

# Improving the Predictive Validity of the Implicit Association Test

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Two experiments examined the extent to which implicit (Implicit Association Test [IAT]) and explicit (Pro-Black/Anti-Black Attitudes Questionnaire [PAAQ]) measures of racial attitudes predicted social behaviors of Caucasian participants toward African American targets. Experiment 1 showed that both the IAT and the Pro-Black subscale of the PAAQ predicted behavior toward an African American partner in a Prisoner's Dilemma. Experiment 2 showed that the IAT predicted friendliness of nonverbal behaviors directed toward Caucasian confederates relative to African American confederates, and that Pro-Black scores predicted friendliness of verbal behaviors toward the African American confederates. Importantly, these results could not be attributed to heightened attitude accessibility because the attitude and behavioral assessments in both experiments were separated by one week and counterbalanced.

The past two decades have seen the development and widespread use of implicit attitude measures (for examples, see Dovidio, Kawakami, & Gaertner, 2002; Fazio & Olson, 2003; Nosek & Banaji, 2001; Nosek, Greenwald, & Banaji, 2005). One of the most popular implicit measures is the *Implicit Association Test*, or IAT (Greenwald, McGhee, & Schwartz, 1998). The IAT is based on the idea that individuals should find it easy to respond in a similar manner to two concepts that are similar in evaluative connotation, and should find it difficult to respond in a similar manner to two concepts that are dissimilar in evaluative connotation. The reliability of the IAT, as well as its convergence with other implicit measures (e.g., evaluative priming; Fazio, Jackson, Dunton, & Williams, 1995), has been established through a number of investigations (e.g., Bosson, Swann, & Pennebaker, 2000; Cunningham, Preacher, & Banaji, 2001; Greenwald & Nosek, 2001).

Much of the research on the IAT has explored its validity by showing that response latencies on the IAT vary sensibly by "known-groups." For

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example, individuals find it easier to respond on the IAT task when one response key must be used to indicate both identifiers of an in-group and positive words, and a second key must be used to indicate identifiers of an out-group and negative words. Conversely, responding is more difficult (in terms of increased response latency and possibly greater commission of errors) when the task asks individuals to use one response key to indicate both identifiers of an in-group and negative words and a second key to identify both identifiers of an out-group and positive words (Greenwald et al., 1998; Rudman, Greenwald, Mellott, & Schwartz, 1999). Such results reflect in-group favoritism, a result that has powerfully emerged in other attitude studies (see Brewer, 1979; Hamilton, 1976).

Such in-group favoritism ought to be reflected in behavior. However, perhaps because of its relative newness, prediction of in-group favoritism behavior using the IAT has been studied less extensively than it has for other implicit techniques (e.g., evaluative priming; Fazio, Sanbonmatsu, Powell, & Kardes, 1986). However, with minor exceptions (e.g., Karpinski & Hilton, 2001), the evidence that has accumulated thus far seems promising (for a review, see Poehlman, Uhlmann, Greenwald, & Banaji, 2006). For example, McConnell and Leibold (2001) had Caucasian participants interact with both Caucasian and African American experimenters. Results indicated that pro-Caucasian biases on the IAT were negatively correlated with ratings of the quality of the interactions with the African American experimenter. That is, high implicit prejudice was correlated with perceptions of lower-quality interactions.

Although the findings of McConnell and Leibold (2001) are promising, they must be interpreted with caution for a number of reasons. First, the interaction with an African American occurred immediately after completion of the attitude measures, whose race-related purpose was almost certainly apparent to participants. Thus, it was quite likely that racial attitudes were activated at the time participants encountered the African American experimenter. Such heightened attitude accessibility could have easily inflated attitude-behavior consistency (see Fazio, Powell, & Williams, 1989). Second, Fazio and Olson (2003) note that completion of the IAT may have increased the probability that participants categorized the second experimenter as "Black" rather than applying some other social category (e.g., male, authority figure, etc.). Third, a key question left unanswered by the McConnell and Leibold study is the extent to which the IAT is related to the relatively spontaneous components of discrimination and the extent to which it is related to the relatively deliberative components of such behavior. Research in social psychology has made it clear that some behaviors are



"thoughtless," in that they are executed with little or no conscious reflection (e.g., Chartrand & Bargh, 1999). Other behaviors are more "thoughtful," in that they require more attention and are determined by an individual's behavioral intentions and beliefs (e.g., Ajzen & Fishbein, 1970). This perspective is perhaps best captured by Fazio's (1990) MODE (*m*otivation and *o*pportunity as *d*eterminants) model of how attitudes guide judgments and behavior. According to the MODE model, fundamental differences exist between behavioral responses based on relatively conscious, deliberative processes and those based on relatively automatic, spontaneous processes. Discrimination can clearly result from either (or both) of these types of processing.

It is possible that different types of attitude measures might be better suited to predict one type of discriminatory behavior (e.g., deliberative) as opposed to the other. For example, explicit attitude measures that require conscious reflection and choice might better predict discriminatory behaviors that require similar reflection and choice. By the same token, attitude measures that assess the relatively automatic, thoughtless aspects of attitudes might better predict behaviors that are similarly thoughtless and automatic. The possibility of such a pattern of prediction is clearly suggested by the findings of Dovidio and his colleagues (Dovidio, Kawakami, Johnson, Johnson, & Howard, 1997; Dovidio et al., 2002), who found differential prediction of verbal and nonverbal behaviors from explicit and implicit measures, respectively. However, their studies used an implicit priming technique rather than the IAT. This pattern of findings is consistent with the MODE model (Fazio, 1990), which suggests that when motivation and/or opportunity to control prejudiced responding are low, an implicit measure of attitudes should be a better predictor of behavior than an explicit measure. When one or both are high, an explicit measure should be more predictive. Thus, Experiment 1 placed participants in a situation in which motivation to control prejudiced responding was likely to be high. Experiment 2 simultaneously examined two types of behavior that are likely to either be susceptible (verbal) or not susceptible (nonverbal) to the effects of motivation.

In addition, the current work is in part inspired by Fazio and Olson's (2003) call for studies in which administration of the IAT is somewhat separated in time from the behavioral assessment. An early attempt at such an approach was taken by Rudman and Lee (2002), whose participants completed a racial stereotyping IAT in a session that was separate from, and earlier than, the portion of the study in which manifestations of prejudice were assessed. In a subsequent session (an unspecified amount of time later), participants were exposed to either violent and misogynous rap music or popular music to prime racial

stereotypes, then completed a person-perception task involving the evaluation of an ambiguously behaving White or Black target. Although the size of the sample was insufficient for the correlations to significantly differ across conditions, a significant correlation between the stereotyping IAT and the behavioral evaluation emerged only in the condition involving a Black target and exposure to rap music.

## EXPERIMENT 1

### Overview

Experiment 1 used methods designed to bypass many of the problems discussed above. A particular focus of the experiment was to eliminate the possibility that a predictive relationship between the IAT and behavior is due solely to heightened attitude accessibility. Thus, the experiment was conducted across two sessions that were separated by a week's time, and the order of these sessions was counterbalanced across participants. In other words, none of the participants interacted with an African American target immediately after completing the attitude measures. In fact, half of the participants completed the behavioral assessment a full week prior to the attitude assessment.

In the attitude assessment session, participants completed both the IAT and an explicit measure of prejudiced attitudes, the *Pro-Black/Anti-Black Attitudes Questionnaire* (PAAQ; Katz & Haas, 1988). This explicit measure has been shown to be both a reliable and valid measure of attitudes towards African Americans (see Biernat & Crandall, 1999). Use of the PAAQ also allows three options: discrimination behavior can be predicted from responses to pro-Black items, to anti-Black items, and from a combination of the pro-and anti-Black items (an index of attitudinal ambivalence; Katz & Hass, 1988).

In the behavioral assessment session, participants were engaged in a Prisoner's Dilemma (PD) game. PD research has shown that individuals exhibit greater cooperation if they play against a member of a racial in-group. Thus, Caucasians should cooperate more with other Caucasians than with African Americans (Baxter, 1973; Sibley, Senn, & Epanchin, 1968). More important to the purpose of the present article is whether behavior toward the African American confederate can be predicted from measures of participants' attitudes toward African Americans.

The primary hypotheses of the present experiments fall into two categories: (1) a race-based difference in behavior, and (2) the predictive power of the IAT relative to the PAAQ. Regarding the first category, Experiment 1 was conducted with the expectation that Caucasian participants would exhibit less cooperation in the PD when playing against an out-group member (i.e., an African American). Both the IAT and the PAAQ were expected to be significant unique predictors of the



extent to which participants exhibited cooperative behavior. In addition, because of the deliberative nature of the PAAQ, it was expected to outperform the IAT as a predictor of this cooperative behavior (which, being choice-based, was construed as similarly deliberative in nature).

## Method

*Participants.* Two hundred and ninety-eight undergraduates enrolled in an introductory psychology course at Northern Illinois University participated in the experiment in partial fulfillment of a course requirement. Of these, 61 participants (37 Caucasians) failed to complete both sessions of the study. Data from these participants were excluded from all analyses. To avoid suspicion about the purpose of the experiment, it was conducted as an open-enrollment study, with no restrictions placed on the ethnicity of participants. However, the experiment was largely designed to explore Caucasians' attitudes and behaviors toward African Americans. Thus, data from an additional 94 non-Caucasian participants were also excluded from the analyses. Finally, data from three additional participants were excluded from the analyses because of error rates thought to be excessive (greater than 40%) during one or more blocks of the IAT. Therefore, data from a final total of 140 Caucasian participants were included in the analyses reported below.

*Implicit Association Test.* Stimuli for the IAT included 72 words: 18 Caucasian first names (e.g., Barry, Crystal), 18 African American first names (e.g., Darnell, Latisha), 18 words referring to pleasant constructs (e.g., rainbow, paradise), and 18 words referring to unpleasant constructs (e.g., disaster, poison; see Greenwald et al., 1998).

The IAT was administered in five steps (see Greenwald et al., 1998). First, participants distinguished between African American and Caucasian first names by pressing one key on the keyboard (the "right" key) for African American names and another key (the "left" key) for Caucasian names. Second, participants used these same keys to distinguish between pleasant and unpleasant words. Third, the stimuli from steps 1 and 2 were presented within the same step; participants responded to African American names and pleasant words with the right key and to Caucasian names and unpleasant words with the left key. Fourth, step 2 was repeated, but with the response key assignments reversed (i.e., the right key was now used to respond to Caucasian names). Finally, step 3 was repeated, but with new evaluative pairings: The right key was pressed in response to Caucasian names and pleasant words, the left key in response to African American names and unpleasant words. The primary dependent variable, the *IAT effect*, was

obtained by computing the difference between the mean response latencies in steps 3 and 5.

The order in which participants executed steps 3 and 5 was counterbalanced, as was key assignment. This counterbalancing resulted in four versions of the IAT, with an approximately equal number of participants encountering the following category combinations first: (1) White + pleasant, Black + unpleasant; (2) Black + pleasant, White + unpleasant; (3) White + unpleasant, Black + pleasant; and (4) Black + unpleasant, White + pleasant.

*Pro-Black/Anti-Black Attitudes Questionnaire.* The PAAQ (Katz & Hass, 1988) consists of 10 Pro-Black items (e.g., "Black people do not have the same employment opportunities that whites do") and 10 Anti-Black items (e.g., "On the whole, black people don't stress education and training"). Participants indicated their agreement with each statement using a scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Scores were computed separately for each subscale by summing items within each subscale. Following procedures established by Katz and Hass, an index of attitudinal ambivalence was obtained by computing the product of the Pro- and Anti-Black subscale scores.

*Procedure.* Experiment 1 was conducted across two separate sessions, with the order of completion for a given participant determined via counterbalancing. The two sessions were separated by approximately one week.

In the attitude assessment session, participants were seated in individual cubicles in which they completed the IAT and the PAAQ. The order in which participants completed these two measures was counterbalanced.

The IAT was administered using a computer program written by Farnham (1998), which progressed according to the procedure outlined above. Participants were told they would be completing a categorization task, and were instructed to respond to each stimulus with either the left ("a") key or the right ("5" on the number pad) key.

The PAAQ was administered using Jarvis' MediaLab (2004b) experimental software. The 20 PAAQ items (10 Pro-Black, 10 Anti-Black) were embedded in a series of explicit measures in an attempt to mask the overall nature of the experiment. The other explicit measures were the 26-item Interpersonal Orientation Scale (Hill, 1987) and the 18-item version of the Need for Cognition scale (Cacioppo, Petty, & Kao, 1984).

Using a procedure adapted from Baxter (1973), participants played two 50-trial PDs. Each player could choose one of two options on each trial: one option reflected cooperation, the other reflected competition. Mutual cooperation resulted in a gain of five points for each player. If the



participant cooperated but the partner defected, he or she lost four points while the partner gained six. If the participant defected but the partner cooperated, he or she gained six points and the partner lost four. If both players defected, both lost three points. The payoff structure was explained thoroughly prior to the commencement of the game; sample trials were provided to further illuminate this structure.

At the start of the session, the participant was asked to enter his or her name using the keyboard. The participant's attention was then directed to a webcam placed atop the monitor, supposedly to take a photograph of the participant that would be sent to the partner via a network connection. The camera was a dummy prop, designed to induce participants to believe that the photos they received depicted their co-players. Next, a "welcome" screen appeared, informing the participant of a slight delay prior to the start of the game. This delay created the illusion that a partner in another room was "logging on" to the game, and that this login process would take a few moments. After a 30-second delay, the name and photograph of the fictional partner appeared on the screen (and supposedly, at the same time, the participant's own name and photo were appearing on the partner's screen). Participants played two consecutive PDs, one against a partner with a stereotypically Caucasian name and appearance ("James") and one against a partner with a stereotypically African American name and appearance ("Jamal"). Partner appearance was conveyed using photographs of one Caucasian and one African American, both males in their mid-20s. The order in which participants played the two partners was determined by counterbalancing.

The participant's name and the partner's name were displayed at the bottom of the screen on a "scoreboard," which kept a running tally of each player's score throughout the game. Two buttons, one blue (cooperation) and one red (defection), were located just above the scoreboard. Using the mouse, participants chose one of the buttons on each trial. After they made their choice, the partner's "choice" was revealed. At that point, a trial summary was presented that included the two players' choices and the resulting payoff. For example, if both the participant and the partner chose blue, the following summary would appear: "You chose blue. James chose blue. You both gain 5 points."

The computer partner responded with cooperation on 45 trials and defection on the other five: a 90% cooperative non-contingent strategy. The sequence in which the computer's choices were executed was random, with the lone restriction being the first five trials were always cooperative. This approach was used to reduce the likelihood of participants employing an unusually competitive strategy based on an early defection by the partner. It also increased the relative equivalence of when the five defection trials occurred across the two partners.

At the conclusion of the first game, participants were told they would be playing a second game with a different partner. A 30-second delay created the illusion that the computer network was searching through the rest of the experimental rooms to find the next available partner. Once the computer "found" the second partner, the second game proceeded almost exactly as the first. The only difference was the name and photograph of the fictional partner: it was "Jamal" if the participant played James first, or it was "James" if the participant played Jamal first.

After the completion of the second game, the participant was probed for any suspicions that: (a) the two sessions of the experiment (attitude measures and PD) were related (if the PD session was the participant's second session), or (b) the partners were fictional. If the PD session was the second session for a given participant, he or she received a full debriefing. If it was the first session, this full debriefing was conducted after the completion of the attitude assessment session. In either case, once the debriefing was complete, the participant was thanked for his or her participation and dismissed.

## Results

*Implicit Association Test.* Mean response latencies (in milliseconds) during the compatible (e.g., Caucasian + pleasant) and incompatible (e.g., African American + pleasant) blocks were submitted to a 2 (Session Order: attitude measures first, PD first)  $\times$  2 (Attitude Measure Order: IAT first, PAAQ first)  $\times$  4 (IAT Block Composition: Caucasian + pleasant first, Caucasian + unpleasant first, African-American + pleasant first, African-American + unpleasant first)  $\times$  2 (IAT Block Compatibility: compatible, incompatible) ANOVA with repeated measures on the last factor. This analysis revealed a main effect of block compatibility,  $F(1, 124) = 302.18, p < .001$ . Participants responded far more quickly during compatible blocks ( $M = 879$  ms) than incompatible blocks ( $M = 1159$  ms), suggesting a large pro-Caucasian preference. The mean IAT effect ( $M = 281$  ms) was comparable to those obtained in previous research (e.g., Greenwald et al., 1998; McConnell & Leibold, 2001).

This main effect was qualified by an interaction with the block composition variable,  $F(3, 124) = 3.86, p = .011$ . Examination of the means indicated that the tendency to respond more quickly during compatible blocks was more pronounced for participants whose first left-key pairing was Caucasian + pleasant. This interaction often occurs in IAT research (see Greenwald et al., 1998; Rudman et al., 1999); its presence does not qualify interpretation of the main effect: In all four block composition conditions, participants exhibited an overwhelming tendency to respond more quickly during compatible (vs. incompatible) blocks. Given that the Block Compatibility  $\times$  Block Composition



interaction in the latency data was ordinal rather than dis-ordinal, all subsequent analyses examined the IAT effect collapsing across presentation order.

*Pro-Black/Anti-Black Attitudes Questionnaire.* Both the Pro-Black and Anti-Black subscales of the PAAQ exhibited acceptable reliability (Cronbach's  $\alpha = .72$  and  $.80$ , respectively). The mean scores for the subscales (Pro-Black  $M = 32.75$ , Anti-Black  $M = 31.45$ ) and the Ambivalence Index ( $M = 1027.61$ ) were similar to those obtained in previous research (see Katz & Hass, 1988). The two subscales were uncorrelated,  $r(140) = -.07, p > .3$ , supporting Katz and Hass' claim that they measure independent constructs. Data for all three variables (Pro-Black, Anti-Black, and Ambivalence) were submitted to separate 2 (Session Order: attitude measures first, PD first)  $\times$  2 (Attitude Measure Order: IAT first, PAAQ first) between-subjects ANOVAs. All three analyses failed to yield any significant effects, all  $p$ 's  $> .10$ .

*Prisoner's Dilemma.* Cooperation rates during the two PDs were examined using a 2 (Session Order: attitude measures first, PD first)  $\times$  2 (Attitude Measure Order: IAT first, PAAQ first)  $\times$  2 (Partner Order: Caucasian partner first, African American partner first)  $\times$  2 (Cooperative Expectancy Instructions: none, cooperative expectancy)<sup>1</sup>  $\times$  2 (Partner Race: Caucasian, African American) ANOVA with repeated measures on the last variable. The only significant effect to emerge from this analysis was a main effect of partner race,  $F(1, 124) = 6.11, p = .015$ . Unexpectedly, participants cooperated at a higher rate with the African American partner ( $M = 51.8\%$ ) than the Caucasian partner ( $M = 48.4\%$ ).

*Predictive utility analyses.* Following Dovidio et al. (1997), multiple regression analyses were conducted to determine whether scores on the IAT and the PAAQ predicted participants' cooperative behavior towards the African American partner.<sup>2</sup> In the first step of the regression analysis, the IAT effect, the PAAQ Pro-Black subscore, and the PAAQ Anti-Black subscore were entered as predictors of the rate at which a participant cooperated with the African American partner.<sup>3</sup> The Ambivalence Index (equivalent to the Pro-Black  $\times$  Anti-Black interaction term) was entered as an additional predictor in a second step. Entering the Ambivalence Index in the second step of the regression revealed it did not account for significant variance beyond that accounted for by the original set of predictors,  $\Delta R^2 = .01, F(1, 135) = 1.39, p > .2$ .

However, the overall squared multiple correlation for the first step was significant,  $R^2 = .074, F(3, 136) = 3.62, p = .015$ , suggesting the set of three main effect predictors accounted for significant variance in participants' cooperation scores. Examination of the standardized regression coefficients for each predictor revealed that both the IAT ( $\beta = -.21, t = -2.51, p = .013$ ) and the Pro-Black subscore ( $\beta = .17, t = 2.10, p$

= .037) significantly predicted the cooperation scores. The negative coefficient for the IAT suggests that as the IAT effect diminished (indicating less pro-Caucasian bias), cooperation with the African American partner increased. The positive coefficient for the Pro-Black subscale shows that cooperation with the African American partner also increased as Pro-Black attitudes increased.

## Discussion

Both the IAT and the Pro-Black subscale of the PAAQ were significant predictors of the behavior of Caucasians toward African American partners in a PD. This contrasts with results of previous research suggesting the IAT does not uniquely predict behavior above and beyond what is accounted for by explicit measures (e.g., Karpinski & Hilton, 2001), and adds to a growing body of evidence for a dissociation between implicit attitudes and explicit attitudes (i.e., that they are related but distinct constructs; see Fazio & Olson, 2003).

These results occurred despite the fact that the attitude and behavioral assessments were temporally separated and counterbalanced. Fazio and Olson (2003) argued that a major limitation of many IAT predictive validity studies (e.g., McConnell & Leibold, 2001) is that the behavioral assessment often immediately followed completion of the attitude measures. Thus, when an attitude-behavior relationship is observed in such studies, it is difficult to determine if this relationship is merely a consequence of heightened attitude activation. The results of Experiment 1 clearly show that such heightened activation is not necessary for the successful prediction of behavior.

One might wonder why the Pro-Black subscale of the PAAQ was a significant predictor of participants' cooperative behavior with the Black partner, while the Anti-Black subscale was not. It could be argued that people might be less likely to respond in politically correct ways when prejudice items are phrased positively. However, it seems to be asking much of participants to exhibit control on negatively worded items, but not on positive items, when the two are intermixed as they were in the present experiment. More reasonable, especially from the point of view of the creators of the PAAQ, is to take the result at face value. That is, the positive and negative subscales of the PAAQ may assess separate aspects of the attitude network, and with our population of relatively urbanized college students it is the positive elements of the mental network representing attitudes toward African Americans that control behavior toward them.<sup>4</sup>

It is interesting to note that, contrary to expectations, Caucasian participants exhibited greater cooperation with an African American partner than a Caucasian partner. While such unexpected results should



always be viewed with caution, several circumstances suggest that this result can be trusted. First, an unpublished pilot study conducted by the first author using a similar methodology (Heider, 2003) yielded similar results. Second, much of the research documenting the tendency of Caucasians to cooperate more with other Caucasians than with African Americans was conducted during the late 1960s and early 1970s (e.g., Baxter, 1973; Sibley et al., 1968), a time of great racial tension in the United States. Although negativity certainly still exists, American society as a whole has become more positive toward African Americans (see Schuman, Steeh, & Bobo, 1985). Perhaps this positivity is also related to the ability of the positive PAAQ subscale, and not the negative, to predict behavior in the PD.

However, it could also have been the case that our participants were aware of their potential prejudices and were overtly trying to not treat the African American "partner" poorly. The MODE model (Fazio, 1990) suggests that when motivation and/or opportunity to control prejudiced responding are low, an implicit measure of attitudes should be a better predictor of behavior than an explicit measure. When motivation and opportunity to control prejudice are both high, an explicit measure should be a better predictor. However, the PD setting used in Experiment 1 is not ideally suited to analysis in terms of the MODE model: it is unclear whether participants were motivated to avoid prejudice, or had the opportunity to do so.

## EXPERIMENT 2

Experimental procedures pioneered by Dovidio et al. (1997, 2002) can be adapted to explore whether the extent to which the IAT predicts social behavior might vary by an actor's opportunity and motivation to control prejudice. Dovidio et al. argued that some behaviors exhibited in social interactions (e.g., the content of verbal interactions) should be responsive to motivation and opportunity to control prejudice, whereas other behaviors (e.g., nonverbal behaviors) should not. Accordingly, the MODE model suggests that verbal behaviors should be well-predicted by explicit measures of attitudes, whereas non-verbal behaviors should be well-predicted by implicit measures. In Experiment 2 we attempted to duplicate this result using the IAT as our measure of implicit attitudes and the PAAQ as our explicit measure. Similar to Experiment 1, the attitude and behavioral assessments were separated by one week and counterbalanced in an effort to refute the argument that relationships between the IAT and behavior are the result of increased attitude activation.

Experiment 2 was conducted with the expectation that Caucasian participants would exhibit less verbal and nonverbal friendliness in a naturalistic conversation with an out-group member (i.e., an African

American). These two types of behavior (verbal and nonverbal) are believed to reflect relatively deliberative and spontaneous processes, respectively (see Dovidio et al., 1997, 2002). It was expected that both the IAT and PAAQ would significantly predict verbal and nonverbal behaviors. It was further expected that the IAT would be a stronger predictor of the friendliness of participants' nonverbal behaviors, whereas the PAAQ would be a stronger predictor of the friendliness of verbal behaviors. These expectations were based on the fact that responses to the IAT and PAAQ are spontaneous and deliberative in nature, respectively.

### Method

*Participants.* One hundred thirty-five undergraduates enrolled in an introductory psychology course at Northern Illinois University participated in the experiment in partial fulfillment of a course requirement. Of these 135, 23 (12 Caucasians) were excluded from all statistical analyses for failing to complete both sessions of the study. As in Experiment 1, to avoid suspicion enrollment for the study was open to all ethnicities. However, given that the focus of the study was on the behavior of Caucasians toward African Americans, data from an additional 57 non-Caucasian participants were also excluded. Unlike Experiment 1, no participants were excluded for excessive error rates during one or more blocks of the IAT (no participant had an error rate greater than 26%). Therefore, a final total of 55 participants were included in the analyses reported below.

*Attitude Measures.* Experiment 2 used the same attitude measures (IAT and PAAQ) as Experiment 1. The PAAQ was administered according to the procedure outlined in Experiment 1. Three changes were made to the administration of the IAT. First, it was administered using DirectRT experimental software (Jarvis, 2004a). Second, photographs of Caucasian and African American faces were used as stimuli for the racial categories rather than stereotypical first names. The use of such photographs has become commonplace in IAT research, primarily because photographs are less ambiguous to categorize than first names. Thus, errors in categorizing the racial stimuli are virtually eliminated (see Fazio & Olson, 2003). Third, to limit the number of conditions created by the procedural variables, only two of the four possible presentation orders (Black + pleasant first, Black + unpleasant first) were used.

*Procedure.* Experiment 2 was conducted across two separate counterbalanced sessions. In the attitude assessment session, participants completed the IAT and PAAQ. A separate behavioral assessment session engaged participants in two separate conversations, one with a Caucasian confederate and one with an African American confederate.



The conversation procedure was adapted from Dovidio et al. (2002). To ensure that each participant interacted with one African American and one Caucasian, undergraduate confederates representing these two ethnicities were employed to pose as ordinary participants. The order in which participants interacted with the two confederates was determined by counterbalancing. The confederates received training to respond consistently across sessions, while not sounding as though their responses were rigidly scripted.

Upon entering the laboratory, a female experimenter escorted the participant to a room containing two chairs on either side of a table, one for the participant and one for the first confederate. The experimenter explained that the current experiment was examining the acquaintance process and that the session would be videotaped for later evaluation (cameras were placed behind each chair, focused on the chair across the table). The participant was told he or she would have two conversations with different partners, both on the topic of dating in the current era vs. dating in earlier periods. At this point, the experimenter left the room and returned with the first confederate (who had supposedly already been informed of the conversation topic). She then gave the participant and confederate three minutes to discuss the topic and left the room. After three minutes the experimenter re-entered the room, signaling for the conversation to end. The participant and confederate were both asked to complete an impression questionnaire, but this was done in separate rooms so they could be filled out in privacy. This questionnaire asked each individual to provide ratings on a series of friendliness-related items (likable, sincere, cruel, friendly, pleasant, and cold; all responses were provided using 7-point scales ranging from *not at all* to *extremely*). The first portion of the questionnaire asked for self-ratings; the second portion asked for ratings of one's conversation partner.

After collecting the questionnaire, the experimenter left the room and returned with the second confederate (always of a different race than the first confederate). The participant and this confederate then took part in another 3-minute conversation on the same topic, followed by the same impression questionnaire. Once the second impression questionnaire was collected, the participant was probed for suspicion, debriefed (fully if he or she had already completed the attitude assessment session; partially if he or she had not), thanked, and dismissed.

An independent judge viewed audioless videotapes of the conversations, and was asked to rate the friendliness of the nonverbal behaviors exhibited by each participant. That judge also listened to an audio-only recording of the conversation, and was asked to rate the friendliness of the statements made during the conversation. With both types of behaviors, the coder made ratings of the participant on each of

the six friendliness-related items that were used by the participants and confederates themselves to rate one another. In all cases, the coder was blind to the identity of the confederates (i.e., whether the conversation was with a Caucasian or African American partner). To establish the reliability of the coder's judgments, the first author coded verbal and nonverbal friendliness from a subset of 15 conversations. Reliability was defined as the extent to which the ratings of the coder correlated with those of the first author. The coding procedure yielded correlations ranging from .74 to .93, all  $p$ 's < .001. Thus, the ratings provided by the independent judge were used for all statistical analyses reported below.

## Results

*Implicit Association Test.* Mean response latencies (in milliseconds) during the compatible (e.g., Caucasian + pleasant) and incompatible (e.g., African American + pleasant) blocks were submitted to a 2 (Session Order: attitude measures first, conversation session first)  $\times$  2 (Attitude Measure Order: IAT first, PAAQ first)  $\times$  2 (IAT Block Composition: Black + pleasant first, Black + unpleasant first)  $\times$  2 (IAT Block Compatibility: compatible, incompatible) ANOVA with repeated measures on the last factor. A main effect of block compatibility emerged,  $F(1, 47) = 65.36$ ,  $p < .001$ . Participants responded far more quickly during compatible blocks ( $M = 739$  ms) than incompatible blocks ( $M = 921$  ms), suggesting a large pro-Caucasian preference.

This main effect was qualified by an interaction with the block order variable,  $F(1, 47) = 12.80$ ,  $p = .001$ . Follow-up tests indicated that the tendency to respond more quickly during the compatible block was more pronounced for participants who completed this block first. However, the presence of this interaction does not qualify interpretation of the main effect: Consistent with the results of both past research and Experiment 1, in both block order conditions participants exhibited an overwhelming tendency to respond more quickly during compatible (vs. incompatible) blocks.

*Pro-Black/Anti-Black Attitudes Questionnaire.* Both the Pro-Black and Anti-Black subscales of the PAAQ exhibited acceptable reliability, Cronbach's  $\alpha = .74$  and  $.86$ , respectively. The mean scores for the subscales (Pro-Black  $M = 33.77$ , Anti-Black  $M = 33.12$ ) and the Ambivalence Index ( $M = 1106.89$ ) were similar to those obtained in previous research. However, unlike Experiment 1, the two subscales were significantly correlated,  $r(55) = -.30$ ,  $p = .024$ . Although this undermines the assumption of independent constructs, the direction of the relationship (negative) is what one would expect if the two subscales were indeed related in any way.



Data for all three variables (Pro-Black, Anti-Black, and Ambivalence) were submitted to separate 2 (Session Order: attitude measures first, conversation session first)  $\times$  2 (Attitude Measure Order: IAT first, PAAQ first) between-subjects ANOVAs. The first two analyses failed to yield any significant effects, all  $p$ 's  $> .20$ . The analysis of the Ambivalence index yielded a main effect of session order,  $F(1, 51) = 4.91$ ,  $p = .031$ . Participants who completed the attitude measures first ( $M = 1181.08$ ) exhibited greater ambivalence than those who completed the conversation session first ( $M = 1032.71$ ).

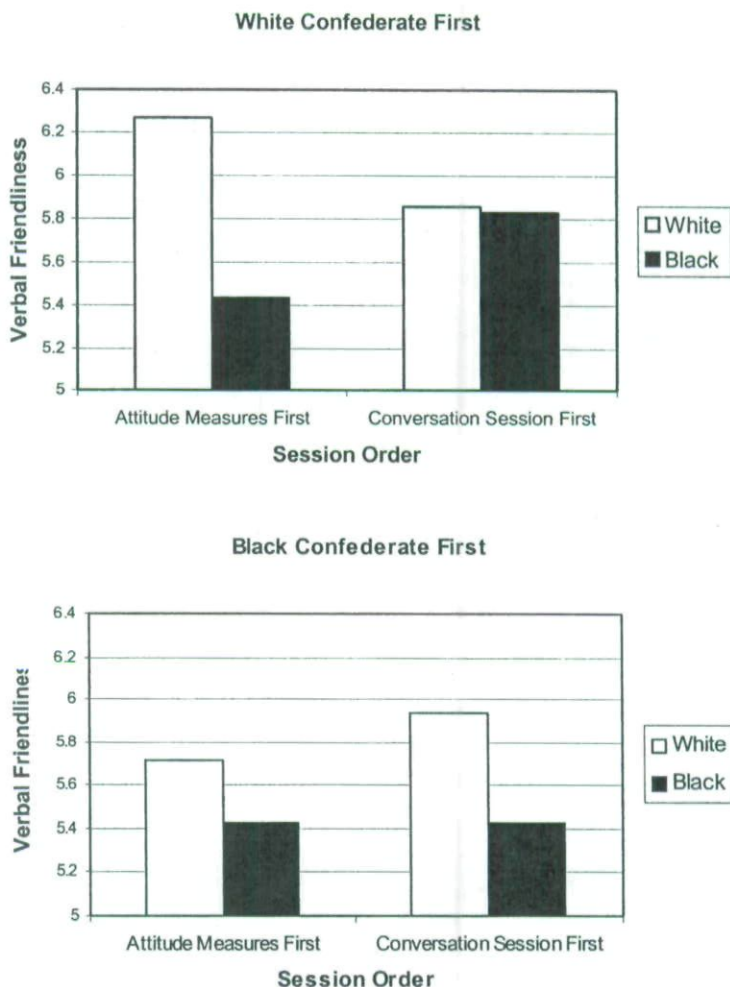
*Conversation analyses.* Cronbach's alpha was calculated for the ratings of verbal friendliness and nonverbal friendliness. These calculations were conducted separately for the conversations with the Black and White confederates. All of the scales exhibited acceptable reliability (smallest Cronbach's  $\alpha = .81$ ). Therefore, ratings on each 6-item scale were averaged to form indices of the two types of friendliness (verbal, nonverbal) with each confederate. These indices were then used as dependent variables in the analyses reported below.

A series of ANOVAs was conducted to determine whether differences between conversations with the Caucasian and African American confederates emerged on each dependent variable (verbal friendliness and nonverbal friendliness). Each variable was submitted to a 2 (Confederate Order: Caucasian confederate first, African American confederate first)  $\times$  2 (Session Order: attitude measures first, conversation session first)  $\times$  2 (Confederate Race: Caucasian, African American) ANOVA with repeated measures on the last variable.

The analysis of the friendliness of participants' verbal behaviors yielded a main effect of confederate race,  $F(1, 51) = 18.88$ ,  $p < .001$ . Participants were rated as significantly more friendly during conversations with the Caucasian confederate ( $M = 5.94$ ) than in conversations with the African American confederate ( $M = 5.53$ ).

However, this main effect was qualified by a three-way interaction,  $F(1, 51) = 7.39$ ,  $p = .009$ ; see Figure 1). To interpret this interaction, separate two-way analyses were conducted by confederate order. For participants who encountered the Caucasian confederate first, an interaction between confederate race and session order emerged,  $F(1, 23) = 10.88$ ,  $p = .003$ . Follow-up tests revealed that the confederate race effect was significant for participants who had completed the attitude measures session first ( $p = .002$ ) but not for those who completed the conversation session first ( $p > .8$ ). For participants who encountered the African American confederate first, only a main effect of race emerged,  $F(1, 28) = 8.66$ ,  $p = .006$ : Regardless of session order, participants were rated as friendlier with the Caucasian confederate ( $M = 5.83$ ) than the African American confederate ( $M = 5.43$ ). Thus, despite the three-way

interaction, it is reasonable to draw the conclusion that, for the most part, participants exhibited more friendly verbal behaviors with the Caucasian confederate than with the African American confederate.



*Figure 1.* Ratings of Participants' Verbal Friendliness as a Function of Confederate Order, Session Order, and Confederate Race

The analysis of participants' nonverbal friendliness revealed the same pattern found in the verbal behavior data: a significant main effect of race ( $p = .001$ ) qualified by a significant three-way interaction ( $p = .048$ ).



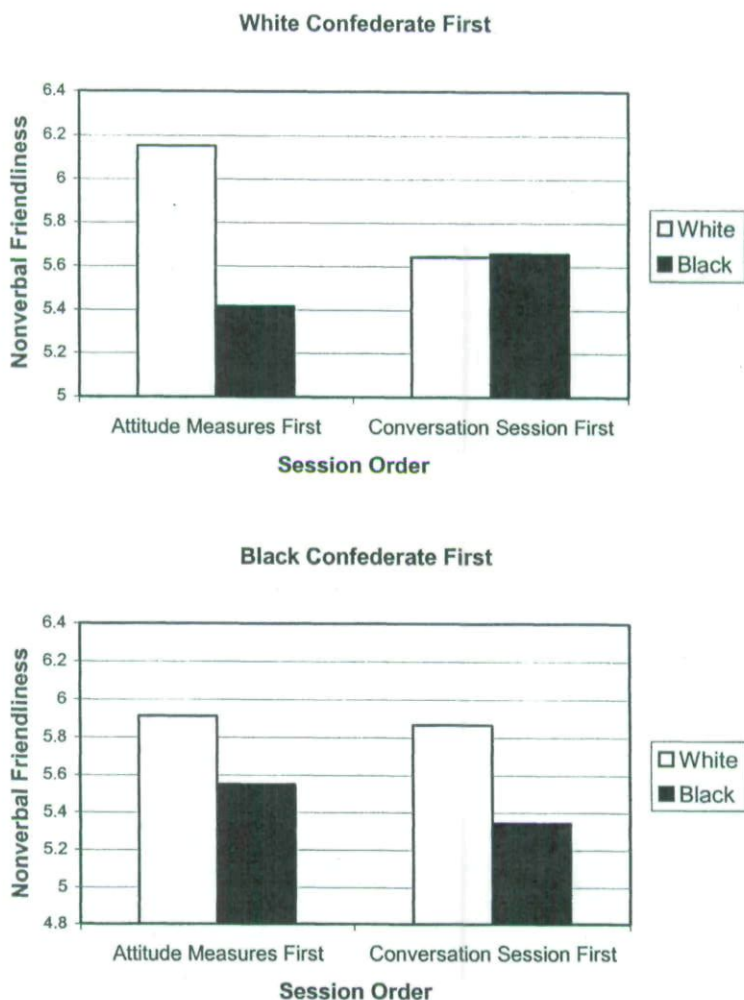
Once again, the tendency for participants to be rated as more friendly with the Caucasian confederate emerged in three of the four possible cells, suggesting participants were indeed friendlier with this confederate than they were with the African American confederate (see Figure 2).<sup>5</sup>

*Predictive utility analyses.* A series of regression analyses was conducted to determine whether the IAT and PAAQ had any value in predicting tendencies to exhibit more friendliness in interactions with the Caucasian confederate relative to interactions with the African American confederate. For two of these regressions, new dependent variables were generated. These variables were difference scores for the verbal and nonverbal dependent variables, created by subtracting scores generated from interactions with the African American confederate from scores generated from interactions with the Caucasian confederate. Thus, positive scores indicated greater friendliness with the Caucasian confederate; negative scores indicated greater friendliness with the African American confederate. Additional regressions focused on participants' behavior with the African American confederate alone, independent of behavior with the Caucasian confederate.

Each regression proceeded in a stepwise fashion. The first step utilized the IAT effect, the PAAQ Pro-Black subscore, and the PAAQ Anti-Black subscore as predictors of the outcome variable in question.<sup>6</sup> The second step added the PAAQ Ambivalence Index (equivalent to the Pro-Black x Anti-Black interaction) to the set of predictors.

First, the difference score generated from the ratings of friendliness derived from participants' verbal behaviors was regressed on the IAT effect, the Pro-Black subscore, and the Anti-Black subscore. The overall squared multiple correlation for this step was non-significant,  $R^2 = .06$ ,  $F(3, 51) = 1.01$ ,  $p > .3$ , suggesting the set of three predictors did not account for significant variance in the difference scores. Entering the Ambivalence Index in the second step revealed it did not account for variance beyond that accounted for by the original predictors,  $\Delta R^2 = .02$ ,  $F(1, 50) < 1$ .

The first step in the regression examining only verbal behavior with the African American confederate as the dependent measure yielded a squared multiple correlation that approached significance,  $R^2 = .12$ ,  $F(3, 51) = 2.25$ ,  $p = .094$ . Examination of the standardized regression coefficients for each predictor revealed that the Pro-Black subscore ( $\beta = .26$ ,  $t = 1.85$ ,  $p = .07$ ) approached being a significant predictor of participants' verbal friendliness with the African American confederate. The positive coefficient for the Pro-Black subscale suggests that as participants' Pro-Black attitudes increased, so did the tendency to exhibit more friendly verbal behaviors with the Black confederate.



*Figure 2.* Ratings of Participants' Nonverbal Friendliness as a Function of Confederate Order, Session Order, and Confederate Race

Entering the Ambivalence Index into the stepwise analysis suggested it could not account for significant variance beyond that accounted for by the original three predictors,  $\Delta R^2 = .001$ ,  $F(1, 50) < 1$ .

Next, the difference score for the ratings of friendliness generated from participants' nonverbal behaviors was regressed on the IAT effect,



the Pro-Black subscore, and the Anti-Black subscore. The overall squared multiple correlation for this step was significant,  $R^2 = .15$ ,  $F(3, 51) = 2.90$ ,  $p = .044$ , suggesting the predictors accounted for a significant amount of variance in participants' difference scores. Examination of the standardized regression coefficients revealed that the IAT ( $\beta = .39$ ,  $t = 2.87$ ,  $p = .006$ ) significantly predicted the difference scores. The positive coefficient suggests that as relative positivity toward Caucasians increased, so did the tendency to exhibit more friendly nonverbal behaviors toward the Caucasian confederate relative to the African American confederate. Entering the Ambivalence Index into the regression did not account for significant variance beyond that explained by the original three predictors,  $\Delta R^2 = .04$ ,  $F(1, 50) = 2.53$ ,  $p > .10$ .

The regression using only behavior with the African American confederate as the dependent measure failed to yield a significant squared multiple correlation in the first step,  $R^2 = .08$ ,  $F(3, 51) = 1.39$ ,  $p > .25$ . However, examination of the standardized regression coefficients indicated that the IAT ( $\beta = -.26$ ,  $t = -1.87$ ,  $p = .068$ ) approached being a significant predictor: As participants' relative positivity toward Caucasians increased, nonverbal friendliness with the Black confederate decreased. Entering the Ambivalence Index into the regression revealed that it did not account for additional variance,  $\Delta R^2 = .01$ ,  $F(1, 50) < 1$ .

## Discussion

The data from Experiment 2 were generally consistent with the predictions of the MODE model. Participants generally exhibited more friendly verbal behaviors toward the Caucasian (vs. African American) confederate. This relative tendency was not predicted by any of the attitude measures. However, when only looking at behavior toward the African American confederate, the results partially replicated those observed in Experiment 1: It was the Pro-Black subscale of the PAAQ (and not the Anti-Black subscale) that predicted participants' verbal friendliness toward the Black confederate. While conceptually replicating the results provided by Dovidio et al. (2002), the results also differ slightly: Dovidio et al. found predictive effects only on a relative explicit measure created by subtracting attitudes toward African Americans from attitudes toward Caucasians (as assessed by semantic differential scales). Nonetheless, both results suggest that explicit attitude measures predict deliberative verbal behaviors exhibited toward African Americans.

Participants also exhibited more friendly nonverbal behaviors toward the Caucasian (vs. the African American) confederate. This relative tendency was predicted by the IAT and not by the PAAQ. This result conceptually replicates the results reported by Dovidio et al. (2002), who found predictiveness using an implicit priming attitude measure. The

IAT, like the implicit measure of Dovidio et al., is relative in nature (i.e., the IAT effect is a difference score). Thus, it seems sensible that it would predict *relative* friendliness of nonverbal behaviors, whereas the PAAQ (a non-relative measure) predicted non-relative verbal friendliness.

It is important to note that, as in Experiment 1, both the IAT and PAAQ independently predicted race-related behaviors, even when both were simultaneously included as predictors in regression analyses. This provides further evidence for the contention that the IAT *can* uniquely predict behavior beyond what is accounted for by explicit measures. In addition, it is once again important to note that the attitude and behavioral assessments in Experiment 2 were temporally separated and counterbalanced. This design feature helps refute the argument that relationships between the attitude measures and behavior emerge only under conditions of increased attitude activation.

### GENERAL DISCUSSION

The current experiments were designed to explore the predictive validity of the IAT in the domain of prejudice and discrimination. Specifically, one of the major goals was to improve the predictive validity of the IAT by demonstrating that increased attitude activation is not necessary for the IAT to wield predictive power. In Experiment 1, the IAT predicted the behavior of Caucasian participants toward African Americans in a Prisoner's Dilemma game; in Experiment 2, it predicted the tendency to exhibit more friendly nonverbal behaviors toward Caucasian conversation partners than toward African American partners. Importantly, these predictive relationships emerged under conditions designed to undermine the artificial inflation of attitude-behavior consistency.

The outcome of Experiment 2 seems to fit with the predictions of Fazio's (1990) MODE model, which specifies when implicit measures might be useful predictors of behavior, and when they may not. However, the outcome of Experiment 1 is at best an uneasy fit with that model. One might argue that PD behavior may theoretically involve substantial doses of self-presentation and political correctness, motives that should limit the predictive utility of the IAT. The fact that the IAT predicted how Caucasians treated African Americans in the game suggests either that the IAT is more useful as a predictor of behavior than would be suggested by the MODE model, that the self-presentation or political correctness concerns in the PD are overblown, or both.

Although not the focus of the studies, the behavior of the explicit measure was also of some interest. Specifically, in all cases it was the Pro-Black subscale of the PAAQ, and not the Anti-Black subscale, that showed a tendency to predict behaviors towards African Americans. We



can only speculate about the reasons underlying this difference. As noted earlier, people might be less likely to respond in politically correct ways when prejudice items are phrased positively. Hence, the Pro-Black subscale might be a more accurate gauge of peoples' true attitudes than the Anti-Black subscale. That is, the Pro-Black and Anti-Black subscales of the PAAQ may assess separate aspects of the attitude network.

One other issue that might be relevant to the study of the extent to which an attitude measure predicts behavior is the relative match between the characteristics of the measure and the behaviors to be predicted. For example, in most instantiations the IAT is a relativistic measure, reflecting only relative preferences for one construct over another. Perhaps this measure is best suited for examining dependent measures that are also relativistic in nature, such as the extent to which behavior toward Caucasian and African American conversation partners differ (as in Experiment 2). On the other hand, some attitude measures, such as the Pro-Black subscale of the PAAQ, are non-relativistic. Such measures might be especially well suited to predicting non-relativistic dependent measures, such as behavior toward the African American PD partner in Experiment 1 (regardless of how one treated the Caucasian partner).

A number of additional ideas can be used to guide future research on the predictive validity of attitude measures with regards to discriminatory behavior. First, one might include a measure of motivation to control prejudiced responding (e.g., Dunton & Fazio, 1997) to more accurately gauge the level of such motivation that is induced by a particular experimental situation. In the current research, conditions were created that *likely* would yield either high or low motivation, but some of the observed results suggest this may not have been the case. An alternative approach would be to experimentally manipulate motivation to control prejudiced responding. Whatever the approach, this construct is clearly important enough that one ought to be able to account for its effects. Second, it might be useful to include a measure of one or more broad constructs that might influence an individual's behavior above and beyond the influence of racial attitudes. One such construct is egalitarianism. To the extent that an individual holds egalitarian attitudes, it is possible that he or she will exhibit more positive behaviors with any target individual, independent of the target's characteristics.

The two experiments described in this article successfully replicated and extended the results of previous IAT predictive validity studies (e.g., McConnell & Leibold, 2001). Three results are particularly important extensions. First, simultaneous regression analyses demonstrated that the IAT has predictive power over and above that demonstrated by explicit attitude measures. Second, although the IAT may be best suited to the

prediction of behaviors that are not under conscious control (e.g., nonverbal behaviors in a conversation), it has predictive power even for some behaviors that might be thought to have a substantial deliberative component (e.g., behavior in a Prisoner's Dilemma game). Third, this predictive power cannot be attributed to procedurally-heightened activation levels of prejudice-related attitudes.

### Footnotes

<sup>1</sup>Following Baxter (1973), we included a manipulation of cooperative expectancy: half of the participants were led to believe they could expect cooperation from their partners; the other half was given no expectancy information. This manipulation failed to yield any significant effects, so it will not be discussed any further.

<sup>2</sup>An additional set of analyses included partner race. These analyses were not informative with respect to the main question of whether discrimination behavior was better predicted by the implicit measure or the explicit measure. Hence, to save space, we opted to present the simpler analyses that examined only the behavior of Caucasians toward African Americans in the PDG.

<sup>3</sup>The IAT effect was almost entirely uncorrelated with both PAAQ sub- scales: IAT-Pro-Black  $r = -.003$ ,  $p > .9$ ; IAT-Anti-Black  $r = -.05$ ,  $p > .5$ .

<sup>4</sup>Admittedly, this interpretation about the effects of urbanization is speculative. We express thanks to an anonymous reviewer for highlighting this issue in an earlier version of this paper.

<sup>5</sup>We thank an anonymous reviewer, who pointed out that the lack of significant friendliness differences in the Caucasian confederate first-conversation session first cell may have been a function of our limited sample size.

<sup>6</sup>The IAT effect was almost entirely uncorrelated with both PAAQ sub- scales: IAT-Pro-Black  $r = -.04$ ,  $p > .7$ ; IAT-Anti-Black  $r = .14$ ,  $p > .3$ .

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