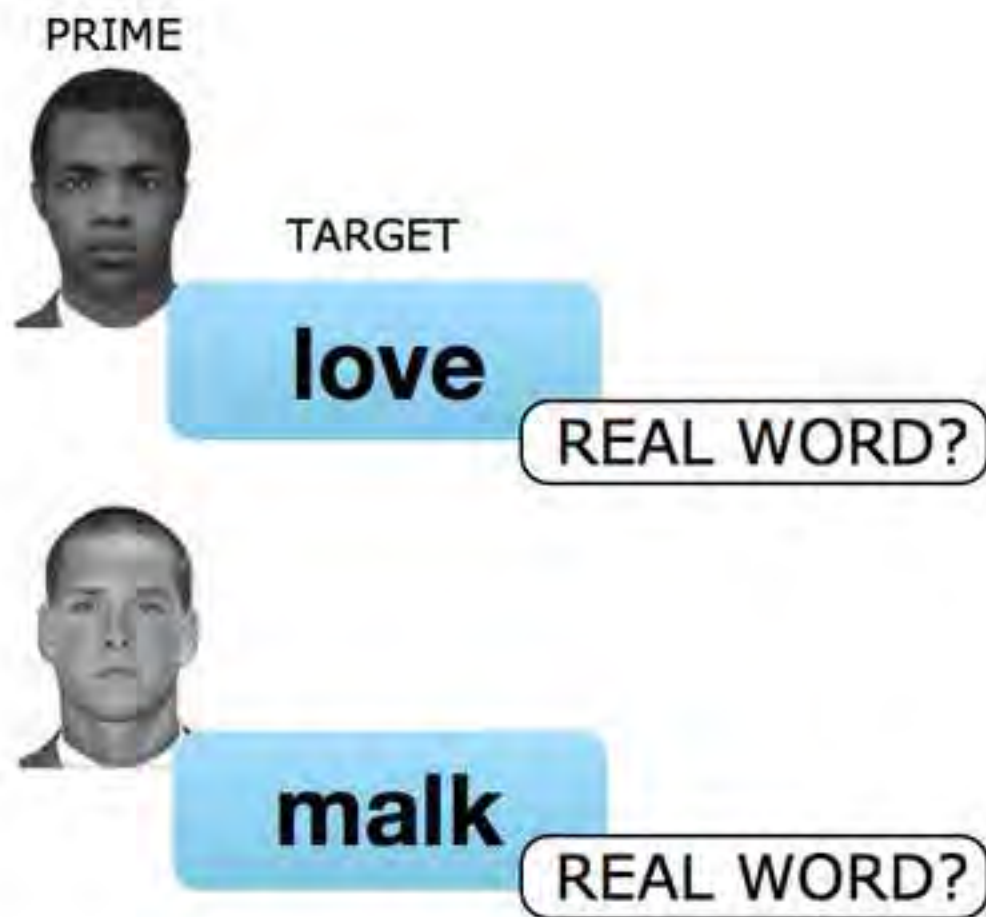
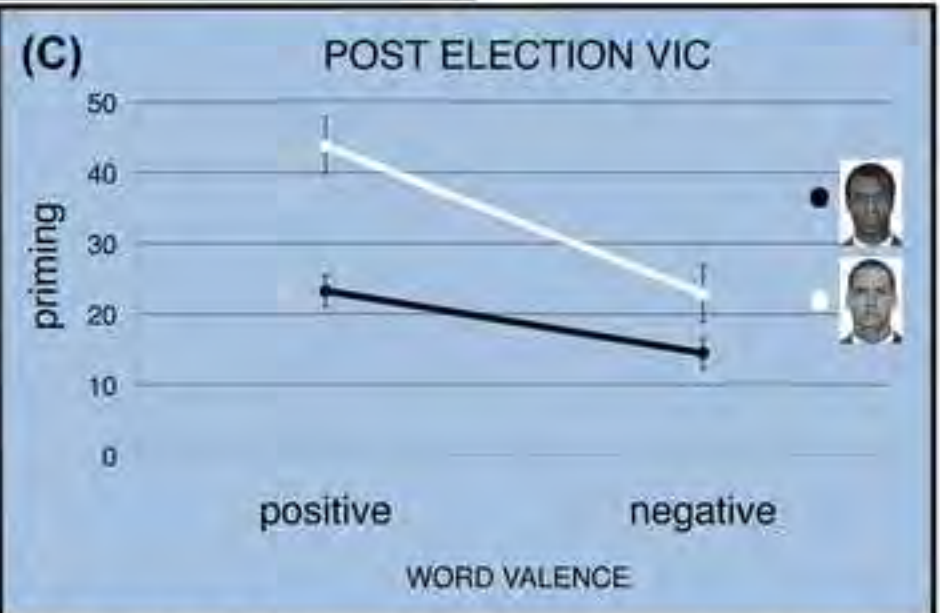
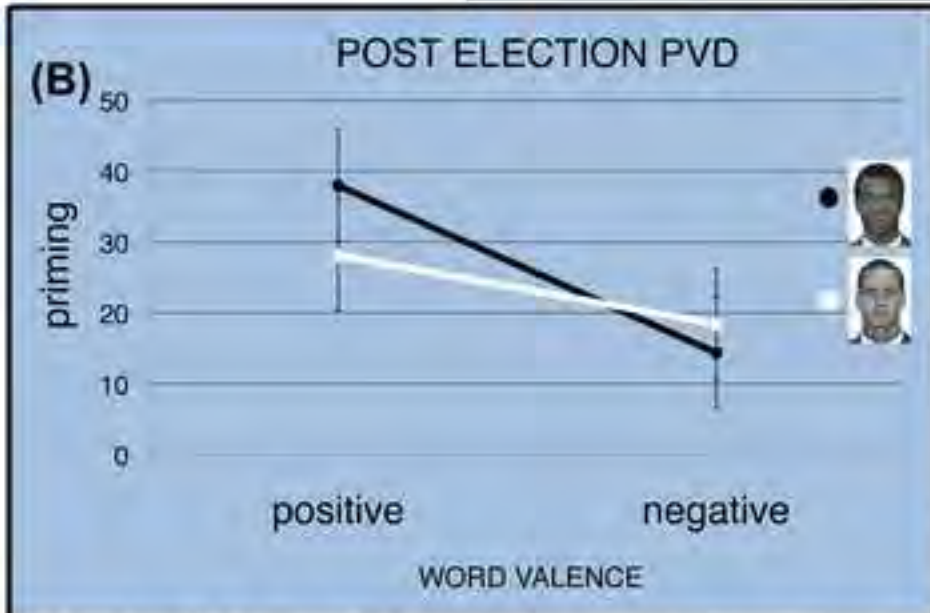
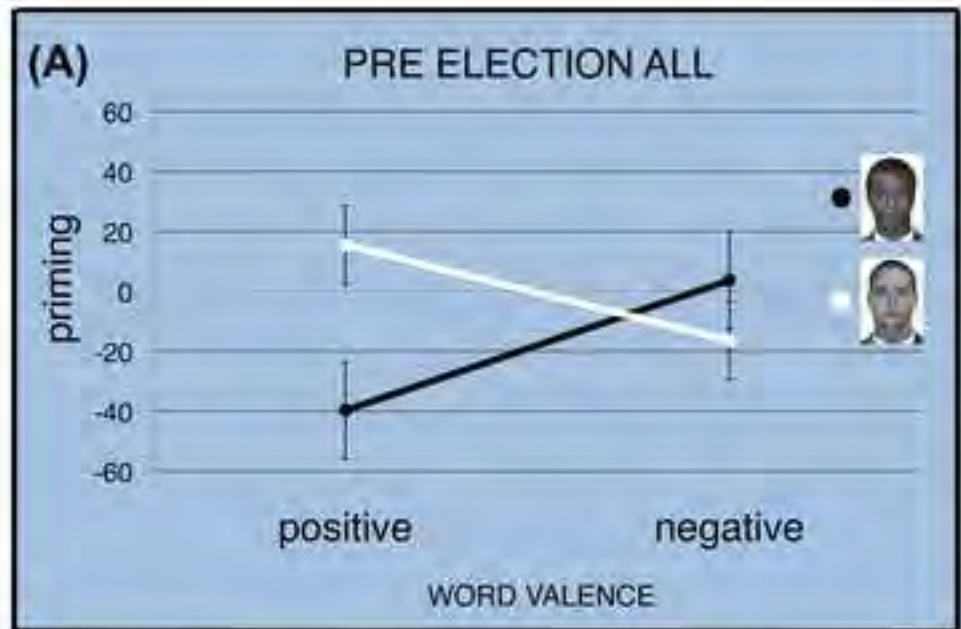


Figure 3
[Click here to download high resolution image](#)

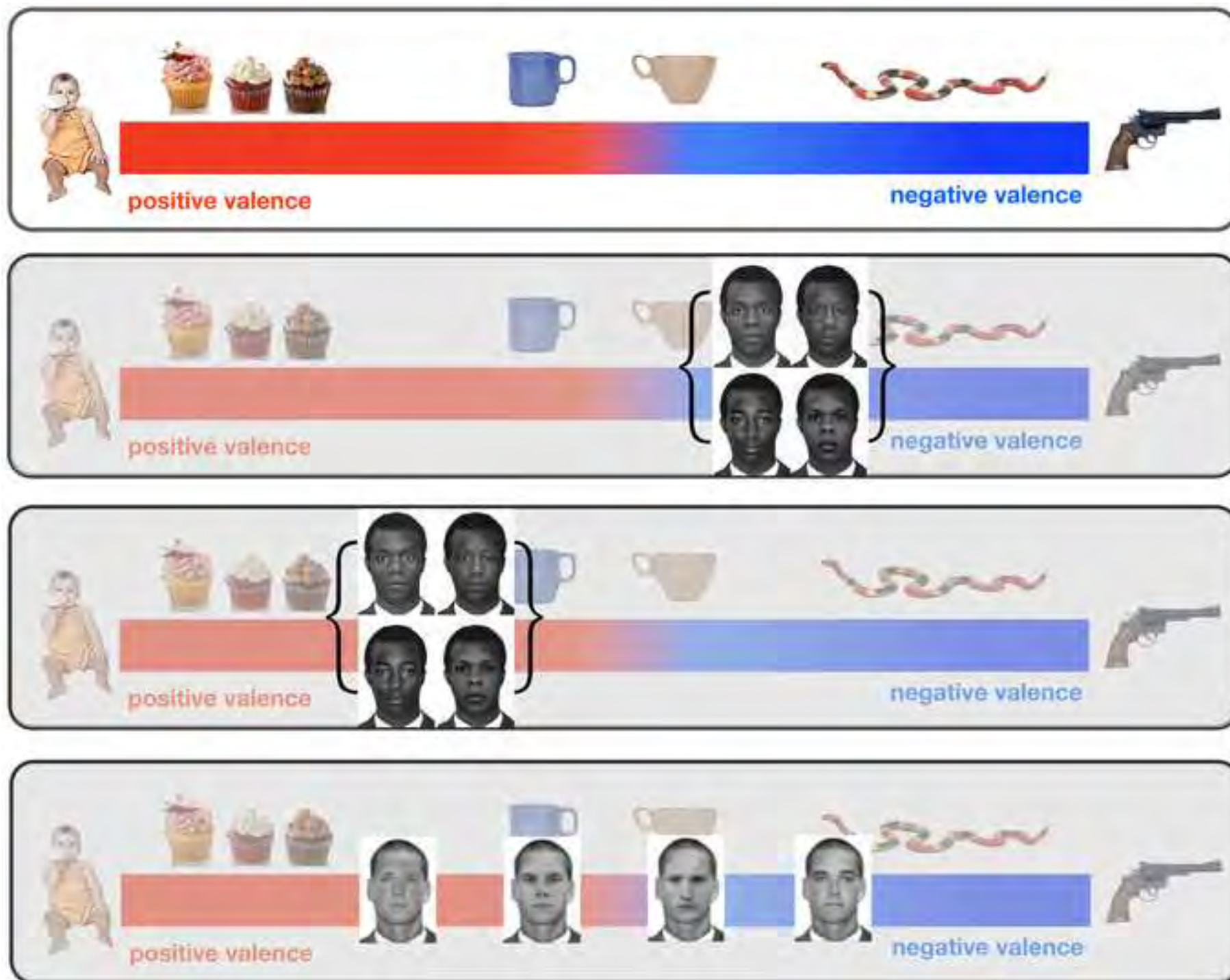


* Significant difference Pre-Post (Race of Prime x Valence of Word x Time)
* Black-Positive significantly faster than Black-Negative

* No Significant difference Pre-Post (Race of Prime x Valence of Word x Time)
* White-Positive significantly faster than White-Negative

* Significant main effect of positive words for all groups Post-Election

Figure 4
[Click here to download high resolution image](#)



Appendix

[Click here to download Supporting Information: Roos_Appendix.doc](#)