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# Reducing the Effects of Stereotype Threat on African American College Students by Shaping Theories of Intelligence

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African American college students tend to obtain lower grades than their White counterparts, even when they enter college with equivalent test scores. Past research suggests that negative stereotypes impugning Black students' intellectual abilities play a role in this underperformance. Awareness of these stereotypes can psychologically threaten African Americans, a phenomenon known as "stereotype threat" (Steele & Aronson, 1995), which can in turn provoke responses that impair both academic performance and psychological engagement with academics. An experiment was performed to test a method of helping students resist these responses to stereotype threat. Specifically, students in the experimental condition of the experiment were encouraged to see intelligence—the object of the stereotype—as a malleable rather than fixed capacity. This mind-set was predicted to make students' performances less vulnerable to stereotype threat and help them maintain their psychological engagement with academics, both of which could help boost their college grades. Results were consistent with predictions. The African American students (and, to some degree, the White students) encouraged to view intelligence as malleable reported greater enjoyment of the academic process, greater academic engagement, and obtained higher grade point averages than their counterparts in two control groups. 

> The traditional model [of intelligence] may be a cause of rather than a potential answer to educational problems, in particular, and societal problems, in general.
>
> —Robert Sternberg (1998)

Because education is the surest route to social equality, the academic underachievement of Black Americans tends to be regarded as both an educational and a social problem (e.g., Garibaldi, 1991; Herrnstein & Murray, 1994; Jencks & Phillips, 1998). It is a problem, we believe, to which Sternberg's argument is particularly applicable; the way people traditionally have thought about intelligence—as largely unmodifiable—is more a barrier than a boost to African American achievement and indeed, the achievement of all students (e.g., Schwartz, 1997). Could encouraging a view of intelligence as expandable hold a key to educational improvement for Black students, who contend regularly with debilitating suspicions of intellectual inferiority? Our research explores this question.

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## AFRICAN AMERICAN UNDERACHIEVEMENT

There is much disagreement about the underlying causes for and, hence, the wisest remedies to the problem of



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African American educational achievement. But quite clearly, a student's race matters. Virtually every measure of academic achievement taken at every level of schooling shows African Americans trailing their White counterparts. This gap in test and academic performance cannot be attributed entirely to socioeconomic status (see Aronson, Quinn, & Spencer, 1998; Jencks & Phillips, 1998; Steele, 1997, for extensive discussions of race gaps and their proposed causes). Although there is little disagreement regarding the scope or gravity of the problem of African American underachievement, attempts to pin down the causes of the problem have fueled decades of visceral debate. Most fierce are the well-known nature–nurture debates, which focus upon whether performance differences stem from genetically determined differences in intelligence (e.g., Herrnstein & Murray, 1994) or from environmental factors that impede certain groups from developing the skills they need to do well on tests and in school (see Jacoby & Glauberman, 1995, for a review). But there is also disagreement among environmentalists regarding which structural factors are most to blame for the poor outcomes for African Americans and other ethnic minorities (Neisser, 1986). Nevertheless, the most widely cited causes, be they endowed by nature or imposed by society, are largely intractable. That is, genetic predisposition, poverty, culture, and the like are clearly factors that are difficult, if not impossible, to alter, and thus such explanations offer little in the way of specific strategies for addressing race gaps in performance.

## STEREOTYPE THREAT AND ITS ROLE IN RACE GAPS

In contrast, a good deal of recent research points to a psychological factor in this underachievement that appears to be far more amenable to intervention—African Americans' responses to stereotypes alleging inferior ability about their group. This psychological factor is referred to as "stereotype threat" (e.g., Aronson et al., 1999; Aronson et al., 1998; Steele, 1997; Steele & Aronson, 1995), and is described as a social psychological predicament rooted in the prevailing American image of African Americans as intellectually inferior.[1] The basic notion behind the stereotype threat analysis is this: in situations where a stereotype about a group's intellectual abilities is relevant—taking an intellectually challenging test, being called upon to speak in class, and so on—Black students bear an extra cognitive and emotional burden not borne by people for whom the stereotype does not apply. This burden takes the form of a performance-disruptive apprehension, anxiety about the possibility of confirming a deeply negative racial inferiority—in the eyes of others, in one's own eyes, or both at the same time. Importantly, it is not necessary that a student believe the stereotype to feel this burden (Good, Aronson, & Harder, 2000). He or she need only be aware of the stereotype and care enough about performing well in the domain (e.g., on the test, in the math class) to want to disprove the stereotype's unflattering implications (e.g., Aronson et al., 1999; Aronson & Good, 2000).

Stereotype threat appears to undermine academic achievement primarily in two ways. First, in the short run, it can impair performance by inducing anxiety. Numerous laboratory experiments involving African-American college students have documented this short-term effect (Aronson, 1999; Aronson et al., 1998; Blascovich et al., 2001; Steele & Aronson, 1995). Inducing stereotype threat—emphasizing intelligence by presenting a test as a measure of ability or emphasizing race by having test-takers indicate their race on the test booklet—significantly undermined the performance of African Americans on intellectual tests such as the Graduate Record Exam (GRE). The same studies showed how minimizing stereotype threat—for example, by characterizing a standardized test as nondiagnostic of ability—significantly improved performance, in many cases completely eliminating the performance gaps between the African Americans and Whites. In many of these studies, levels of anxiety (as measured by self-report inventories or direct measures of blood pressure) were significantly higher under conditions of stereotype threat.

The second way stereotype threat appears to undermine achievement is through "disidentification," the psychological disengagement from achievement hypothesized to help students cope with stereotype threat and underperformance in a given domain. Many researchers have noted that to promote and maintain self-esteem, students tend to identify with—that is, to base their self-esteem upon—domains in which they can excel (e.g., Eccles & Wigfield, 1995; Harter, 1990). To sustain self-esteem one needs either to succeed in a domain—if one can—or to disidentify from the domain if success is elusive. Disidentification occurs when one redefines the self-concept such that a threatened domain no longer is used as a basis of self-esteem (e.g., Aronson, Blanton, & Cooper, 1995; Pelham & Swann, 1989; Steele, 1992). It should be noted that the disidentification process can take various forms, ranging from temporary or situation-specific devaluing of a domain in response to negative outcomes to a more chronic divestment of the self from one or more domains of achievement. Devaluing, an early stage of disidentification, can be observed when, for example, a student proclaims that "math is for nerds," in response to receiving a poor grade in math class. But often, this kind of devaluing is short lived, a temporary disengagement of self-esteem from outcomes in a domain. But over time, chronic disengagement of this sort may lead the student to disidentify fully from mathematics (see Major & Schmader,

[1] Polls indicate that a sizable portion of White Americans—53%—indicate thinking Blacks to be less intelligent than Whites (Smith, 1990), and even greater numbers appear to implicitly hold this stereotype (Devine, 1989).

1998, for a thorough discussion of these issues). There is increasing evidence that in part because of stereotype threat, African Americans are more prone than their White counterparts to disidentify from academics (e.g., Major & Schmader, 1998; Osbourne, 1995; Steele et al., in press). Because identification with academics is assumed to be crucial for success in college or school, any force or set of forces that frustrates this psychological engagement can be a serious barrier to achievement (Steele, 1997). In sum, both responses to stereotype threat—impaired test performance and reduced identification—can critically depress students' performance in college.

As noted, the stereotype threat analysis offers the clear advantage of considering factors easier to change than poverty, genes, and so forth (Steele, 1997; Steele & Aronson, 1995). But easier does not necessarily mean easy. Performance-boosting factors that can be manipulated with ease in the laboratory may stubbornly resist change in schools. For example, two strategies—eliminating evaluative scrutiny in a testing situation and making the test-takers' racial identity a nonissue—markedly improved the test performance of African American college students in laboratory studies (e.g., Steele & Aronson, 1995). But, in the typical college milieu, such steps would be next to impossible to take. Ability evaluation is a cornerstone of schooling and the very essence of testing; awareness of race and ethnicity is an inevitable feature of integrated classrooms or college campuses.

In the present research, rather than apply successful laboratory manipulations verbatim, we tried the alternative approach of using our understanding of the roots of stereotype threat in the hopes of developing a protection against some of its effects. Although an obvious tactic might be simply to combat the prevailing stereotypes regarding African-Americans' intellectual abilities, such well-known cultural stereotypes are notoriously resistant to change (e.g., Hewstone, 1996; Pettigrew, 1981), even in young children (e.g., Bigler, 1999). Thus, we reasoned that a more realistic strategy would acknowledge the presence of the stereotype (and thus of stereotype threat), but attempt to inoculate students against some of its undesired effects on their performance and academic engagement. Past research suggests that such negative effects might be meaningfully attenuated by encouraging students to change the way they think about intelligence itself. Specifically, we propose that underperformance and devaluing of academic achievement will be lessened if stereotype targets are encouraged to see intelligence as modifiable. We now turn to the rationale for this hypothesis.

## CONCEPTIONS OF INTELLIGENCE AND STEREOTYPE THREAT

Scholars have long argued about what intelligence is and how it should be measured (e.g., Gardner, 1983; Gould, 1981; Herrnstein & Murray, 1994; Lewontin, Rose, & Kamin, 1984; Neisser et al., 1996). A question that has produced opinions at both extremes concerns the malleability of intelligence—whether it is expandable or fixed. The truth appears to lie somewhere in between; intelligence can be expanded to some degree, but there are limits to its plasticity (e.g., Sternberg, 1996a). But irrespective of the truth—or what psychometricians believe to be the truth—there is very compelling evidence that what a *student* thinks about intelligence can have a powerful effect on his or her achievement. The clearest example is provided by Dweck and her colleagues (e.g., Dweck, 1999, 1986; Dweck & Leggett, 1988; Hong, Chiu, & Dweck, 1995). Their research shows how children's implicit theories about the nature of intelligence—whether they tend to hold an "entity theory" (which views intelligence as fixed) or an "incremental theory" (which views it as malleable)—determines the goals they pursue, their responses to difficulty, and how well they do in school.

Students who hold an entity view of intelligence tend to pursue "performance goals" (Dweck, 1999; Dweck & Leggett, 1988); they are concerned with demonstrating their intelligence and prefer tasks that will verify that they are smart and capable. In contrast, students who hold an incremental view of intelligence tend to pursue "learning goals." They tend to be more concerned with learning new concepts and improving their competence. When tasks become challenging, entity theorists tend to become debilitated and disengage, whereas malleable theorists appear to experience less anxiety, put forth more effort, and increase their engagement (Dweck, 1986, 1999; Nicholls, 1984; Utman, 1997).

Our reasoning is that entity theorists and individuals targeted by ability stereotypes may adopt the same performance goal mind-set when faced with academic difficulty or the possibility of low performance. Like the entity theorist when faced with a difficult task, the Black student in a stereotype threat situation faces essentially the same predicament, the troubling implication that he or she is intellectually limited, with little or no hope for improvement. The goal that flows from this mind-set is to protect—and to project—an image of competence, to disprove the stereotype of intellectual inferiority. Consistent with this reasoning, past research has shown that stereotype threat manipulations elicit from stereotype targets many of the hallmark responses that distinguish entity theorists from incremental theorists (e.g., Dweck, 1999). Specifically, like entity theorists, stereotype targets tend to choose easier, success-assuring tasks when their abilities are subject to scrutiny or if their ethnicity or gender is made salient (Aronson & Good, 1999), experience greater performance pressure and anxiety when tasks are both evaluative and challenging (Blascovich et al., 2001; Steele & Aronson, 1995), and tend to devalue ability domains in which they have performed poorly (e.g.,

Major & Schmader, 1998; Major et al., 1998). In sum, we suspect that negative ability stereotypes may derive part of their power to undermine intellectual performance and motivation precisely because they imply a self-threatening and inalterable deficiency—a fixed lack of intelligence. Importantly, just as situations often influence people to act contrary to their attitudes or personality traits, the mind-set imposed by stereotype threat may be strong enough to overwhelm an individual's own implicit beliefs about intelligence. If our logic is correct, then it follows that one way to help students resist responding to stereotype threat in a maladaptive fashion—that is, by adopting a performance goal orientation—would be to convince them that their abilities are expandable.

Two recent laboratory studies support this line of reasoning. In the first study (Aronson, 1999), the effects of manipulating a fixed-versus-expandable view of an ability on test anxiety and performance was examined. African American and White college students took a challenging verbal test. Prior to the test, some were informed that the ability being tested was highly expandable, whereas others were told that the ability was fixed. A third (control) group was simply told that the test measured verbal ability. Relative to the controls, test-takers (both Blacks and Whites) reported more anxiety and solved fewer items in the "fixed ability" condition and reported less anxiety and solved more items in the "expandable ability" condition. In a second study examining the effect of an incremental mind-set on devaluing (Aronson, 1997), Blacks and Whites took a test presented as measuring either an endowed and fixed ability or an expandable skill. Following the test, they received bogus positive or negative performance feedback. Later the students were asked how much they cared about the tested ability. The results were very clear. Regardless of race, students in the "fixed ability" condition who received a low score devalued the ability—that is, they claimed it was not a particularly important skill to have. Those in the "expandable skill" condition, however, valued the skill whether or not they thought they had performed well on the test. Thus, encouraging students to see ability as exapandable undermined the two pernicious responses to stereotype threat that have been proposed as mediators between stereotype threat and the poor achievement outcomes of African Americans.

## THE PRESENT STUDY

In the study to be reported, we wanted to see if encouraging incrementalism could be used to affect students' actual academic engagement and achievement outside the laboratory. Our objective was straightforward. We sought to persuade a group of students to adopt the view that their basic intelligence was malleable, that they could expand it with work. But, as research on attitude change shows persuasive messages often fail to move people if the issues are important. Moreover, even when persuasion succeeds, the attitude change may be short lived. And, even when persuasion works well and the new attitude endures, it still may lack the necessary cognitive accessibility to guide behavior (see Petty & Wegener, 1998, for a review). Thus in seeking to create lasting and influential attitude change about the nature of intelligence, we created an intervention built around a variety of social psychological tactics shown not only to change attitudes, but also to make them persevere and come easily to mind.

Research, particularly within the dissonance and self-perception theory traditions, suggests that attitude change is greatly fostered by getting people to advocate a particular position in their own words, a phenomenon sometimes called the "saying-is-believing effect" (Higgins & Rholes, 1978). Public commitment to an advocacy has been shown to increase acceptance of the position advocated (e.g., Pallak et al., 1981). Once formed, attitudes have been shown to persevere and remain resistant to change, if they are validated by the message recipient's own experiences (Ross, Lepper, & Hubbard, 1975). In particular, inducing people to consider how their own past behaviors are consistent with an attitude strengthens that attitude (Fazio, 1995). Because strong attitudes are more accessible and more automatically activated, they are more resistant to counterinformation, less influenced by momentarily salient information, and more persistent over time. Consequently, attitudes changed or created in this way are most likely to influence actions (Fazio & Williams, 1986). Past interventions marshalling such attitude change tactics have shown promise for influencing such important behaviors as reducing violence among children (Huesman et al., 1983) and increasing recycling among adults (Fried & Aronson, 1995). We thus attempted to integrate each of these tactics into the current intervention to induce an influencial change in attitude about the malleability of intelligence.

### Method

#### *Overview*

Three groups of African-American and Caucasian (both male and female) undergraduates participated in the study. One group participated in an intervention (a pen pal program) that employed numerous attitude change techniques designed to teach them, help them internalize, and make cognitively available the notion that intelligence is expandable (malleable pen pal condition). The attitudes and achievement outcomes for this group were compared to those of two control groups, one that participated in the same intervention with a different intelligence orientation (control pen pal condition) and a third group that did not participate in the intervention (non pen pal condition). In this way, we were able to determine whether the positive outcomes we were predicting resulted from adopting the

malleable intelligence orientation, rather than mere participation in the pen pal program. Participants in the malleable pen pal condition and the control pen pal condition came into the laboratory on three occasions, purportedly to participate in the pen pal program. During these laboratory sessions, the participants participated in the attitude change intervention. A few days after the intervention the participants completed a measure of their beliefs about intelligence as a check on the manipulation, but the remaining measures were given several months subsequent to the start of the intervention. These later measures included participants' beliefs about the nature of intelligence, ratings of their enjoyment of and identification with academics, their grades, and items designed to assess their perceptions of stereotype threat. Participants in the non pen pal condition did not participate in the intervention but did complete both sets of measures. We predicted that relative to the two control conditions, the participants in the malleable pen pal condition would come to see intelligence as more malleable and, as a result, report greater academic identification and enjoyment, higher grades, and, perhaps, less stereotype threat. We further predicted that the benefits of this intervention would occur primarily for the African American students, whose academic performance and identification we presumed to be depressed by their reactions to stereotype threat.

### *Participants and Design*

A total of 109 Stanford undergraduates were recruited to take part in the study for pay. A number of participants were unable to continue past the initial session for a variety of reasons—time constraints, discomfort about releasing their official grade transcripts, repeatedly missed appointments, or because they asked (and were invited) to join the research team—but attrition did not vary as a function of experimental condition. In the final analysis, a total of 79 male and female participants (42 Black, 37 White) were randomly assigned to one of the six conditions of the study, a $2 \times 3$ design yielded by crossing race (African American or Caucasian) with treatment (malleable pen pal, control pen pal, or non pen pal).

### *Procedure*

At the beginning of winter quarter (mid-January) two thirds of the participants—the pen pals—were contacted by phone and scheduled for their first session. At this time, they were told that they would be participating in several sessions involving long-distance mentoring of young students and a final unrelated study examining the relationship of some psychology measures and grades. It was explained that although these studies were unrelated, we wished them to participate in all of them to simplify the bookkeeping on the research grant that was funding the project. None of the participants questioned this reasoning. Participants were asked to sign forms releasing their grade and SAT transcripts from the registrar. The entire intervention consisted of three 1-h laboratory sessions, spaced approximately 10 days apart, and was completed by late February. Participants in the non pen pal control condition were contacted, scheduled, and asked to fill out measures and sign grade-release forms near the end of February.

Participants in the two pen pal conditions were run in groups of two to five. Whenever possible the groups were racially mixed. Each session was randomly designated as either the malleable intelligence orientation or the control orientation. Both began the same way. The experimenter (White female) introduced herself as an educational psychologist working with an organization called "Scholastic Pen Pals." The purported role of Scholastic Pen Pals was to set up one-time letter exchanges between young, educationally "at risk" middle school students and college students. The purpose of the exchange was to give the younger students encouragement, to show them that successful college students had once been like them, but had overcome their struggles to find eventual success. After a brief introduction to the program's procedures and philosophy, participants were informed that they would answer one letter from a seventh grader. In each case, the middle-schooler was characterized as coming from an impoverished community and could thus benefit from having an elder role model. The true purpose of the letter writing was to convince half of the pen pals themselves of the expandable nature of intelligence.

*Middle school student letters.* To increase believability, all letters received by the participants were handwritten and sealed in envelopes. Some students received letters written by boys, others received letters from girls, but the letters made no reference to race. The content of the letters was otherwise the same; the child described some difficulties he or she was having in school in addition to describing favorite subjects and activities. After reading the letters, participants were given instructions for writing their replies that varied as a function of condition.

*Malleable pen pal orientation.* Participants in this condition were asked to write a reply that would encourage their pen pals to work hard in spite of their difficulties. In addition to whatever they wanted to offer in the way of encouragement, participants were told that it would be particularly helpful to incorporate a theme stressing what research was revealing about the nature of human intelligence. They were asked to impress upon their pen pals the view that intelligence is not a finite endowment, but rather an expandable capacity that grows—"like a muscle"—with mental work. They were further told:

> Because intelligence is malleable, humans are capable of learning and mastering new things at any time in their lives. This message is especially important to get across to young, struggling students. If

> these students view intelligence as a fixed quantity, they may feel that they are incapable of learning if they encounter difficulty with their school work. If, however, students can be convinced that intelligence expands with hard work, they may be more likely to remain in school and put effort into learning.

To reinforce the scientific validity of this message, participants were shown a brief video clip that discussed how the brain, and hence intelligence, is capable of growing and making new connections throughout life. The clip included a vivid color animation of the brain developing new neurons, while a voiceover reported that brain researchers were discovering how the brain grows in response to intellectual challenge.

*Control pen pal orientation.* This orientation was designed to offer the same experience—writing encouraging letters to a younger student—that differed only in the underlying message about the nature of intelligence. Thus, in addition to the same information given all pen pals, these participants were told that:

> Intelligence is not a single entity, but rather composed of many different talents, and, as a result, every person has both intellectual strengths and weaknesses. Therefore, it is a potentially devastating mistake to view intelligence as a single attribute; it may lead young students to give up entirely on education if they are struggling in one subject, because the students can see themselves as failures at a global level. But if struggling students can be convinced that there are many different types of intelligence, they may be more likely to continue to learn in an attempt to find and develop areas of strength.

To bolster this message, participants were shown a brief video clip that discussed how psychologists were beginning to look at intelligence not as a single unit but as composed of many different abilities.

*Attitude change tactics.* Although the speech and the film clip seemed quite persuasive on their own, as noted, we wanted to maximize the durability and influence of the attitude change. To engage this saying-is-believing effect, we asked participants to advocate the malleability-of-intelligence position. To bolster commitment to and personal responsibility for their message, a Polaroid photo of the participant was taken and clipped to their letter. To remind them of their advocacy and to suggest that their letters had impact, all participants received a thank-you note from their pen pal and his or her teacher at the next session of the intervention. To maximize belief perseverance, students in both conditions were asked to build into their letters examples from their own life that illustrated their arguments about intelligence. To make the message as chronically available as possible, we used repetition (e.g., Cacioppo & Petty, 1979; Cook & Wadsworth, 1972). Specifically, after writing one letter, participants were brought back to the laboratory on 2 subsequent days. On the second day they wrote another letter with the same message to a new pen pal. On the third day they reworked their letters, turning them into brief speeches, which were then audiotaped for use in future interventions with at risk children. During this third session, participants listened to their own audiotaped speech twice. Because of these tactics, it seems reasonable to assume that by the end of the third session, participants in both conditions of the intervention were well versed in the theory of intelligence assigned to them.

*Dependent measures.* Several days after the intervention, as a check on the manipulation, participants filled out a two-item measure assessing their belief in the malleability of intelligence. Several weeks later, these beliefs were reassessed in a separate survey along with ratings of their enjoyment of academics, their degree of identification with academics, and measures designed to assess their experience of stereotype threat. Each of theses measures is described in detail in the next section.

## Results and Discussion

### *SAT Scores*

Subsequent to the completion of the study, students' official SAT scores were obtained from the registrar. Although subjects were randomly assigned to experimental condition, an initial observation of the means of the SAT scores suggest that, by chance, the subjects in the malleable pen pal condition ($M = 1203$) had lower SAT scores than subjects in both the pen pal control condition ($M = 1322$) and the non pen pal condition ($M = 1261$). Furthermore, Black participants ($M = 1185$) had lower SAT scores than White participants ($M = 1342$). To determine if these differences were significant, a 2 (race) $\times$ 3 (condition) analysis of variance (ANOVA) was performed on the participants' SAT scores. Results revealed a significant main effect of race, $F(1, 73) = 59.19$, $p < .001$ and a significant main effect of condition, $F(2, 73) = 10.17$, $p < .001$. To correct for these differences, all analyses were conducted using SAT as a covariate.

### *Manipulation Check*

To assess the initial effectiveness of the intervention, we probed participants for their beliefs about the malleability of intelligence. During an unconnected study that took place not more than a week after the third session of the intervention was complete, participants in all three conditions of the study filled out a number of questionnaires related to academic attitudes and abilities. Embedded in these questionnaires were two items that assessed participants' conception of intelligence ("you have a certain amount of intelligence and you really can't do much to change it"; you can learn new things, but you can't really change your basic intelligence"). Both were measured on 6-point scales anchored at the endpoints by the phrases strongly agree (1) and strongly disagree (6). Participants' responses on the items were highly correlated ($r = .84$), so an index of malleability was formed by computing their mean. The

TABLE 1
Short-Term and Long-Term Effects of Intervention

| Measure | Experimental condition | | | | | |
|---|---|---|---|---|---|---|
| | Malleable pen pal | | Control pen pal | | Non pen pal control | |
| | Blacks ($n$ = 16) | Whites ($n$ = 12) | Blacks ($n$ = 12) | Whites ($n$ = 11) | Blacks ($n$ = 14) | Whites ($n$ = 14) |
| Short-term malleability beliefs | 5.04[a] | 4.81[ac] | 4.40[ab] | 4.07[ab] | 4.15[b] | 3.72[b] |
| Long-term malleability beliefs | 5.42[a] | 4.70[ab] | 4.31[bc] | 3.79[cd] | 3.91[cd] | 3.20[d] |
| Enjoy academics | 4.38[b] | 5.43[ad] | 3.47[c] | 4.89[ab] | 3.42[c] | 5.81[d] |
| Academics are important | 4.77[b] | 5.61[a] | 3.89[c] | 5.67[ab] | 3.45[c] | 5.71[a] |
| Perceived stereotype threat | 5.22[a] | 1.62[b] | 4.70[a] | 1.42[b] | 5.17[a] | 1.26[b] |
| Spring quarter GPA | 3.32[a] | 3.55[a] | 3.05[b] | 3.34[ac] | 3.10[bc] | 3.35[a] |

*Note.* Higher values indicate stronger belief that intelligence is malleable, greater enjoyment of academics, greater identification with academics, more stereotype threat, and higher GPA. All means are adjusted by SAT. Means within rows not sharing a common superscript differ at least at the .05 level. Means sharing a common superscript do not differ.

index was submitted to a 2 (race: African American or Caucasian) × 3 (condition: malleable pen pal, pen pal control, or non pen pal control) analysis of covariance (ANCOVA), which yielded a significant effect of experimental condition, $F(2, 72) = 6.014$, $p < .005$, and a nonsignificant effect of race, ($p > .29$). The interaction did not reach significance ($p > .93$). Participants reported viewing intelligence as more malleable in the malleable pen pal condition ($M = 4.92$) than in the pen pal control condition ($M = 4.24$), $t(73) = 2.07$, $p < .05$. The ratings of the participants in the non pen pal control condition ($M = 3.93$) did not differ significantly from those of the intervention control participants ($M = 4.24$). Thus, the intervention appears to have successfully altered the malleable pen pals' views in the predicted direction, at least in the short term, and to have left the beliefs about the malleability of intelligence intact among control pen pals.

### *Long-Term Effects*

Our chief concern, however, was whether these changed attitudes would hold over time and, more importantly, whether they would influence participants' reactions to stereotype threat and improve their academic attitudes and performance. Two sets of measures were obtained to assess the effectiveness of the intervention—attitude measures and official grade transcripts collected at the end of the academic year (near the beginning of June). Because the intervention had taken place in the Winter quarter of the academic year, approximately 9 weeks passed between the start of the intervention and the final measurement of the participants' attitudes.

Attitudes at year's end were obtained by means of a brief telephone interview conducted by a research assistant (African American female) who was purportedly conducting a survey of attitudes about the academic life at Stanford. The interviewer made no mention of the pen pal program, and none of the participants inquired if there was a connection. In addition to a number of filler questions (about current university policies, current events, etc.), she asked students to answer several questions—in the form of Likert scale statements—aimed at measuring students' experience of stereotype threat, their degree of academic identification, and their enjoyment of the educational process at the university. Grade transcripts from the first available complete grading period (spring quarter) were obtained from the registrar later in the summer.

*Beliefs about the malleability of intelligence.* Embedded in the set of interview items were the two questions regarding the malleability of intelligence participants had initially answered shortly after the intervention. Participants' responses on these items were once again highly correlated ($r = .85$) and thus were averaged to form the malleability index. The index was submitted to a 2 (race: African American or Caucasian) × 3 (condition: malleable pen pal, pen pal control, or non pen pal control) analysis of covariance (ANCOVA) using SAT as the covariate. The ANCOVA yielded significant main effects of both race, $F(1, 72) = 6.03$, $p < .02$, and experimental condition, $F(2, 72) = 19.638$, $p < .0001$, but no race by condition interaction ($F < 1$). The results (Table 1) suggest not only that the attitude change created by the malleable intelligence intervention endured, but also it appears that the passage of time widened the differences between malleable pen pals' beliefs and those of participants in the two control conditions.[2] Interestingly, there was a tendency for African Americans in all three conditions to view intelligence as more malleable than did their White counterparts, though the difference only reached marginal significance in the

[2] All analyses were initially conducted including participant gender as a factor. Because no main or interaction effects were found, the gender variable will not be discussed further.

malleable pen pal condition, $t(73) = 1.91$, $p < .06$. This finding of a race difference on this measure replicates findings from earlier research (e.g., Aronson & Damiani, 1997). African Americans appear to be more likely to endorse the incremental theory of intelligence, perhaps because it offers a self-protective shield against the intelligence stereotype as well as the tendency to underperform (Aronson, in press).

*Enjoyment of the educational process.* Students were asked "How much do you enjoy the educational process—studying, going to class, taking tests, etc.—at Stanford?" and were asked to indicate their degree of enjoyment on a 7-point scale, with 1 indicating *low* and 7 indicating *high* enjoyment. The ANCOVA performed on these ratings yielded a significant effect of race, $F(1, 73) = 37.10$, $p < .0001$, a significant effect of condition, $F(2, 73) = 3.43$, $p < .05$, and a significant race by condition interaction, $F(2, 73) = 4.23$, $p < .02$. The adjusted means are presented in Table 1. Thus in general, African American students in this sample reported enjoying academics less than their White counterparts, a finding in line with past ethnographic research (e.g., Feagin & Sikes, 1994). This is somewhat striking, considering the fact that we controlled for ability and preparedness by using SAT scores as a covariate. But the intervention appeared to moderate the race differences in enjoyment. African American participants indicated greater enjoyment of the educational process if they had written letters advocating the malleability of intelligence than if they had been in the pen pal control, $t(72) = 2.05$, $p < .05$. African Americans' enjoyment ratings did not differ across the two control conditions ($t = .12$). White participants' ratings also showed a positive effect of the intervention, although the difference between the malleable pen pal condition and the pen pal control was not significant ($p = .15$). Interestingly, Whites reported significantly higher enjoyment in the non pen pal control than did their counterparts in the pen pal control, $t(72) = 2.62$, $p < .02$.

*Identification with academic achievement.* We predicted that participants would be less likely to disidentify with academic achievement—less likely, that is, to reduce the centrality of academics to their self-concepts—if they were convinced that intelligence was malleable. To assess this, participants were asked to answer the following question: "Considering all the things that matter to you and make you who you are (e.g., friends, family, activities, sports, talents, etc.), how important is academic achievement?" Participants were asked to rate their valuation of academics on a 7-point scale, with 1 indicating *low* and 7 indicating *high* importance. The ANCOVA (as described above) performed on this measure yielded a significant effect of race, $F(1, 72) = 32.76$, $p < .0001$, a marginally significant effect of experimental condition, $F(2, 72) = 2.81$, $p < .07$, and a significant race $\times$ condition interaction, $F(2, 72) = 4.10$, $p < .05$. The pattern of adjusted means (Table 1) is similar to that found for the enjoyment-of-academics question. Consistent with previous accounts of the academic identification of various ethnic groups (e.g., Osbourne, 1995), African Americans across all experimental conditions appeared to base their self-worth less upon academic achievement than did their White counterparts, a phenomenon believed to stem in part from stereotype threat (Osbourne, 1995; Steele, 1997; Steele & Aronson, 1995). Our prediction that a malleable theory of intelligence could attenuate this divestment of self from academics was supported. African-Americans reported valuing academics more in the malleable pen pal condition than their counterparts in the pen pal control condition, $t(72) = 2.22$, $p < .05$, or than those in the non pen pal control condition, $t(72) = 3.85$, $p < .001$. For White participants, the intervention apparently had little effect on their identification with academics (all $t$'s, *ns*).

*Perceptions of stereotype threat.* Did these improvements in enjoyment and identification for Black students result from a direct reduction in stereotype threat? Apparently not. During the interview, participants were asked to indicate their degree of agreement (again on 7-point Likert scales) with two items past research (e.g., Steele et al., in press) has used to measure students' perceptions of a stereotype threatening environment ("people make judgments about my abilities based on my race," people make judgments about my racial group based on my performances"). These items were highly correlated and thus were averaged to form an index of stereotype threat. The ANCOVA performed on the index revealed only a highly significant effect of participant race, $F(1, 72) = 196.76$, $p < .0001$. Regardless of experimental condition, African American participants reported more stereotype threat ($M = 5.40$) than did White participants ($M = 1.46$). Thus, in contrast to other interventions, which have lifted the academic achievement and identification of African American students (e.g., Steele et al., in press), this intervention did not appear to do so by reducing students' direct experience of feeling judged by others through the lens of stereotypes. It is therefore likely that the intervention worked by changing their responses to a stereotype threatening environment, rather than their direct perception of it.

*Academic performance.* The most important question was whether the change in attitudes about intelligence and toward academics helped facilitate actual gains in achievement. To assess whether participants' grades improved as a result of participating in the intervention, we computed their grade point averages from their official grade transcripts. These were submitted to the ANCOVA, yielding only the main effects of race, $F(1, 72) = 9.62$, $p < .01$, and of experimental condition, $F(2, 72) = 4.93$, $p < .01$. There are several striking features of this data pattern. First, because we controlled for SAT, the race difference in academic performance is remarkable. SAT was a highly sig-

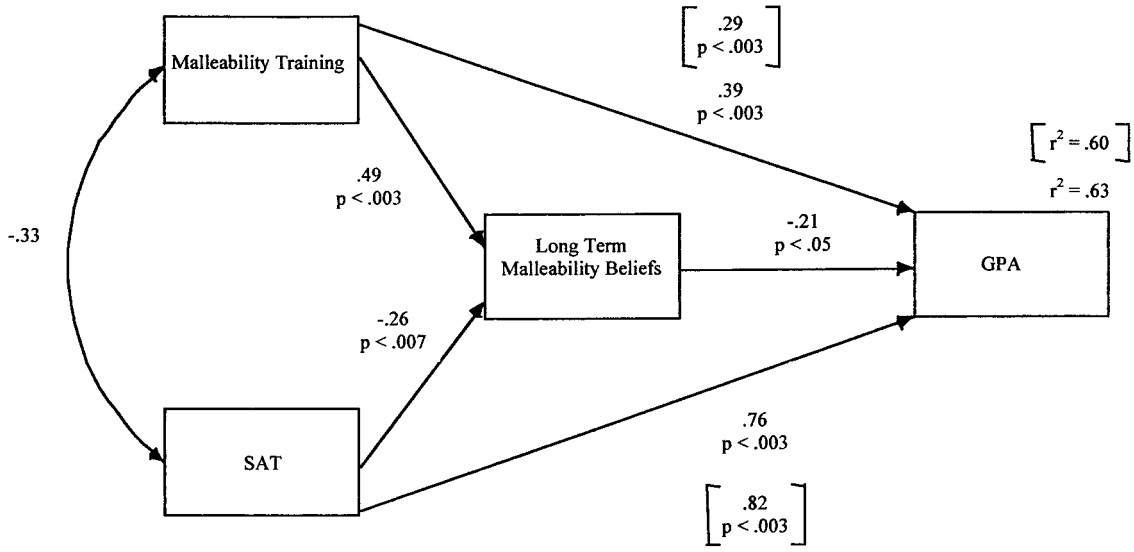


**FIG. 1.** Standardized direct effects of malleability training, long-term malleability beliefs, and SAT on GPA. Note: In the model, values associated with a double arrow indicate correlations, and values associated with a single arrow indicate standardized direct effects and the corresponding significance levels. Bracketed values reflect standardized direct effects and significance levels of malleability training and SAT on GPA without the presence of the mediator.

nificant predictor of participant GPA, $F(1, 72) = 36.28$, $p < .0001$. Nonetheless, controlling for it in the analysis did not eliminate the race gap. In each condition of the experiment Whites obtained higher grades than African Americans. Although this is certainly consistent with our reasoning (e.g., Steele, 1997; Steele & Aronson, 1995) about the extra academic burdens faced by African Americans, it is nonetheless surprising to see the degree to which race appears to influence academic performance. To examine whether the observed race gap may have stemmed from stereotype threat, we included the stereotype threat index as a factor in the above described ANCOVA, which yielded a less strong, but still significant effect of race, $F(1, 71) = 4.80$, $p < .05$. Thus, some other factor not captured by SAT or our measures of stereotype threat were operating to depress African Americans' grades relative to those of Whites.

The second striking feature of these data is how well the malleable intelligence intervention worked—not only for African Americans, but for the White participants as well. As inspection of the adjusted means in Table 1 shows, African Americans tended to obtain higher grades in the malleable pen pal condition, both compared to the no pen pal control participants, $t(72) = 2.19$, $p < .05$, and those in the pen pal control, $t(72) = 2.24$, $p < .05$. This strongly suggests that it was the malleability-of-intelligence message—not some other feature of the intervention—that was responsible for the gains in academic achievement. For the White participants, the condition difference was only marginally significant, but in the same direction as predicted; higher grades were obtained by participants in the malleable pen pal conditions than in either the pen pal control condition, $t(72) = 1.76$, $p < .09$, or in the non pen pal control condition, $t(72) = 1.82$, $p < .08$.

*Long-term malleability beliefs as mediator of GPA.*[3] Because our intervention seemed to work so well, in its effects on both attitudes and academic achievement, we were interested in additional data that might strengthen the argument that changes in implicit theories of intelligence underlay these improvements. Specifically, we wanted to determine if malleability of intelligence beliefs mediated the differences we found in GPA. To this end, we conducted a mediational analysis using long-term malleability beliefs as the mediator in contrasting the malleable pen pal condition with the two control conditions.

As Fig. 1 shows, malleability training and SAT (without the presence of the mediator) both had significant direct effects on GPA. To conclude that long-term malleability beliefs mediated this relationship, we should expect to see a reduction in the standardized direct effect of malleability training on GPA. However, the standardized direct effect of malleability training was actually strengthened, not weakened, in the presence of the mediator. Thus, because our analyses did not show a reduced direct effect of malleability training on GPA, we cannot conclude that the positive effects of the malleability training on GPA were mediated by malleability beliefs.[4]

[3] Mediation analyses were also conducted using the attitude variables as dependent variables. In all cases, the results failed to indicate that the malleability beliefs mediated the intervention's effects on these variables.

[4] Similar results were obtained when the mediation analysis was performed using only Black subjects. All paths were significant except the path from SAT to Long-Term Malleability Beliefs, $B = .07$, $p > .53$, and the path from Long-Term Malleability Beliefs to GPA, $B = -.236$, $p >$

TABLE 2
Table of Correlations among the Variables

| Black/White | Short-term malleability beliefs | Long-term malleability beliefs | Enjoy academics | Academics are important | Perceived stereotype threat | Spring quarter GPA | SAT | Malleability training |
|---|---|---|---|---|---|---|---|---|
| Short-term malleability beliefs | | .855*** | −.007 | .120 | .033 | −.153 | −.285 | .480** |
| Long-term malleability beliefs | .811*** | | .098 | .138 | .136 | −.113 | −.405* | .618*** |
| Enjoy academics | .206 | .317* | | −.156 | −.067 | −.298 | −.412* | .130 |
| Academics are important | .340* | .562*** | .592*** | | .066 | −.233 | −.405* | .085 |
| Perceived stereotype threat | .165 | .077 | .172 | .032 | | .182 | .087 | .240 |
| Spring quarter GPA | −.164 | −.066 | −.169 | −.108 | .037 | | .577*** | .079 |
| SAT | −.254 | −.160 | −.373* | −.353* | −.148 | .521*** | | −.395* |
| Malleability training | .379* | .596*** | .528*** | .606*** | .117 | .080 | −.368* | |

*Note.* The short-term malleability beliefs variable was collected not more than a week after the end of the intervention. Variables measuring long-term malleability beliefs, enjoyment of academics, academic importance, and perceived stereotype threat were collected approximately 9 weeks after the end of the intervention. The malleability training variable was coded as follows: Malleable Pen Pal Condition, 1; Pen Pal Control Condition, 0; Non Pen Pal Control Condition, 0.

* $p < .05$.
** $p < .01$.
*** $p < .001$.

Why did this analysis fail to support our explain the gains in GPA found in the malleable pen pal condition? Intercorrelations (Table 2) were computed to shed light on this issue. First, the mediation analysis revealed a negative effect of long-term malleability beliefs on GPA. As Table 2 shows, the negative effects found in the mediation analysis may reflect the general tendency for SAT to positively correlate with GPA and further, for people with low SAT scores to more strongly endorse a malleable view of intelligence. This tendency for people with low standardized test scores to more strongly endorse a malleable view of intelligence may be a protective strategy—believing that one can get smarter when faced with poor prior performance preserves a sense of hope that increased performance in the future is possible (Aronson, in press).

Second, in addition to the rather small sample size, which can make intercorrelations unstable, the mediational analysis may also have been frustrated by a restricted range problem with the malleability of intelligence scale. Specifically the mean on this measure for all subjects was 4.25, with a standard deviation of 1.17 and a maximum possible score of 6. And most importantly, for participants in the malleable pen pal condition, the means approached the maximum possible rating, suggesting that the manipulation created a ceiling effect, which would certainly work against finding supportive mediational results. One possible interpretation is that most participants expressed a belief that intelligence is more malleable than fixed—*when asked.* But, because of the nature of the intervention, those in the malleable pen pal conditions may have been particularly convinced of this, and the conviction was, moreover, accessible enough to affect their achievement behaviors, without our measures being sufficient to capture this critical difference. Indeed, these differences in mere belief versus accessible conviction (see Fazio, 1995) may help explain the seemingly inconsistent result found here and in several other studies showing Blacks to be not only more convinced than Whites of the malleability of intelligence but also more prone to academic failure. Further studies investigating the mediating effects of malleability training on GPA should include measures of attitude accessibility designed to capture such differences.

Although the mediation results were less than encouraging, it is hard to ignore both the current and past experimental support for the hypothesis. The results of three experiments have shown that malleability-of-intelligence manipulations both boost performance and identification relative to control groups that did not receive this critical element of the manipulation. We are thus inclined to take the lack of mediational support with a grain of salt. Still, it is intriguing to speculate about other factors that may have driven these gains that could conceivably have arisen as artifacts of the malleability-of-intelligence manipulation. One such factor could be increased motivation produced by the combination of stereotype threat with the belief that intelligence is malleable. Simply put, perhaps as we have seen in past stereotype threat studies (e.g., Steele & Aronson, 1995), stereotype threat boosts one's motivation to disprove the stereotype. The belief that intelligence is malleable may act to sustain this motivation by creating the conviction that one's efforts will amount to real gains. Thus it is possible that, by itself, the malleability-of-intelligence belief may have a less powerful influence on GPA than a

.19. Thus, Long-Term Malleability Beliefs did not mediate malleability training's effect on GPA for Black subjects.

combination of the belief coupled with a threatening—but motivating—stereotype. We are currently testing this hypothesis with additional experiments.

## GENERAL DISCUSSION

The results of this intervention were on the whole extremely encouraging. African American students, after just three sessions of advocating the malleability of intelligence, created an enduring and beneficial change in their own attitudes about intelligence. This change improved their academic profile to a significant degree: compared to their counterparts in either of the two control conditions, they reported enjoying and valuing academics more and they received higher grades. The intervention had some of the same positive effects for White students, though not to the same degree. One clear difference was that whereas, over time, African American students appeared to become more convinced of the expandability of intelligence, the White students' attitude change did not persist. Perhaps this is related to the greater baseline endorsement Blacks appear to give to the incremental view, which we have suggested can stem as much from desires as convictions. Nonetheless, White students seemed to enjoy some benefit from the malleable intelligence intervention; their grades improved, though their reported academic identification and enjoyment did not.

At the same time we must note the less encouraging story these results tell us about the African American experience in college. Even after controlling for preparation and ability (as measured by SAT scores), these students received significantly lower grades, showed significantly lower identification or engagement with the schooling process, and reported enjoying themselves less than their White classmates. This finding—as well as the additional finding that controlling for stereotype threat did not fully eliminate this gap in performance and engagement—underscores the difficulty these students face on predominantly White campuses. Our findings, moreover, are consistent with past findings in suggesting that at least part of this difficulty is created by suspicions of intellectual inferiority. And, also consistent with past research, the present study suggests that such doubts may be particularly damaging when the inferiority can be seen as irremediable (Aronson, 1999; Dweck, 1999).

It is interesting to note that this relatively simple intervention of changing students' views of the expandability of intelligence had about as much positive influence on grades as some larger scale, multifaceted interventions, such as one reported by Steele et al. (in press), who, also working from the stereotype threat model, successfully raised the grades (by four tenths of a grade) of Black freshmen at the University of Michigan. This program used a combination of special recruitment procedures, weekly study groups, and frequent mastery workshops. There is a critical difference between these two approaches that, we believe, holds out hope that even more dramatic gains could occur if the approaches were combined. Specifically, Steele et al. report that their gains were mediated by a direct effect on perceived stereotype threat. That is, their intervention had the effect of significantly changing Black students' feelings about being perceived by the larger community in a stereotypical way—they felt less looked down upon academically by their White peers. Our intervention clearly did not have this effect; perceptions of stereotype threat were untouched by the conceptions-of-intelligence manipulation. Instead, it appeared that the attitude change intevention did something to change their academically relevant responses to stereotype threat. It is quite possible then, that a marriage of the two approaches—which could both reduce stereotype threat and reduce some of the negative responses it spurs—could have an additive effect, boosting African American achievement more than either approach alone.

### Implications

The quality of life for Black Americans has improved dramatically in the past few decades. Discrimination on the basis of race has diminished—or, at least, has become less blatant (e.g., Kinder, 1986; Pettigrew & Meertens, 1995), and equal access is guaranteed by law, if not always by practice. These changes, along with a surging economy have helped make the current times better for African Americans than ever, with fewer unemployed or in poverty than ever and the highest level of health and optimism on record (Cose, 1999). Still, despite this brightening economic and cultural picture, African American school achievement stubbornly lags that of Whites. In one sense the economic forces that have improved the lives of all minorities in America make the educational disparities more dire. The economy has become and is likely to remain "knowledge-driven"; making a living increasingly requires most individuals, regardless of race or gender, not only to pursue higher education, but to draw fully upon its resources to develop the kind of skills needed to compete and thrive in the job market (Hershberg, 1998; Murnane & Levy, 1997). Individuals unable to attend or finish college are, more than ever, at risk of being left behind (Fullilove & Treisman, 1990). The apparent irreversibility of the knowledge-driven economy underscores the importance of addressing the persistent underachievement of underrepresented minority students at all levels of schooling.

We think that shaping students' conceptions of ability to promote more adaptive responses to the inevitable frustrations and threats posed by racially integrated colleges and schools could easily become part of school curriculum, perhaps as a complement to other structure-altering approaches, such as cooperative learning (e.g., Aronson &

Patnoe, 1997) and other forms of intergroup communication (Steele et al., in press) that have also proved useful in addressing minority student underachievement. Presumably, shaping or reshaping the views of grade-schoolers would be easier than with college students, since their attitudes about intelligence may be less entrenched and because young children tend start out as malleable theorists and grow more entitivistic as they move through school (Dweck, 1999).

In the past 2 decades, there has been encouraging progress within the scientific community. Traditional notions of what creates academic and life success (e.g., Hernnstein & Murray, 1994) are broadening to include factors other than innate intellectual ability. Scholars have begun to recognize and demonstrate the importance of such factors as emotional regulation (e.g., Goleman, 1995; Sternberg, 1996b), self-theories and goals (e.g., Dweck, 1999), and explanatory styles (e.g., Nolen-Hoeksema, Girgus, & Seligman, 1987). They have also begun rethinking longstanding and widespread notions of what intelligence is and, in particular, how it can expand in response to intervention (e.g., Gardner, 1983; Sternberg, 1998; Thompson & Nelson, 2001). The current study suggests the potential value of making these modern views as well known to the lay population as they are to those in academia.

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