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Cognitive-affective consequences of exposure to stereotype information

by

Wayne Chan

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Committee in charge:

Professor Rodolfo Mendoza-Denton, Chair

Professor Gerald A. Mendelsohn

Professor Özlem N. Ayduk

Professor Coye Cheshire

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Abstract

Cognitive-affective consequences of exposure to stereotype information

by

Wayne Chan

Doctor of Philosophy in Psychology

University of California, Berkeley

Professor Rodolfo Mendoza-Denton, Chair

Previous research shows that when individuals are exposed to a stereotype favorable to the their group, they perform better (Walton & Cohen, 2003), and when they are exposed to a negative stereotype, they perform worse (Steele & Aronson, 1995). Exposure to stereotypes has been related to lay theories of personal qualities (Aronson, Fried, & Good, 2001; Dar-Nimrod & Heine, 2006; Mendoza-Denton, Kahn, & Chan, 2008). Furthermore, societally favored groups also have a higher tendency to experience certain emotions such as guilt (Spanierman & Heppner, 2004), with implications for stated support for reparative political acts (Leach, Iyer, & Pedersen, 2006). In the current research, I explored the interrelationships between stereotype information, lay theories of personal qualities, and affective reactions, as well as the predictive utility of each for reparations. In a series of two studies, high- and low-status group members were exposed to stereotype information. In Study 1 men and women read either male-superior or no-difference stereotype information and then completed a math test. In Study 2, men and women read either female-superior or no-difference stereotype information and then completed a verbal test. Results demonstrated that high-status group members who felt more guilty after stereotype confirmation subsequently were more willing to engage in political action to improve the low-status group's performance in a relevant domain. High-status group members were also more likely to increase their beliefs in stable implicit theories after reading stereotype information. Furthermore, participants who increased their beliefs in malleable theories after stereotype information were also more likely to stereotype low-status members. Implications for academic intervention and outreach are discussed.

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Cognitive-affective consequences of exposure to stereotype information

A growing body of research has been documenting the affective consequences of being a target of a negative stereotype, as well as the behavioral correlates of such emotional reactions. African Americans faced with a stereotype of low academic achievement often react with anxiety (Blascovich, Spencer, Steele, & Quinn, 2001) and anger (Swim, Hyers, Cohen, Fitzgerald, & Bylsma, 2003), leading to lowered academic performance (Steele & Aronson, 1995) and a decreased sense of belonging in majority-White universities (Mendoza-Denton, Downey, Purdie, Davis, & Pietrzak, 2002). Similarly, some Asian Americans faced with a stereotype of low social competence react with shame leading to decreased self-esteem and increased reporting of depressive symptoms (Chan & Mendoza-Denton, 2008). In contrast, the affective consequences of being a target of a positive stereotype, and the antecedents of such consequences, remain less well understood.

A meta-analysis of the stereotype threat literature found that information about superior performance of one's group boosts subsequent performance in a variety of domains (Walton & Cohen, 2003). When high-status group members were reminded of their privileged group status, their performance on a stereotype-relevant task increased. Are there any cognitive, affective, and behavioral consequences that might covary with this performance improvement? Does improved performance relate to changes in the perceptions of the fluidity of social status, in experienced emotions, or in willingness to effect social change? At least for low-status groups, conveying the information that intelligence could be incrementally acquired has been shown to reduce the power of the stereotype information (Aronson, Fried, & Good, 2001). Furthermore, there are several distinct emotions that have been empirically related to high-status group membership, such as pride (e.g., Oyserman & Sakamoto, 1997), and guilt (e.g., Spanierman & Heppner, 2004). What are the interrelations among these various phenomena that are associated with high status? In this dissertation I attempt to review and bridge these disparate literatures in order to inform our understanding of the effects of stereotyping on privileged groups. Specifically, I informed participants of chronic (Study 1) and situational (Study 2) high status, and measured their performance and cognitive, affective, and behavioral reactions in stereotype-relevant domains. Based on existing literature, when influenced by information about a favorable stereotype, I would expect privileged group status to be related to higher performance, a more fixed view of personal qualities, and increased feelings of guilt. The next sections address each prediction in turn.

Stereotype Lift

One well-known effect of privileged group status is *Stereotype lift*. First conceived by Walton and Cohen (2003), this is the notion that as negative stereotypes about members of certain groups depress performance in a stereotypic task, positive stereotypes about members of other groups boost performance in a stereotypic task, by freeing up resources that would otherwise be utilized in performance concerns. Endorsing a fixed view of ability could specifically boost the performance of favorably stereotyped group members by assuring them that their group's advantage, relative to other groups, is immutable. Thus, while perceptions of immutable group differences should prove disruptive to performance and increase the difficulty of tests among members of unfavorably stereotyped groups, the same immutable differences should prove beneficial to performance and decrease the difficulty of tests among members of favorably stereotyped groups. By extension, when the unfavorable stereotype of one's own group

is refuted, low-status participants may behave more like members of high-status groups, and endorse beliefs that the (now refuted) intergroup difference is immutable. Consistent with these hypotheses, an entity view of intelligence has been related to enhanced achievement in a college level course relative to an incremental view only among already high-achieving students (Grant & Dweck, 2003), and an experimental entity manipulation of intelligence beliefs was related to high math performance in a group primed with positive math achievement stereotypes, but low math performance in a group primed with negative math achievement stereotypes (Mendoza-Denton, Kahn, & Chan, 2008).

Many researchers have suggested that beyond the group-level processes outlined above, there are individual differences in one's vulnerability to pernicious negative stereotypes (Pinel, 1999; Mendoza-Denton et al., 2002; London, 2008; Chan & Mendoza-Denton, 2008). Of the many processes that may contribute to the variability in stereotype vulnerability, Dar-Nimrod and Heine (2006) suggest that one ingredient may be participants' implicit theory about the origins of intergroup performance differences that underlie stereotypes. Women who only received information about the stereotype of low math performance behaved as in previous research: a refutation of the stereotype resulted in increased math performance, whereas a confirmation of the stereotype resulted in depressed math performance. In two additional conditions, the stereotype of low math performance was confirmed, but with the implicit theory about the origins of that stereotype explicitly stated. One condition attributed a gender gap in math performance to genetic origins (presumably static and fixed), and the other condition attributed a gender gap to societal origins (presumably malleable). In the condition where the stereotype was true and static, participants performed as if under stereotype threat, and in the condition where the stereotype was true and malleable, the effects of stereotype threat disappeared. In other words, the effects of stereotype threat might be mediated by the implicit theory of the participants about the malleability of qualities related to group performance.

Malleability of Personal Qualities

Implicit theories about the malleability of people's personal qualities (Dweck, 1999) have been shown to have short-term (Mueller & Dweck, 1998) and long-term (Henderson & Dweck, 1990; Stipek & Gralinski, 1996) consequences for academic performance, such that a belief in the malleability of personal qualities is beneficial. Furthermore, training low-status group members on the malleability of intelligence has been shown to reduce the gender (Good, Aronson, & Inzlicht, 2003) and ethnic (Aronson, Fried, & Good, 2001) gap in academic achievement.

Because the benefits of incremental theory belief have been well demonstrated in the literature for low-status group members and targets of prejudice, the current research focuses on the implications of the malleability of personal qualities for high-status group members and the perpetrators of prejudice. Allport (1958) theorized that the level of prejudice directed at targets of stigma is positively related to the perceptions that stigma is controllable, and this conception is confirmed in various research programs on stigma from the perpetrator's perspective. In particular, Crandall (1994) has found that an experimental manipulation conveying the immutability of body weight reduced prejudice against the overweight. Similarly, participants holding more malleable beliefs were more likely to report intolerance towards gays (Hegarty, 2002). On the other hand, a biological conception of race was correlated with *less* tolerant attitudes towards African Americans (Williams & Eberhardt, 2008), though biological

conceptions of race were only weakly correlated with implicit theories of personality ($r = .13$). This suggests that the relationship between prejudice and malleable beliefs might center less around the malleability of the group membership per se (e.g. the physical trait of being African American) and more around the malleability of behavioral correlates of group membership (e.g. overeating or exercising behavior, or public displays of affection). Bringing together insights from both the stereotype lift and trait malleability literatures, Mendoza-Denton, Kahn, & Chan (2008) found that high status group members, when reminded of both the validity of their high status and the malleability of behavioral outcomes of that status, subsequently performed worse on a task at which they were stereotyped to perform well. Taken together, these strands of evidence suggest while the belief in the malleability of personal qualities may be beneficial for targets of stigma, such beliefs may be related to increased prejudice and decreased performance for the perpetrators of prejudice.

Affective Consequences of Stereotype Information

Might the relationship between stereotype information and affect be explained by the same mechanisms that underlie the relationship between stereotype information and academic performance? There is a growing tradition of research that may bear on the affective consequences of being a member of a high-status group. In the study of self-conscious emotions, guilt is an emotion that signals personal responsibility for a negative event, and willingness to repair the harm done by that negative event (Ferguson, Brugman, White, & Eyre, 2007). In particular, collective guilt has been conceptualized as a reaction to societal injustices committed by ingroup members with whom one is in contact (Lickel, Schmader, Curtis, Scarnier, & Ames, 2005). One example of guilt predicated on high-status group membership is the concept of "White guilt" (Spanierman & Heppner, 2004), where European Americans feel guilty about discrimination against minorities committed by other Americans of European heritage, and subsequently become more willing to endorse social policies that might benefit subjugated minority groups. Another example is the "existential guilt" felt by high-status group members when informed of an ingroup advantage in relation to an outgroup (Harth, Kessler, & Leach, 2008). To the degree that guilt results from a failure to personally atone for a perceived transgression (Morrison, 1996), and that belief in the stability of personal qualities means that victims are perceived as powerless to effect change, belief in the stability of personal qualities should be related to guilt in high status group members. If low-status group members are powerless, then it would be the responsibility of the high-status group to institute reparations, and if the high-status group is not collectively atoning for that perceived transgression, guilt should occur among the high-status group.

One emotion that is highly related to guilt is the feeling of shame (Tangney, Wagner, & Gramzow, 1992). Typically, shame and guilt are strongly correlated and share common method variance due to negative valence. Therefore, one would expect shame and guilt to covary. However, there have been attempts to disentangle shame and guilt, and to delineate the different behavioral correlates of shame and guilt. Feelings of shame arise from the global negative evaluation of the self, whereas guilt arises from the negative evaluation of a specific behavior of the self (Tangney & Dearing, 2002). In the context of collective guilt and shame, Lickel and colleagues (2005) suggest that unlike guilt, an invocation of shame does not motivate one to repair past harms. Rather, shame motivates one to withdraw from the situation (Iyer, Schmader, & Lickel, 2007). In other words, the self-directed focus induced by feelings of shame would

imply that one might become *less* concerned about the well-being of others. There has been some evidence that feelings of shame might increase one's tendency to be prejudiced (Pattison, 2000). Furthermore, feelings of shame have been empirically related to the externalization of blame and subsequent expressions of anger (Tangney et al., 1992; Tangney & Dearing, 2002), whereas anger and shameless guilt are essentially uncorrelated. Consequently, if the blame for differences among groups is externalized to the outgroup, the high-status group member feeling shame should not feel obligated to support policies that would attempt to reduce the performance differences between groups. They may also perceive outgroup members in a more stereotypical manner. In other words, while guilt and shame may be highly correlated, their behavioral consequences may be different.

Another self-conscious emotion that might be related to high social status may be the feeling of pride. Oyserman and Sakamoto (1997) found that Asian American college students reported pride about their group's high status in the academic domain, and about the group's high status epitomized by the Model Minority stereotype. On the other hand, research on subjugated minorities found that low-status minorities also reported pride about their group membership (e.g., Carter, 1996). How can this be? Researchers on pride suggest that there may be two types of pride, both elicited in the same situations that might be related to different outcomes. Authentic pride is the "adaptive, prosocial, achievement-oriented facet of the emotion" (Tracy & Robins, 2007), which is related to increased self-esteem, whereas hubristic pride is narcissistic and may be related to underlying feelings of shame. To the degree that authentic pride is related to attributions of controllability, and hubristic pride is related to attributions of immutability (Tracy & Robins, 2007), authentic pride should be related to malleable beliefs about personal qualities, and hubristic pride should be related to beliefs about the immutability of personal qualities.

Attitudinal and Behavioral Consequences of Stereotype Information

How might affective reactions be related to attitudes and behavior? According to both the collective emotions and the self-conscious emotions literatures, there are specific attitudes and behaviors related to specific emotions that are well differentiated. Lickel and colleagues (2005) found that participants feeling guilty were more motivated to repair harm inflicted by the ingroup. Harm repair might also be represented by support for reparative compensation of the underperforming outgroup (Leach, Iyer, & Pedersen, 2006). Ironically, if we accept the premise that entity theory endorsement might lead to guilt in high-status group members, and that guilt leads to reparations by the high-status group members, incremental training of high-status group members may perpetuate group inequality, both by perpetuating actual intergroup differences in performance (Mendoza-Denton et al., 2008) and by reducing high-status group members' willingness to effect change.

Harm repair might also consist of undoing the pernicious effects of stereotypes through a variety of means. For example, one might refuse to utilize stereotypes, which might be operationalized as a decrease in endorsement of prejudicial attitudes (Powell, Branscombe, & Schmitt, 2005), or by a decreased attribution of stereotypical traits to a relevant outgroup (e.g. Kawakami, Spears, & Dovidio, 2002). Engagement in counterstereotypic behavior in this case might be represented by an attempt to perform in a way that is inconsistent with the stereotype about one's ingroup (e.g. pressure to prove the stereotype wrong, Steele & Aronson, 1995).

In contrast, because shame is in essence a self-focused critical emotion, outcomes related to shame might tend to be more focused on the self, or the ingroup in the context of collective shame. Ingroup focus might lead one to allocate more resources to the ingroup in an attempt to self-improve (cf. Harth et al., 2008). Feelings of shame may also lead one to withdraw, for example, by making more distinctions between the ingroup and the outgroup, or by attributing more stereotypical traits to the outgroup (Pattison, 2000). However, in line with Schmader and Lickel (2006), shame should not predict reparations towards the outgroup. Harth and colleagues (2008) further propose that positive emotions such as pride and sympathy might have consequences for reparative action. Specifically, pride might be related to allocation of more resources to the ingroup, whereas sympathy might be related to allocation of resources to the outgroup.

The Present Studies

In light of the evidence above, I propose that the relationship between the presentation of stereotype information and various negative consequences may be mediated by implicit theories of personal qualities. This model should also apply to affective outcomes such as guilt and shame. Online changes in guilt and shame should be related to different cognitive consequences such as endorsement of stereotypical attitudes and perceptions of outgroup members in stereotypical ways. Changes in guilt, pride, and sympathy should also have different behavioral consequences, such as the allocation of resources to the outgroup, and support for reparative policies towards the outgroup. Furthermore, I expect that these cognitive, affective, and behavioral reactions should be related to situationally induced status rather than chronic high status per se, because chronically high-status groups such as European American males have been induced into a stereotype threat state when experimentally compared to a group with even higher situational status in that particular domain (e.g. Aronson, Lustina, Good, Keough, Steele, & Brown, 1999), or compared in a domain where they have situationally low status (e.g. Stone, Lynch, Sjomeling, & Darley, 1999). Additionally, chronically low-status groups such as women have been induced to perform better when reminded of another aspect of their personal status that may be valued in that particular domain (e.g. Shih, Pittinsky, & Ambady, 1999).

To experimentally test the relationship between stereotypes, lay theories of attributes, and emotional reactions, I experimentally confirmed or refuted stereotypes about a particular high-status group in two different domains using broadly similar methodology. After supplying stereotype information in the relevant domain, I measured participants' endorsement of implicit theories of personal attributes, engaged participants in a performance task to amplify any affective reactions, and measured their affective reactions after success or failure. I provided participants with an opportunity to engage in reparative action. Finally, participants were measured on their endorsement of stereotyping, beliefs about the ingroup and outgroup, and feelings toward the ingroup and outgroup. The low-status groups were assessed as a comparison group. Study 1 focused on a chronically high-status group (men) supplied with situational stereotype information that is consistent with their chronic high status. Study 2 attempted to disentangle chronic and situational status by focusing on a chronically low-status group (women) who were tested in a domain where they have situational high status. I expect that the positive stereotype information would induce guilt in the situationally high status group in both studies. Induced guilt might be related to an increase in the willingness to engage in reparative action,

operationalized as the support for policies that benefit the outgroup, and the engagement in actions that benefit outgroup members.

Study 1

Despite progress in the reduction of prejudice against women, sexism continues to be pervasive in society today, albeit in less blatant ways (Swim, Aikin, Hall, & Hunter, 1995). For example, labeling otherwise identical job applicants as female rather than male led to lower recommended salaries (Smith, Tabak, Showail, Parks, & Kleist, 2005) and lower competence ratings (Correll, Benard, & Paik, 2007, Foschi, 1996). This phenomenon may help explain the actual gender gap in salaries in the United States (U.S. Census Bureau, 2000). Gender stereotypes were also well known and widely endorsed, even among contemporary college students (Chan & Mendelsohn, 2010). A meta-analysis found that men's successes were most often attributed to stable personal qualities such as innate ability, whereas women's successes were most often attributed to unstable personal qualities such as luck (Swim & Sanna, 1996), a finding that is consistent with my predictions with regard to high status and beliefs about the malleability of personal qualities. Finally, there were stable gender differences in reported feelings of shame (e.g. Tangney & Dearing, 2002), in that women, who possess chronic low status, were more likely than men to experience and report shame. There is reason to believe that the pervasive accessibility and availability of gender stereotype information may help explain some of these differences between groups.

Specifically, there is a large literature on the relationship between the availability of gender stereotype information and academic performance (e.g., Shih, Ambady, Richeson, Fujita, & Gray, 2002; Shih, Pittinsky, & Trahan, 2006). Research has shown that implicit theories of personal attributes may be related to academic performance among women (e.g., Dweck, 1999, Good et al., 2003). Furthermore, there is a well-established stereotype of male achievement in the math domain (e.g., Steele, 1997; Spencer, Steele, & Quinn, 1999), and that has been related to actual gender differences in math performance (Hyde, Fennema, & Lamon, 1990). Experimental manipulation of stereotype information has been shown to produce performance differences in student samples (e.g. Mendoza-Denton et al., 2008). Therefore in Study 1 I experimentally informed women and men of an already prevalent stereotype with powerful real-world consequences, namely, that men outperform women in mathematics. I measured their emotional reactions after they were exposed to information either confirming or nullifying an existing societal stereotype, after subsequent math tests, and finally at the end of the experiment. I expect that their emotional changes caused by the gender stereotype information would be negatively related to the attribution of stereotypical traits to targets and the willingness to express more prejudice, and positively related to support for reparative policies.

Methods

Participants. One hundred and ten students at the University of California, Berkeley completed the experiment for partial course credit. Seventy-one participants were female, and 39 were male. The mean age of participants was 20.45 years old, with a standard deviation of 3.82 years. Of those, 52 participants were of Asian descent, 32 were of European descent, 10 were of Latino descent, 3 were of African descent, and 13 reported "other" ethnicity.

Procedure. Participants arrived at the laboratory in groups of two to five, and read brief instructions that that would evaluate several professional journal articles for clarity. Furthermore, they would also be asked to recall certain details about the articles at a later time. They were informed that the experiment would repeatedly assess their feelings, so that it would be normal to see the same question more than once. After the introduction, participants completed a short survey battery comprising of a domain-general implicit theories scale, an intelligence-specific implicit theories scale, self-esteem, and affect (Time 1, see Appendix A). Then participants read a short informative article of males and females' math performance. Half of the participants read the summary concluding there is no gender difference in math performance, and the other half read the summary concluding that men outperform women in math. All participants also read and evaluated two additional distractor articles (Appendix B contains the distractor articles used in the dissertation, and Appendix C contains the math performance stereotype information articles). After the stereotype information, participants completed the short survey of implicit theories, self-esteem, and affect again (Time 2).

Participants then were told that they would complete the article recall task after an unrelated study, which consisted of a 10-item multiple-choice math test that is moderately difficult (see Appendix E), as a measure of domain-relevant performance. At the conclusion of the test, half of the participants were told that they performed very well on the math test, and the other half were told that they performed moderately on the test. This served to disentangle the affective reactions to the test from actual performance on the test. Then participants completed the short survey battery once again (Time 3; at this time participants did not complete the implicit theories scale in the interest of time), and completed a second math test. At the conclusion of the second math test, participants completed the same short survey a fourth time in addition to surveys measuring stereotyping of ingroup and outgroup members, feelings toward ingroup and outgroup members, and reparative behaviors (Time 4; see Appendix F). Participants were then debriefed and dismissed. In essence, this was a 2 (group membership: high-status vs. low-status) x 2 (stereotype information: confirmed vs. nullified) x 2 (feedback: success vs. failure) design.

Measures

All measures were prefaced with a prompt instructing participants to complete each question with respect to how they felt "right now".

Self-esteem. The Single-Item Self-Esteem Scale (Robins, Hendin, & Trzesniewski, 2002) is a short measure of self-esteem validated for use among adults as a substitute for the 10-item Rosenberg (1979) Self-Esteem scale. It consisted of a single item, "I have high self-esteem", which participants rated on a 6-point Likert-type scale for agreement. For the four time points, mean scores were 4.32 ($SD = .95$), 4.20 ($SD = 1.02$), 4.35 ($SD = 1.14$), and 4.25 ($SD = 1.15$).

Implicit theory beliefs. I included two measures of beliefs about the malleability of personal characteristics. The intelligence-specific implicit theory scale is an 8-item scale used in Mendoza-Denton et al. (2008) that assessed the degree to which participants considered intelligence to be changeable. The domain-general implicit theory scale is the same as the domain-general entity-incremental scale used in Levy and Dweck (1998). It consists of 8 items assessing the degree to which participants considered basic personal characteristics to be changeable, rated on a 7-point Likert-type scale. Sample items included "Everyone, no matter

who they are, can significantly change their basic characteristics" and "Everyone is a certain kind of person, and there is not much they can do to change that" (reverse-coded). Means, standard deviations, and alpha reliabilities of each of the scales can be found in Table 1.

Affect. A set of emotion terms derived from existing research on group-based emotions was administered to participants. Each of these terms was rated on a 5-point Likert-type scale, with higher scores indicating more agreement. Because of past research on the role of prejudice on anxiety (e.g. Mendoza-Denton et al., 2002, Chan & Mendoza-Denton, 2008), *anxious* was included as an emotion of interest. The focal emotions of interest were the ones related to guilt, using a composite constructed from Lickel, Schmader, Curtis, Scarnier, & Ames (2005), Leach, Iyer, and Pedersen (2006) and Harth, Kessler, and Leach (2008) (*guilty, regret, remorse, responsible, have a bad conscience*). The emotion scale also contained related constructs that should be theoretically distinct from guilt, such as shame (using the Lickel et al., 2005, composite: *ashamed, embarrassed, disgraced, humiliated*). Anger was assessed as per Leach et al. (2006): *angry, annoyed, hostile, indignant, resentful, outraged.* And finally, as per Harth et al. (2008), I also included two other common emotional constructs related to high-status group membership, yet should not be related to guilt: pride (*pride, successful, happy*), and sympathy (*sympathy, compassion*). Means, standard deviations, and alpha reliabilities of each of the scales can be found in Table 2.

Math performance. Twenty math items were chosen from a GRE review booklet (Robinson & Katzman, 1992) for moderate difficulty (between 20-40% of past test takers incorrectly answered each question). Ten of the items from the booklet were also used in Mendoza-Denton et al. (2008), and ten additional items were chosen from the booklet that were within the same range of difficulty as the items featured in Mendoza-Denton et al. (2008). For the first ten math items, participants answered a mean of 7.38 questions correctly, with a standard deviation of 2.36. For the second set of ten math items, participants answered a mean of 7.30 questions correctly, with a standard deviation of 2.50.

Baseline academic performance. Participants reported their college GPA, as well as their SAT math and verbal scores. In the current sample, participants had a mean GPA of 3.38, with a standard deviation of .45. Their mean SAT math scores were 647.4, with a standard deviation of 125.49. Their mean SAT verbal scores were 637.1, with a standard deviation of 124.17.

Stereotyping. In this study I used three separate measures of stereotyping. Participants were first assessed on their attribution of relevant stereotypical traits to ingroup and outgroup targets, then on their endorsement of prejudicial attitudes towards women, and finally on their abstract feelings towards ingroup and outgroup members.

Trait attribution. Participants read one description of a gender ingroup target (male or female Berkeley student, depending on participant gender), one description of a gender outgroup target (again a male or female Berkeley student, depending on participant gender), and finally, one description of a mutual outgroup target (Stanford student), drawn from pre-tested stimuli used in Mendoza-Denton, Ayduk, Mischel, Shoda, and Testa (2001). Participants then rated each target on a variety of traits, some related to masculinity, some related to femininity, and some distractors, using a 9-point Likert-type scale, with higher scores indicating more agreement. The

masculine and feminine traits were averaged separately as an index of stereotyping of the target. Means, standard deviations, and alpha reliabilities of each of the scales can be found in Table 3.

Sexist beliefs. The Modern Sexism Scale (Swim et al., 1995) measured participants' prejudicial attitudes towards women. Sample items on the scale included "Over the past few years, the government and news media have been showing more concern about the treatment of women than is warranted by women's actual experiences" and "It is rare to see women treated in a sexist manner on television." Participants rated each item on a 5-point Likert-type scale, with higher scores indicating more agreement. In this sample, participants scored a mean of 3.68 with a standard deviation of .44, and alpha reliability on the scale was .63.

Feeling thermometers. To assess attitudes towards the ingroup and outgroup in a less concrete manner, participants reported how warm they felt towards the average male undergraduate and the average female undergraduate on a 100 point scale. This methodology has been shown to have validity in the evaluation of social groups (e.g. Wilcox, Sigelman, & Cook, 1989). As a distractor, participants also reported how warm they felt towards the average male and female undergraduate enrolled at Stanford University, as well as other participants in the study. Means and standard deviations on the items can be found in Table 4.

Reparative actions. To assess the degree to which affective reactions influenced stated reparative actions, I asked participants to predict their behaviors in several situations. Participants were first asked to allocate resources for the benefit of the ingroup and outgroup, and they were also asked about their willingness to take political action for the benefit of the ingroup and outgroup.

Resource allocation. Participants read a short vignette about the University receiving additional funding to encourage academic achievement, and were asked to make decisions on the percentage of total resources to allocate to female math and science students, to male liberal arts students, and academic advising, faculty funding, and outreach for first-generation college students. Total funding for all 5 items could not exceed 100 percent. This is broadly similar to the "resource allocation" task used in Harth et al. (2008). Means expressed as a percentage of total funding allocated to each category and standard deviations of each item can be found in Table 5. The focal reparative actions here were funding allocations to female math students and male liberal arts students.

Political action. A second measure of reparative action was the willingness to engage in political action. Modeled after Leach et al. (2006), this scale asked participants about their willingness to participate in gender-based political action, from writing a letter to the dean requesting increased funding for math and science outreach programs for women, to volunteering to participate in outreach programs, to donating money to outreach programs. Parallel questions asked participants about their willingness to participate in political action favoring men, in this case, outreach programs for improving men's performance in writing. Participants rated each item on a 6-point Likert-type scale, with higher scores indicating more agreement. Means and standard deviations of each item can be found in Table 6.

Manipulation check. As a manipulation check, participants were asked to recall the content of the articles at the beginning, and also the degree to which they were in agreement with the articles.

Results

Null findings. There were no main effects or interactions involving self-esteem, anger, pride, or sympathy at any time point, nor effects involving sexist beliefs or the feeling thermometers at Time 4. These dependent variables will not be discussed further.

Replication of Stereotype Threat performance effects. Controlling for participant ethnicity known to have an effect on math performance (e.g. Mendoza-Denton et al., 2008, Shih et al., 2006), and success/failure feedback (which did not have an effect on math performance), there was a marginal main effect of participant gender, $F(1,101) = 2.83$, $p < .10$, and a marginal main effect of stereotype information, $F(1,101) = 3.51$, $p < .10$, both qualified by a marginal gender x stereotype interaction, $F(1,101) = 3.39$, $p < .10$, such that high-status group members performed best on the second math test in the condition where the stereotype was confirmed, and low-status group members performed best on the second test in the condition where the stereotype was nullified. There were no gender, stereotype information, nor success/failure feedback effects on the first math test. This interaction on the second math test is illustrated graphically in Figure 1.

Implicit theories. Controlling for success/failure feedback (which did not have an effect on implicit theories, $F < 1$), there was a main effect of participant gender, $F(1,58) = 5.19$, $p < .05$, qualified by a marginal gender x stereotype interaction, $F(1,58) = 3.35$, $p < .10$, such that high-status group members changed their intelligence-specific implicit theory beliefs (change computed as Time 4 – Time 1 within-subjects) in the direction of more stability when the stereotype was confirmed, and low-status group members changed their intelligence-specific implicit theory beliefs in the direction of more stability when the stereotype was nullified. This interaction on intelligence-specific implicit theory change is illustrated graphically in Figure 2.

In terms of domain-general implicit theories, controlling for success/failure feedback (which did not have an effect on implicit theories, $F < 1$), there was only a gender x stereotype interaction, $F(1,61) = 3.83$, $p = .05$, such that high-status group members changed their domain-general implicit theory beliefs (change computed as Time 4 – Time 1 within-subjects) in the direction of more stability when the stereotype was confirmed, and low-status group members changed their domain-general implicit theory beliefs in the direction of more stability when the stereotype was nullified. This interaction on domain-general implicit theory change is illustrated graphically in Figure 3.

Guilt and shame. In terms of guilt, controlling for success/failure feedback (which did not have an effect on guilt, $F < 2$), there was a main effect of stereotype information, $F(1,74) = 5.65$, $p < .05$, qualified by a gender x stereotype interaction, $F(1,74) = 6.11$, $p < .05$, such that high-status group members felt more guilty (change computed as Time 3 – Time 1 within-subjects) when the stereotype was confirmed, and low-status group members felt more guilty when the stereotype was nullified. This interaction on guilt change is illustrated graphically in Figure 4.

In terms of shame, controlling for success/failure feedback (which did not have an effect on shame, $F < 2$), there was a main effect of stereotype information, $F(1,73) = 5.56$, $p < .05$, qualified by a gender x stereotype interaction, $F(1,73) = 5.80$, $p < .05$, such that high-status group members felt more ashamed (change computed as Time 3 – Time 1 within-subjects) when the stereotype was confirmed, and low-status group members felt more ashamed when the stereotype was nullified. This interaction on shame change is illustrated graphically in Figure 5.

Stereotyping. For the ascription of feminine traits to the female ingroup student target, controlling for success/failure feedback (which did not have an effect on stereotyping, $F < 2$), there was a main effect of gender, $F(1,73) = 10.44$, $p < .01$, such that high-status group members were more likely to rate the gender-outgroup target higher on stereotypical traits, a main effect of stereotype information, $F(1,73) = 5.52$, $p < .05$, such that participants who had the stereotype nullified were more likely to stereotype, both qualified by a marginal gender x stereotype interaction, $F(1,73) = 3.63$, $p < .10$, such that high-status group members in the condition where the stereotype was nullified were most likely to ascribe stereotypical traits to the gender-outgroup target. This interaction on stereotyping is illustrated graphically in Figure 6. There were no gender, stereotype, nor success/failure effects on the ascription of stereotypical traits to the gender-ingroup student target or the mutual-outgroup student target.

Resource allocation. In the allocation of funding to various campus programs, controlling for success/failure feedback (which did not have an effect on resource allocation, $F < 3$), there was a marginal main effect of stereotype information, $F(1,71) = 3.65$, $p < .10$, qualified by a gender x stereotype interaction, $F(1,71) = 4.80$, $p < .05$, such that high-status group members in the condition where the stereotype was confirmed were most likely to allocate funding to programs designed to improve men's performance in liberal arts majors. This interaction on resource allocation is illustrated graphically in Figure 7. There were no gender, stereotype, nor success/failure effects on the allocation of funding to programs designed to improve women's performance in math, nor were there differences on funding allocations to distractor items such as first-generation college students, faculty, and outreach.

Political action. There were no gender, stereotype, nor success/failure effects on participants' desire to engage in any sort of political action for programs to increase verbal performance in the student body. For programs designed to increase math performance, controlling for success/failure feedback (which did not have an effect on political action, $F < 1$), there was a main effect of gender, $F(1,70) = 4.96$, $p < .05$, such that low-status group members were more willing to write a letter in support of increased funding for math programs, and a main effect of stereotype information, $F(1,70) = 4.55$, $p < .05$, such that participants in the condition where the stereotype was confirmed were more willing to write a letter in support of increased funding for math programs, both qualified by a marginal gender x stereotype interaction, $F(1,70) = 3.46$, $p < .10$, such that the effect of the stereotype confirmation was stronger among the high-status group members. This interaction on willingness to write a letter in support of math programs is illustrated graphically in Figure 8.

This effect is broadly similar across the other math-related political action items. For desire to volunteer at a math tutoring center, there was a main effect of gender, $F(1,69) = 9.87$, $p < .01$, a main effect of stereotype information, $F(1,69) = 5.62$, $p < .05$, both qualified by a marginal gender x stereotype interaction, $F(1,69) = 4.24$, $p < .10$. This interaction on willingness to volunteer at a math tutoring center is illustrated graphically in Figure 9. For desire to donate

money to math education programs, there was a main effect of gender, $F(1,54) = 5.96$, $p <$ .05, a main effect of stereotype information, $F(1,54) = 4.32$, $p < .05$, both qualified by a gender x stereotype interaction, $F(1,54) = 4.99$, $p < .05$. This interaction on willingness to donate money to math education programs is illustrated graphically in Figure 10.

Interactive properties of the various dependent variables. Because there were many dependent variables moderated by participant gender and stereotype prime, it might be informative to investigate the various interrelationships of the dependent variables. In particular, controlling for participant ethnicity, SAT-math scores, and GPA, performance on the second math test predicted changes on the domain-general implicit theories measure at the end of the experiment, $F(1,37) = 6.14$, $p < .05$, such that participants who performed well on the math test tended to shift their implicit theories in a more stable direction. For high-status group members in the stereotype nullified condition, there was a trend-level correlation between math performance and change in guilt, $r(12) = -.39$, $p = .17$, such that the better one performed on the math test, the less guilty they felt compared to baseline. Implicit theories, guilt and shame, however, were not correlated (all $|r| < .13$, *ns*).

Changes in implicit theories were related to the ascription of feminine traits to a female target at a trend level, $r(60) = .20$, $p = .13$. Further inspection revealed that this effect was driven mostly by the low-status group, $r(35) = .32$, $p = .05$, such that low-status group members whose implicit theory beliefs had become more change-based were more likely to rate other low-status group members in stereotypically consistent ways. Ascription of stereotypical traits was not related to guilt or shame changes throughout the experiment (all $|r| < .10$, *ns*). However, changes in guilt positively predicted the desire to engage in reparative political action, specifically, the desire to volunteer at a math tutoring center, for only high-status participants in the stereotype confirmed condition, $r(12) = .50$, $p = .06$, but were not related to changes in shame, $r(12) = .27$, *ns,* nor to changes in implicit theories (all $|r| < .10$, *ns*). Changes in shame predicted allocating *more* resources to men, $r(63) = .25$, $p < .05$, but was only marginally related to changes in guilt, $r(64) = .22$, $p < .10$, and not at all related to changes in implicit theories (all $|r| < .10$, *ns*). The shame – resource allocation effect was mostly driven by the high-status group members, $r(23) = .44$, $p < .05$.

Discussion

Consistent with existing literature, high-status group members (Spanierman & Heppner, 2004) in an academic domain (Tangney & Dearing, 2002) felt guilty, especially when informed of their stable high status (Lickel et al., 2005). Also consistent with existing literature on stereotype threat (e.g. Steele, 1997; Steele, Spencer, & Aronson, 2002) and stereotype lift (Walton & Cohen, 2003), group members stereotyped to perform well performed better when told that the stereotype is true, and group members stereotyped to perform poorly performed better when told that the stereotype is false. Contrary to predictions, feelings of guilt after reading about the ingroup's high status were not mediated by the individual difference change in implicit theory belief from baseline. Guilt, shame, and implicit theory belief were all moderated by participant gender and stereotype information, but those cognitive-affective constructs were not precursors of each other. Rather, each of those 3 constructs had distinctive behavioral consequences.

Consistent with the existing literature on high-status guilt (e.g. Leach et al, 2006; Harth et al., 2008), guilt in the high-status group member was related to a desire to support reparative political action to the low-status group, in this case, volunteering at a math tutoring center. Shame, however, was related to ingroup preferential treatment, in the allocation of more resources towards the high-status group by the high-status group members who felt shame, again consistent with existing research (e.g. Harth et al., 2008). The increase in the belief that attributes are changeable, however, actually was associated with a tendency to view the low-status group in more stereotypical ways, at least among the low-status group members. This might be related to the notion that stigmatized group members are more responsible for their plight if attributes are changeable (e.g. Crandall, 1994; Crocker, Cornwell, & Major, 1993; Hegarty, 2002). Interestingly, stereotypical trait attributions only extended to the relevant low-status group, but not to either the high-status group or the irrelevant outgroup. Furthermore, in the low-status group, stereotypical trait attributions only applied in the attributions of stereotypical traits but not to counter-stereotypical traits. This may be due to the domain specificity of the effects of stereotype information, such that when the low-performing stereotype of women was manipulated, it directly affected how high-status group members perceived women and their femininity, but not how they perceived women and their masculinity.

There were several emotions that were not related to behavioral outcomes primarily because they were not systematically related to our manipulation. Anger, pride and sympathy were not related to the presentation of stereotype information. Indeed, while there might be some research evidence that these emotions were related to reparative outcomes (e.g. Harth et al., 2008), there was little evidence that the presentation of stereotype information could be related to these emotions. The current measure of pride might also be unable to differentiate between authentic pride and hubristic pride (Tracy & Robins, 2007). The lack of findings in the feeling thermometers was also unsurprising due to the domain generality of the measure. Modern sexism might be a more trait-like dimension that is unlikely to be changed by the manipulation. Furthermore, I did not administer a baseline for modern sexism, possibly allowing individual differences to overwhelm changes due to the experimental manipulation.

Overall, Study 1 illustrated the specificity of the effects of stereotype information. The emotional reactions to the stereotype were not uniformly negative, but were confined to the specific emotions of negative self-evaluation. Stereotype information also interacted with participants' group status, such that the high-status group felt more guilt when the stereotype was confirmed, and the low-status group felt more shame when the stereotype was nullified. Most importantly, when high-status group members were aware of the intergroup differences in performance, and they felt more guilt, there were more likely to engage in reparative political action to help the low-status group. However, when low-status group members were exposed to information that nullified the stereotype, they were more likely to judge other low-status group members more stereotypically. This is preliminary evidence that conventional interventions to reduce intergroup performance differences may have ironic effects on downstream cognitive and behavior consequences.

Several additional caveats remain. One possible explanation for the lack of effect of the success/failure prime in Study 1 is that for math tests with a clear right or wrong answer, participants might have an intuitive sense of their own relative performance on the test. Therefore, feedback that is inconsistent with their felt experience during the test might be

discounted as inaccurate. Another possibility may be that affective consequences of stereotype information manipulation were unaffected by success and failure feedback. It would be reasonable to expect that attitudes and beliefs about entire groups might be unaffected by an individual's own success and failure.

Because participants have had copious experience in the mathematics domain and have formed their own actual beliefs about mathematical performance and the gender gap, the prime might differentially affect participants. The controversy over Harvard president Larry Summers' comments about women in science education (see Barlow, 2007) demonstrated the pervasiveness and the societal impact of the well-known stereotype. Consequently, one alternative explanation of Study 1 results could be that due to the chronic high status of men and the pervasiveness of stereotypes of male superiority, men would tend to feel guilty after any mention of intergroup differences, and would support reparative policies to any chronically low-status group. This alternative explanation could not be discounted with Study 1 data, since the situational high status of men in the mathematics domain overlapped with the chronic high status of men. Therefore, in Study 2 I attempted to address these shortcomings, both by studying a less pervasive stereotype, and also by focusing on a situational high-performing stereotype for a group that has chronic low status.

Study 2

Study 2 attempted to disentangle chronic and situational high status by engaging participants in a domain in which group members with chronic low status were given information about a domain in which they have situational-specific high status. This methodology has been used by Shih et al. (2002; 2006) with Asian American women and math performance. In a series of studies, Shih and colleagues administered math tests to Asian American females. When their Asian identity was activated (where the applicable stereotype is high math performance) participants performed better on the math test than when their female identity was activated (where the applicable stereotype is low math performance).

In parallel fashion, I focused on a domain where women are considered to have high performance. Pilot studies revealed that women at Berkeley are considered to excel in verbal performance, and in Study 2 I sought to replicate the general findings in Study 1, except in the verbal performance domain. In addition to reading stereotype information about verbal performance, and taking two verbal tests, participants completed the same implicit theories, affect, and self-esteem scales, and completed the same sexism, trait attribution, resource allocation, feeling thermometer, and political action outcome measures as in Study 1. If effects in Study 1 were dependent on chronic high status, results should be identical in Study 2. That is, men informed of a stereotype of superior female verbal performance should nevertheless feel guilty about their chronic high status and be more likely to support policies that improve women's societal standing. If, on the other hand, effects were driven by situational high status, results in Study 2 should be the *mirror* image of Study 1, where women in the stereotype confirmed condition, now possessing situational high status, should feel more guilt, and men in the stereotype confirmed condition should change their implicit theory beliefs in a more malleable direction.

Pilot Study

In order to determine an appropriate domain for use in Study 2, I collected pilot data on the academic domains in which men and women were stereotypically expected to excel. In the pilot study, 765 Berkeley psychology students rated the degree to which men and women were stereotypically expected to do well in math and verbal tests, using a 7-point Likert-type scale. Results showed that participants expected women to perform worse than men on math tests (women $M = 3.28$, $SD = 1.22$; men $M = 5.06$, $SD = 1.20$, $t(763) = 26.21$, $p < .001$), while women were expected to perform better than men on verbal tests (women $M = 4.85$, $SD = 1.29$; men $M = 3.84$, $SD = 1.30$, $t(759) = 14.56$, $p < .001$). Therefore, Study 2 supplied participants with stereotype information about women's performance in the verbal domain, and participants completed two verbal standardized tests.

Methods

Participants. Eighty-seven students at the University of California, Berkeley completed the experiment for partial course credit. Fifty-five participants were female, and 32 were male. The mean age of participants was 20.69 years old, with a standard deviation of 2.49 years. Of those, 52 participants were of Asian descent, 17 were of European descent, 8 were of Latino descent, 3 were of African descent, and 7 reported "other" ethnicity.

Procedure. Participants arrived at the laboratory in groups of two to five, and read brief instructions that that would evaluate several professional journal articles for clarity. Furthermore, they would also be asked to recall certain details about the articles at a later time. They were informed that the experiment would repeatedly assess their feelings, so that it would be normal to see the same question more than once. After the introduction, participants completed a short survey battery comprising of a domain-general implicit theories scale, an intelligence-specific implicit theories scale, self-esteem, and affect (Time 1, see Appendix A). Then participants read a short informative article of males and females' verbal performance. Half of the participants read the summary concluding there is no gender difference in verbal performance, and the other half read the summary concluding that women outperform men in verbal performance. All participants also read and evaluated two additional distractor articles (Appendix B contains the distractor articles used in the dissertation, and Appendix D contains the verbal performance stereotype information articles) After the stereotype information, participants completed the short survey of implicit theories, self-esteem, and affect again (Time 2).

Participants then were told that they would complete the article recall after an unrelated study, which consisted of a 10-item multiple-choice verbal test that is moderately difficult (see Appendix G), as a measure of domain-relevant performance. At the conclusion of the test, half of the participants were told that they performed very well on the verbal test, and the other half were told that they performed moderately on the test. This served to disentangle the affective reactions to the test from actual performance on the test. Then participants completed the short survey battery once again (Time 3; at this time participants did not complete the implicit theories scale in the interest of time), and completed a second verbal test. At the conclusion of the second verbal test, participants completed the same short survey a fourth time in addition to surveys measuring stereotyping of ingroup and outgroup members, feelings toward ingroup and outgroup members, and reparative behaviors (Time 4 survey materials can be found in Appendix F). Participants were then debriefed and dismissed. In essence, this was a 2 (group membership: high-status vs. low-status) x 2 (stereotype information: confirmed vs. nullified) x 2 (feedback: success vs. failure) design.

Measures

All measures were prefaced with a prompt instructing participants to complete each question with respect to how they felt "right now".

Self-esteem. In Study 2 the same Robins et al. (2002) self-esteem scale was used as in Study 1. For the four time points in Study 2, mean scores on the self-esteem scale were 4.45 (*SD* = .89), 4.21 (*SD* = 1.02), 4.12 (*SD* = 1.26), and 4.21 (*SD* = 1.23).

Implicit theory beliefs. The intelligence-specific implicit theory scale and the domain-general implicit theory scale were the same as the respective scales used in Study 1. Means, standard deviations, and alpha reliabilities of each of the scales can be found in Table 7.

Affect. The affect composites were the same as the scales used in Study 1. Specifically, items measuring anxiety, guilt, shame, anger, pride, and sympathy were included. Means, standard deviations, and alpha reliabilities of each of the scales can be found in Table 8.

Verbal performance. Twenty verbal items were chosen from a GRE review booklet (Robinson & Katzman, 1992) for moderate difficulty (between 20-40% of past test takers incorrectly answered each question). For the first ten verbal items, participants answered a mean of 5.10 questions correctly, with a standard deviation of 2.35. For the second set of ten verbal items, participants answered a mean of 5.88 questions correctly, with a standard deviation of 2.74.

Baseline academic performance. Participants reported their college GPA, as well as their SAT math and verbal scores. In the current sample, participants had a mean GPA of 3.27, with a standard deviation of .42. Their mean SAT math scores were 644.5, with a standard deviation of 149.74. Their mean SAT verbal scores were 610.0, with a standard deviation of 139.72.

Stereotyping. As in Study 1, stereotyping was measured using a trait attribution task, a sexist beliefs scale, and the feeling thermometers.

Trait attribution. Participants read one description of a gender ingroup target (male or female Berkeley student, depending on participant gender), one description of a gender outgroup target (again, a male or female Berkeley student, depending on participant gender), and finally, one description of a mutual outgroup target (Stanford student), in the same format as Study 1. Participants then attributed masculine and feminine traits to each target. Means, standard deviations, and alpha reliabilities of the masculine and feminine trait attributions for each ingroup and outgroup target can be found in Table 9.

Sexist beliefs. The Modern Sexism Scale (Swim et al., 1995) is the same measure of prejudicial attitudes towards women used in Study 1. In this sample, participants scored a mean of 3.59 with a standard deviation of .57, and alpha reliability on the scale was .74.

Feeling thermometers. To assess attitudes towards the ingroup and outgroup in a less concrete manner, participants reported how warm they feel towards the average male undergraduate and the average female undergraduate on a 100 point scale. As a distractor, participants also reported how warm they feel towards the average male and female

undergraduate enrolled at Stanford University, as well as other participants in the study. Means and standard deviations on the items can be found in Table 10.

Reparative actions. To assess the degree to which affective reactions influenced stated reparative actions, I asked participants to allocate resources to ingroup and outgroup members, as well as to report their willingness to participate in political action for the benefit of ingroup and outgroup members.

Resource allocation. As in Study 1, I gave participants a short vignette about the University receiving additional funding to encourage academic achievement. Participants allocated resources to female math and science students, to male liberal arts students, and distractor questions about academic advising, faculty funding, and outreach for first-generation college students. Means expressed as a percentage of total funding allocated to each category and standard deviations of each item can be found in Table 11.

Political action. A second measure of reparative action was the willingness for political action. As in Study 1, participants reported their willingness to participate in political action to improve either math and science education programs for women, or writing programs for men. Means and standard deviations of each item can be found in Table 12.

Manipulation check. As a manipulation check, participants were asked to recall the content of the articles at the beginning, and also the degree to which they were in agreement with the articles.

Results

Null findings. There were no main effects or interactions involving anger or sympathy at any time point, nor effects involving sexist beliefs, resource allocation, or the feeling thermometers at Time 4. These dependent variables will not be discussed further.

Performance effects. Controlling for participant GPA, SAT verbal section scores, and success/failure feedback (which had only a main effect on verbal performance, $F(1,54) = 4.45$, $p < .05$), there was a main effect of stereotype information, $F(1,54) = 3.78$, $p = .05$, such that participants given the stereotype confirmation performed best on the second verbal test. There were no gender, stereotype information, nor success/failure feedback effects on the first verbal test. This effect is illustrated in Figure 11.

Implicit theories. There was only a gender x stereotype x feedback three-way interaction, $F(1,59) = 8.32$, $p < .01$ in the change of intelligence-specific implicit theory beliefs (change computed as Time 4 – Time 1 within-subjects). To investigate this three-way interaction further, I analyzed low- and high-status group members separately. Among the high-status group members, there was a marginal 2-way stereotype x feedback interaction, $F(1,36) = 3.24$, $p = .08$, such that high-status group members were more likely to change their intelligence-specific beliefs in the direction of more stability when the stereotype is confirmed and they had been given failure feedback on the verbal exam. This 2-way interaction is illustrated in Figure 12. Among the low-status group members, there was a 2-way stereotype x feedback interaction, such that low-status group members were more likely to change their intelligence-specific beliefs in the direction of *less* stability when the stereotype is confirmed and they had been given failure

feedback on the verbal exam. This interaction on intelligence-specific implicit theory change is illustrated graphically in Figure 13.

In terms of domain-general implicit theories, there was only a marginal three-way gender x stereotype x feedback interaction, $F(1,59) = 3.28$, $p = .07$. To investigate this three-way interaction further, I analyzed low- and high-status group members separately. Among the high-status group members, there was a main effect of stereotype, $F(1,37) = 4.07$, $p = .05$, qualified by a marginal 2-way stereotype x feedback interaction, $F(1,37) = 3.73$, $p = .06$, such that high-status group members were more likely to change their domain-general beliefs (change computed as Time 4 – Time 1 within-subjects) in the direction of more stability when the stereotype was confirmed and they have been given failure feedback on the verbal exam. This 2-way interaction is illustrated in Figure 14. There were no significant effects among the low-status group members.

Self-esteem. There was only a main effect of feedback, $F(1,70) = 16.50$, $p < .001$, such that participants who received success feedback about their verbal exam reported higher self-esteem (Time 3 – Time 1 within-subjects).

Pride. There was only a main effect of feedback, $F(1,68) = 14.53$, $p < .001$, such that participants who received success feedback about their verbal exam reported more pride (Time 3 – Time 1 within-subjects).

Guilt and shame. In terms of guilt, there was a main effect of gender, $F(1,65) = 13.24$, $p < .001$, qualified by a marginal gender x stereotype x feedback interaction, $F(1,65) = 2.94$, $p = .09$. To investigate this three-way interaction further, I analyzed low- and high-status group members separately. For low-status group members, there was a marginal stereotype x feedback interaction, $F(1,22) = 3.26$, $p = .08$ such that low-status group members felt more guilty (change computed as Time 3 – Time 1 within-subjects) when the stereotype was confirmed, and they were given positive feedback. This interaction on guilt change is illustrated graphically in Figure 15. For the high-status group members there were no main effects or interactions involving stereotype information or feedback.

In terms of shame, controlling for success/failure feedback (which did not have an effect on shame, $F < 2$), there was a main effect of gender $F(1,65) = 8.54$, $p < .01$, a marginal main effect of stereotype information, $F(1,65) = 2.83$, $p < .10$, both qualified by a marginal gender x stereotype interaction, $F(1,65) = 3.55$, $p < .06$, such that high-status group members felt less ashamed (change computed as Time 3 – Time 1 within-subjects) in the stereotype nullified condition. This interaction on shame change is illustrated graphically in Figure 16.

Stereotyping. For the ascription of feminine traits to the male ingroup student target, controlling for success/failure feedback (which did not have an effect on stereotyping, $F < 1$), there was only a gender x stereotype interaction, $F(1,65) = 4.00$, $p < .05$, such that high-status group members in the stereotype nullified condition were least likely to ascribe stereotypically female traits to the male target. This interaction on stereotyping is illustrated graphically in Figure 17. There were no gender, stereotype, nor success/failure effects on the ascription of stereotypically female traits to the female ingroup target or the outgroup target, and there were no gender, stereotype, or success/failure effects on the ascription of stereotypically male traits to any targets.

Political action. There were no gender, stereotype, nor success/failure effects on participants' desire to engage in any sort of political action for programs to increase math performance in the student body. For programs designed to increase verbal performance, there was a marginal three-way gender x stereotype x feedback interaction, $F(1,64) = 3.62$, $p = .06$. To decompose this interaction, I analyzed low- and high-status group members separately. For high-status group members, there was a main effect of stereotype, $F(1,42) = 5.71$, $p < .05$, qualified by a stereotype x feedback interaction, $F(1,42) = 2.89$, $p = .10$, such that high-status group members in the stereotype confirmed condition who have been given failure feedback on the verbal test were least willing to write a letter in support of increased funding for verbal programs. Among the low-status group members, there were no significant main effects or interactions. This interaction on willingness to write a letter in support of math programs is illustrated graphically in Figure 18.

This effect is broadly similar across the other verbal-related political action items. For desire to protest for increased verbal education, there was a trend gender x stereotype x feedback interaction, $F(1,66) = 2.59$, $p = .11$. To decompose this interaction, I analyzed low- and high-status group members separately. For high-status group members, there was a main effect of stereotype, $F(1,42) = 9.85$, $p < .01$, qualified by a stereotype x feedback interaction, $F(1,42) = 9.53$, $p < .01$, such that high-status group members in the stereotype confirmed condition who have been given failure feedback on the verbal test were least willing to protest for increased verbal education. Among the low-status group members, there were no significant main effects or interactions. This interaction on willingness to protest for increased verbal education is illustrated graphically in Figure 19. For desire to volunteer at a verbal tutoring center, there was a main effect of stereotype information, $F(1,66) = 4.26$, $p < .05$, qualified by a marginal gender x stereotype interaction, $F(1,66) = 2.76$, $p = .10$, such that high-status group members when the stereotype was confirmed were most willing to volunteer at a verbal tutoring center. This interaction on willingness to volunteer at a verbal tutoring center is illustrated graphically in Figure 20.

Interactive properties of the various dependent variables. Because there were many dependent variables moderated by participant gender, stereotype prime, and success, it might be informative to investigate the various interrelationships of the dependent variables. In particular, controlling for SAT-verbal scores and GPA, performance on the second verbal test predicted changes on the intelligence-specific implicit theories measure at the end of the experiment, $F(1,43) = 2.91$, $p < .10$, such that participants who performed well on the verbal test tended to shift their implicit theories in a more stable direction. Furthermore, changes in belief in implicit theories in a more stable direction were related to increased guilt, $r(59) = .23$, $p = .08$, and shame, $r(59) = .24$, $p = .06$.

Changes in implicit theories were related at a trend level to the ascription of counter-stereotypical traits to a gender-outgroup target by high-status group members, $r(37) = .24$, $p = .14$, such that high-status group members whose implicit theory beliefs had become more change-based were less likely to rate the gender-outgroup target in counterstereotypical ways. Ascription of counterstereotypical traits was also related to changes in guilt, $r(37) = .29$, $p < .05$, and changes in shame $r(37) = -.34$, $p < .05$, such that high-status group members who felt more guilt were more likely to ascribe counterstereotypical traits to the gender-outgroup target, and high-status group members who felt more ashamed were less likely to ascribe

counterstereotypical traits to the gender-outgroup target. Changes in guilt positively predicted the desire to engage in reparative political action, specifically, the desire to volunteer at a verbal tutoring center, for only high-status participants, $r(41) = .26$, $p = .09$, but was not related to changes in shame, $r(41) = .09$, *ns,* nor to change in implicit theories (all $|r| < .10$, *ns*).

Discussion

In Study 2, there was evidence for the interactive effects of group membership, stereotype information, and success/failure feedback. Participants reacted differently depending on whether they were given success or failure feedback. High-status group members were more likely to "lock in" their high status by changing their implicit theory beliefs in a more fixed direction after failure, and low-status group members were more likely to change their implicit theory beliefs in a more malleable direction after failure. This change was different from Study 1 results, in which high-status group members tended to change their beliefs in a more fixed direction regardless of feedback, and low-status group members tended to change their beliefs in a more malleable direction regardless of feedback; nevertheless, Study 2 findings were in line with the group status dependent performance improvements after an experimental implicit theory belief manipulation (Mendoza-Denton et al., 2008). This suggests that participants, after failure, changed their implicit theory belief in a direction that would be most likely to be protective of subsequent performance. Contrary to Study 1, all participants given the stereotype information performed better on the second test. It is possible that the second test was easier than the first test, such that the main effect of test overwhelmed any stereotype x group membership interactions. Consistent with predictions, feelings of guilt after reading about the ingroup's high status were related to individual differences in change in implicit theory belief from baseline.

Extending Study 1, increases in guilt among situationally high-status group members were related to a desire to support reparative political action to the situationally low-status group, in this case, to volunteer time at a verbal tutoring center. The situational specificity was further strengthened by the lack of desire to support verbal programs in Study 1, where the low-status group did not suffer a performance deficit, and the lack of desire to support math programs in Study 2, where the low-status group also did not suffer a performance deficit. This effect suggests that support for domains in which the low-status group performed poorly may be a genuine reparative act specific to the low-status group and not merely support for societally-valued domains in general. Consistent with existing research on self-conscious emotions (e.g. Schmader & Lickel, 2006), shame was again not related to the desire for reparative action.

The increase in the belief that attributes are changeable was associated with a tendency to stereotype the outgroup (perceive them with fewer counterstereotypic traits) among the high-status group members, analogous to the tendency to stereotype the ingroup (perceive them with more stereotypic traits) among low-status group members in Study 1. The current findings provided experimental confirmation for the theorized ironic negative consequences of a malleable implicit theory intervention. Increases in prejudice against the low-status group might be related to the notion that stigmatized group members are more responsible for their plight if attributes are changeable (e.g. Crandall, 1994; Crocker, Cornwell, & Major, 1993; Hegarty, 2002). Interestingly, stereotypical trait attributions only extended to the relevant low-status group, but not to either the high-status group or the mutual outgroup. Consistent with the notion that shame leads to increases in stereotyping (e.g. Pattison, 2000), this attribution of stereotypical traits to the low-status group was positively related to shame, but negatively related to guilt.

As in Study 1, there were several emotions that were not related to outcomes primarily because they were not systematically related to our manipulation. Anger, pride and sympathy were not related to the presentation of stereotype information. The lack of findings in the feeling thermometers was also unsurprising due to the domain generality of the measure. Again, modern sexism might be a more trait-like dimension that was unlikely to be changed by the manipulation. Replication of these null effects in both Studies 1 and 2, however, suggests that these constructs might not be related to the notion that stereotype information has different consequences depending on the situational status of the recipient of the information.

General Discussion

In the last decade there have been several lines of research on interventions designed to reduce the persistent gender and ethnic gaps in academic performance. Particularly, manipulations of implicit theories (Aronson et al., 2001; Good et al., 2003) and the veracity of prevalent social stereotypes (Dar-Nimrod et al., 2006) have been shown to be effective in reducing the status-based gap in academic performance. Results of the current research demonstrated that there might be affective and behavioral consequences related to interventions that might be less desired. Consistent with previous research (Mendoza-Denton et al., 2008), both studies in this dissertation showed that the application of a social stereotype nullification intervention to high-status group members resulted in decreased performance in the relevant domain, controlling for individual differences in baseline performance. This may be emerging evidence that interventions to reduce status-based gaps in academic performance may function by both eliminating the stereotype threat effect in lower status group members, and the stereotype lift effect in higher status group members.

Co-occuring with the decreased performance of high-status group members were other emotional and cognitive effects. If the high-status group member received information that the achievement stereotype is untrue, and that there was no intergroup performance difference, then there was no harm committed by the high-status group. The lack of harm freed high-status group members from having to feel guilty about their status, and would negate the need for any reparative actions. Furthermore, if the intergroup performance difference had already been overcome, that would not only imply that the difference might be more malleable than previously theorized, but also that those who continued to demonstrate low performance must be doing so voluntarily. Therefore, it stands to conclude that low-status group members might be less in need of aid and more deserving of prejudice.

Affective consequences of stereotype information

In contrast to the performance consequences of interventions, the affective consequences of stereotype-nullifying interventions were less well understood. To my knowledge, the emotional correlates of being exposed to favorable stereotypes have not been systematically studied. Results of this research suggest that in a conventional stereotype condition, low performance by the stereotypically high performance group led to increases in feelings of guilt, which ironically is related to increases in willingness to engage in pro-outgroup political action to repair past injustices. Increases in feelings of shame, however, led high-status group members to increase ingroup preference in resource allocation. Although people have difficulty distinguishing between shame and guilt in the abstract (e.g. Tangney, Wagner, & Gramzow, 1992), and shame and guilt were correlated in the samples in this dissertation, changes in shame

and changes in guilt had different consequences both in the literature (e.g. Lickel et al., 2005) and in this dissertation.

Cognitive consequences of stereotype information

Aside from the effects of stereotype information-based interventions on the high-status group members, implicit theory change may also have implications for person perception and cognition. In the current research, participants who changed their implicit theory beliefs in the direction of incrementalism were then more likely to attribute more stereotypical traits to others. If attributes and statuses are more malleable than typically expected, low-status group members might be seen as less worthy of help, and could be viewed in more stereotypical ways (e.g. Crandall, 1994; Crocker, Cornwell, & Major, 1993; Hegarty, 2002). In other words, if people are capable of self-initiated change, status-linked low performance might be perceived as a choice on the part of the low-status group member. If true, this may help explain why some low-status group members who were beneficiaries of interventions would express prejudice against ingroup members. A fruitful expansion of research could focus on the relationships between interventions, performance, and expressions of ingroup-directed prejudice.

Limitations

One limitation of this research was the inconsistent effect of feedback information on affect and performance. In Study 1, there were no effects of success/failure feedback on any of the dependent variables. It could be possible that group status and stereotypes were stable constructs and unrelated to success or failure in a particular situation. However, the significant feedback effects in Study 2 in interaction with situational status and stereotype information suggests that participants had fewer intuitions about their performance on verbal tests, and therefore were more affected by the feedback. Note however that pilot data for Study 2 revealed that the differences between men's and women's math performance were perceived to be greater than the differences between men's and women's verbal performance. One possible explanation for the findings, then, would be that the interactive effects of status, stereotype information, and feedback vary as a function of the strength of the preexisting stereotype. Future studies should disentangle the two possibilities by manipulating performance and stereotypes in a novel domain with which participants have little experience.

Unfortunately, the current research does not allow for differentiation of the antecedents of guilt and shame; while guilt and shame were related to changes in cognitions of implicit theory, there were no meditational relationships. Researchers of self-conscious emotions (e.g. Tangney & Dearing, 2002) suggest that a key antecedent of guilt that is unshared with shame may be the degree to which one feels personal responsibility for a particular outcome. Future research should focus on identifying other candidate cognitive antecedents to guilt and shame, and particularly the degree to which participants feel personal responsibility for social injustice and intergroup differences in performance.

Concluding thoughts

Taken as a whole, the results of this research illustrated the unintended negative consequences of possible interventions to reduce social injustice. Typical interventions designed to reduce the effects of pernicious stereotypes on low-status group members might be

detrimental to high-status group members' performance. Perhaps to maximize societal gain, interventions should be tailored to each individual group, so that low status group members can benefit from the boost of invalidating stereotypes, and that high status group members can keep the performance boost of having locked in a favorable stereotype. Furthermore, information about the stereotype being false might disrupt the guilt-reparations pathway in high-status group members. Historically, any peaceful action towards restorative justice must be enacted by the high-status group relinquishing some of its power. If interventions to eliminate stereotype threat effects also reduced the guilt among high-status group members, they might be unwilling then to support policies that would further reduce the societal barriers to equal achievement. This may be another way where the application of an intervention designed for low-status group members without regard to the recipient's social status might have negative consequences. Future research should attempt to ascertain whether these unintended negatives consequences extend to non-academic domains outside of a student population. It would also be interesting to see if the theoretical differences in support for reparative policies translate to real-world political actions.

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Table 1

Descriptive statistics for the domain-general and intelligence-specific implicit theories scales in
Study 1.

	Domain-general		Intelligence-specific	
	M (SD)	*α*	*M (SD)*	*α*
Time 1	4.48 (1.27)	.93	4.94 (1.26)	.95
Time 2	4.44 (1.30)	.92	4.79 (1.20)	.94
Time 3	Omitted	Omitted	Omitted	Omitted
Time 4	4.49 (1.30)	.95	4.63 (1.31)	.96

Table 2

Descriptive statistics for affective reactions in Study 1.

		Time 1	Time 2	Time 3	Time 4
Anxious:	*M (SD)*	1.89 (.95)	1.76 (.97)	1.88 (1.04)	1.71 (.94)
Guilt:	*M (SD)*	1.66 (.46)	1.55 (.48)	1.58 (.50)	1.45 (.37)
	α	.66	.76	.75	.72
Shame:	*M (SD)*	1.12 (.32)	1.16 (.33)	1.46 (.81)	1.26 (.51)
	α	.84	.76	.95	.90
Anger:	*M (SD)*	1.24 (.42)	1.22 (.33)	1.46 (.63)	1.26 (.40)
	α	.89	.78	.88	.81
Pride:	*M (SD)*	2.94 (.81)	2.85 (.95)	2.82 (1.05)	2.63 (.96)
	α	.74	.80	.82	.82
Sympathy:	*M (SD)*	2.50 (1.16)	2.35 (1.19)	2.13 (1.15)	2.03 (1.09)
	α	.85	.90	.85	.86

Table 3

Descriptive statistics for masculine and feminine trait ratings of the target persons in Study 1.

	Masculine composite		Feminine composite	
	M (SD)	α	*M (SD)*	α
Male Berkeley student	4.19 (.97)	.60	5.28 (1.08)	.74
Female Berkeley student	4.39 (1.14)	.65	4.55 (1.05)	.68
Stanford Student	4.83 (1.39)	.65	4.58 (1.24)	.75

Table 4

Descriptive statistics for the feeling thermometer in Study 1.

Feeling towards:	*M (SD)*
Male Berkeley students	67.01 (17.14)
Female Berkeley students	71.44 (14.02)
Male Stanford students	48.31 (21.54)
Female Stanford students	52.07 (19.73)
Other participants in the study	64.74 (18.58)

Table 5

Descriptive statistics for the University funding resource allocation task in Study 1.

	M (SD)
Male liberal arts students	8.40 (7.68)
Female math and science students	12.00 (9.67)
First-generation college students	19.30 (13.14)
Faculty funding	35.35 (16.68)
Advising	24.95 (13.94)

Table 6

Descriptive statistics for the political action task in Study 1.

		M (SD)
Math-related political action	Write a letter in support for more funding	2.94 (1.41)
	Volunteering at the tutoring center	3.44 (1.53)
	Donate money to an outreach program	2.64 (1.47)
	Go to an on-campus protest for more funding	2.51 (1.49)
Writing-related political action	Write a letter in support for more funding	3.08 (1.38)
	Volunteering at the tutoring center	3.32 (1.52)
	Donate money to an outreach program	2.79 (1.45)
	Go to an on-campus protest for more funding	2.55 (1.44)

Table 7

Descriptive statistics for the domain-general and intelligence-specific implicit theories scales in Study 2.

	Domain-general		Intelligence-specific	
	M (SD)	*α*	*M (SD)*	*α*
Time 1	4.55 (1.02)	.90	4.71 (1.15)	.92
Time 2	4.66 (1.15)	.95	4.68 (1.24)	.95
Time 3	Omitted	Omitted	Omitted	Omitted
Time 4	4.57 (1.18)	.94	4.48 (1.24)	.96

Table 8

Descriptive statistics for affective reactions in Study 2.

		Time 1	Time 2	Time 3	Time 4
Anxious:	*M (SD)*	2.19 (1.00)	1.96 (.93)	1.97 (1.12)	1.82 (1.00)
Guilt:	*M (SD)*	1.84 (.61)	1.64 (.53)	1.71 (.65)	1.65 (.63)
	α	.74	.80	.80	.79
Shame:	*M (SD)*	1.19 (.41)	1.26 (.51)	1.68 (.86)	1.47 (.73)
	α	.86	.88	.92	.94
Anger:	*M (SD)*	1.28 (.49)	1.31 (.53)	1.53 (.70)	1.48 (.72)
	α	.88	.91	.90	.93
Pride:	*M (SD)*	2.88 (1.00)	2.73 (1.02)	2.48 (1.07)	2.47 (1.09)
	α	.85	.84	.87	.88
Sympathy:	*M (SD)*	2.39 (1.18)	2.16 (1.09)	2.07 (1.10)	1.95 (1.01)
	α	.84	.78	.87	.73

Table 9

Descriptive statistics for masculine and feminine trait ratings of the target persons in Study 2.

	Masculine composite		Feminine composite	
	M (SD)	*α*	*M (SD)*	*α*
Male Berkeley student	4.29 (1.23)	.76	5.19 (1.39)	.83
Female Berkeley student	4.33 (1.35)	.74	4.70 (1.37)	.81
Stanford Student	4.86 (1.50)	.72	4.55 (1.21)	.69

Table 10

Descriptive statistics for the feeling thermometer in Study 2.

Feeling towards:	*M (SD)*
Male Berkeley students	65.35 (18.64)
Female Berkeley students	67.37 (19.50)
Male Stanford students	49.43 (23.50)
Female Stanford students	52.69 (22.39)
Other participants in the study	59.32 (18.29)

Table 11

Descriptive statistics for the University funding resource allocation task in Study 2.

	M (SD)
Male liberal arts students	7.97 (7.41)
Female math and science students	11.03 (9.51)
First-generation college students	17.32 (14.17)
Faculty funding	37.23 (23.17)
Advising	26.45 (14.51)

Table 12

Descriptive statistics for the political action task in Study 2.

		M (SD)
Math-related political action	Write a letter in support for more funding	2.88 (1.55)
	Volunteering at the tutoring center	3.20 (1.69)
	Donate money to an outreach program	2.70 (1.43)
	Go to an on-campus protest for more funding	2.48 (1.43)
Writing-related political action	Write a letter in support for more funding	3.22 (1.52)
	Volunteering at the tutoring center	3.21 (1.63)
	Donate money to an outreach program	2.87 (1.46)
	Go to an on-campus protest for more funding	2.57 (1.44)

Figure 1

Replication of Stereotype Threat performance effects in the second math test in Study 1.
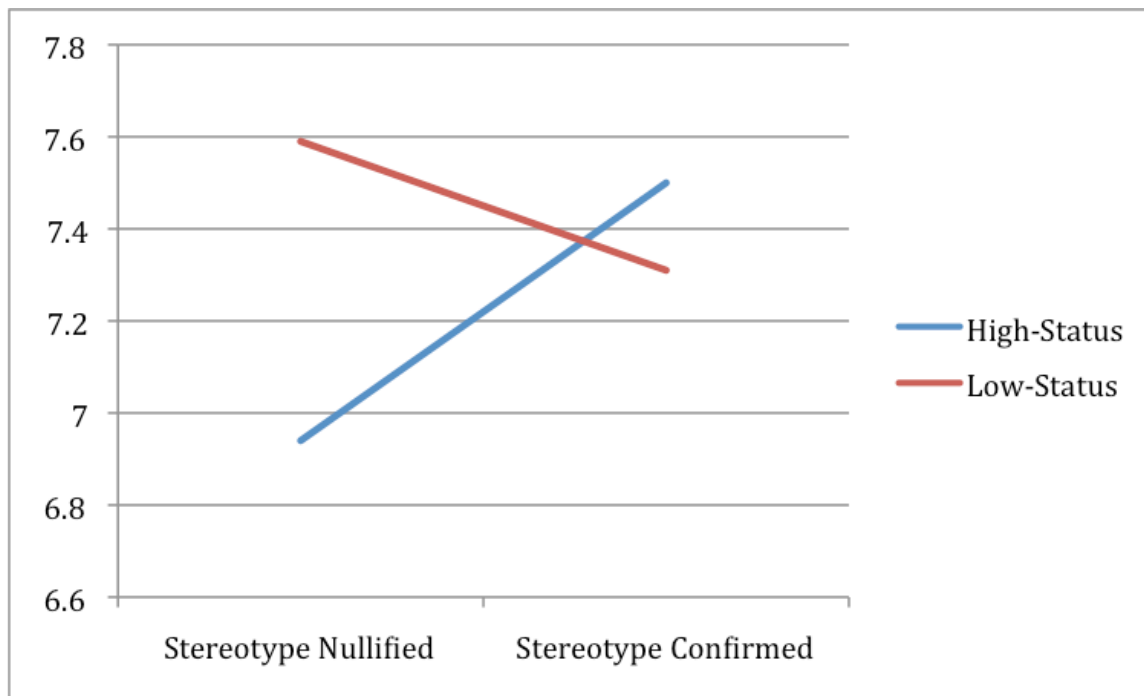
Figure 2

Intelligence-specific implicit theory change between Time 1 and Time 4 in Study 1.
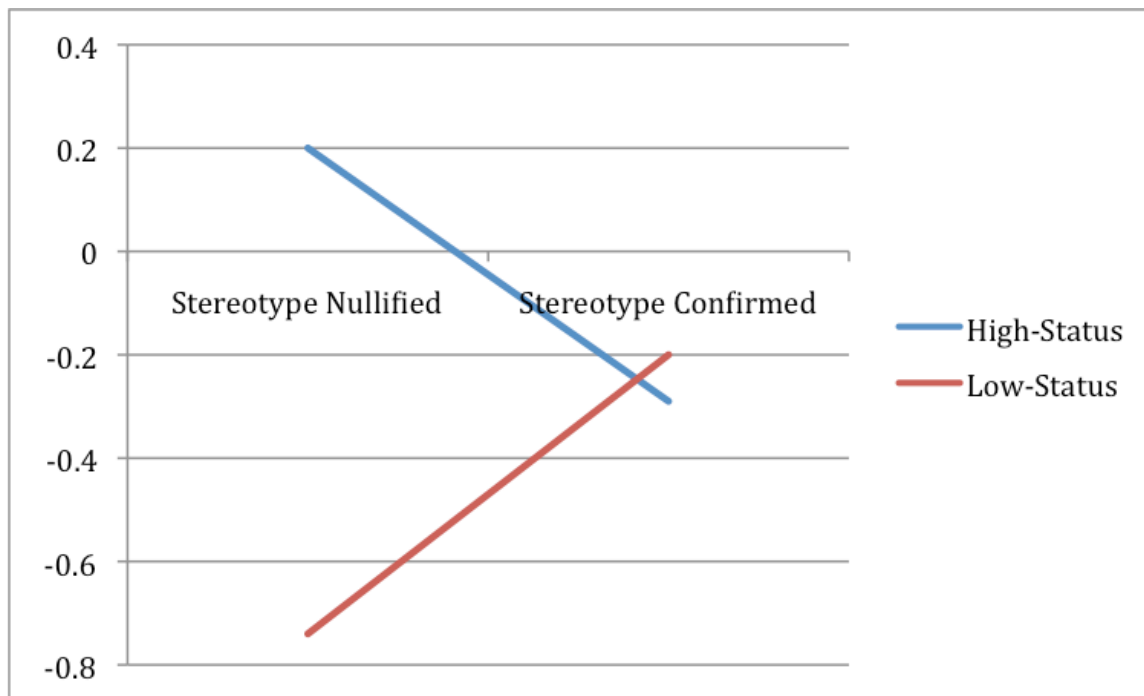
Figure 3

Domain-general implicit theory change between Time 1 and Time 4 in Study 1.
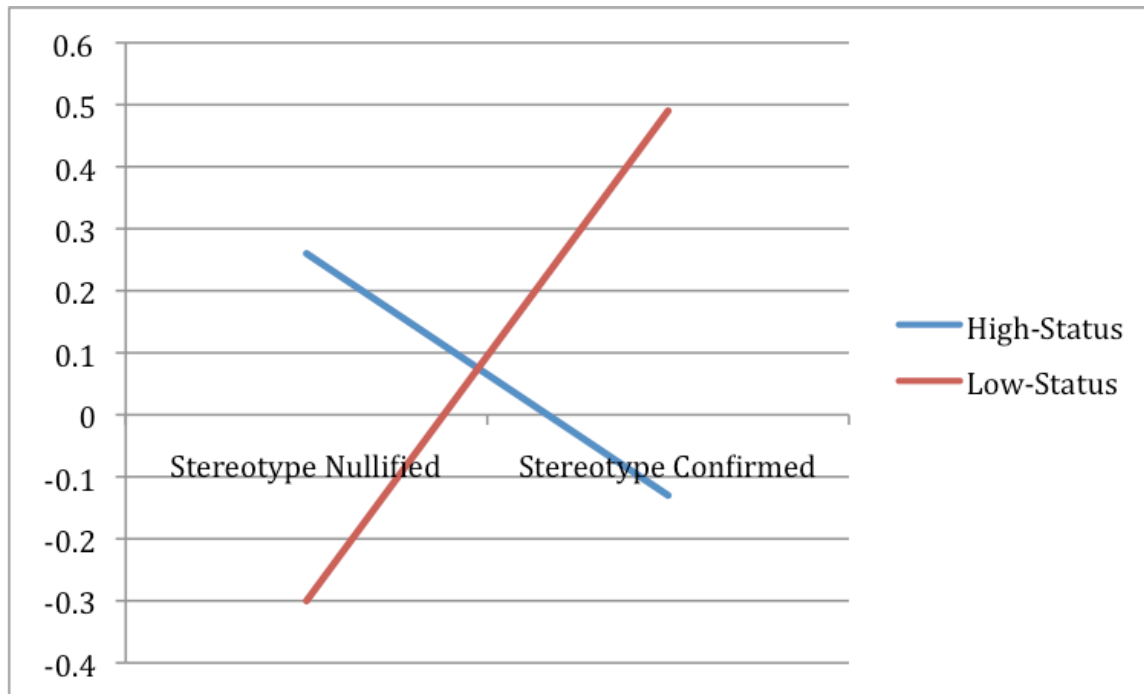
Figure 4

Guilt composite change between Time 1 and Time 3 in Study 1.

Figure 5

Shame composite change between Time 1 and Time 3 in Study 1.
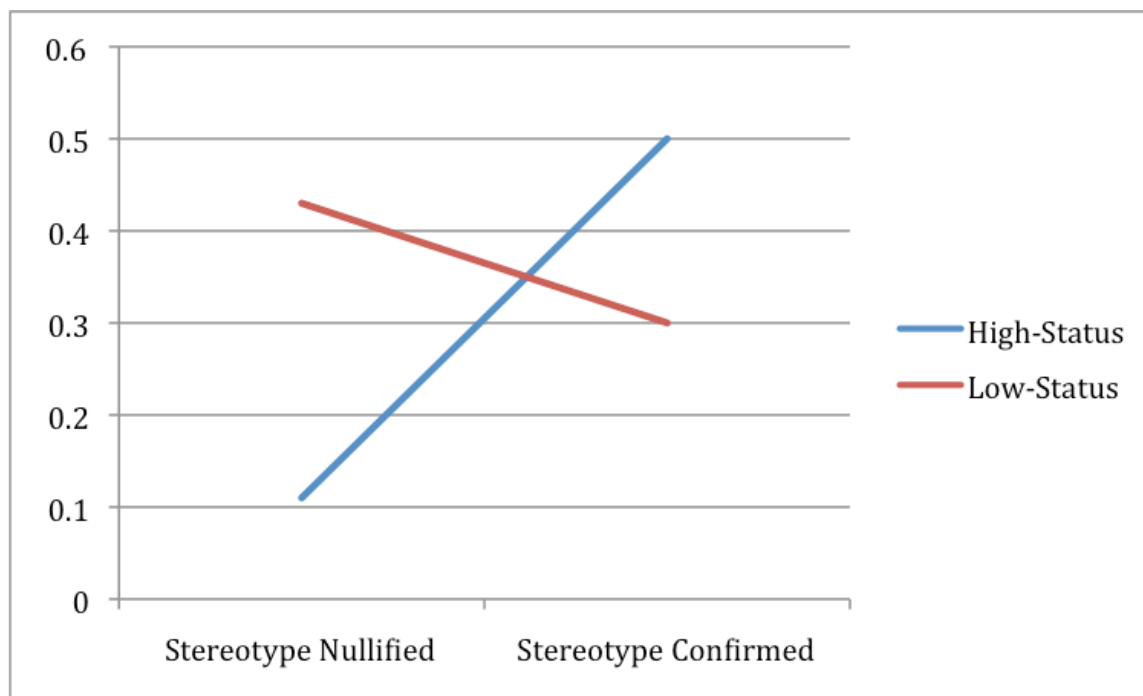
Figure 6

Ascription of stereotypically female traits to the female target in Study 1.
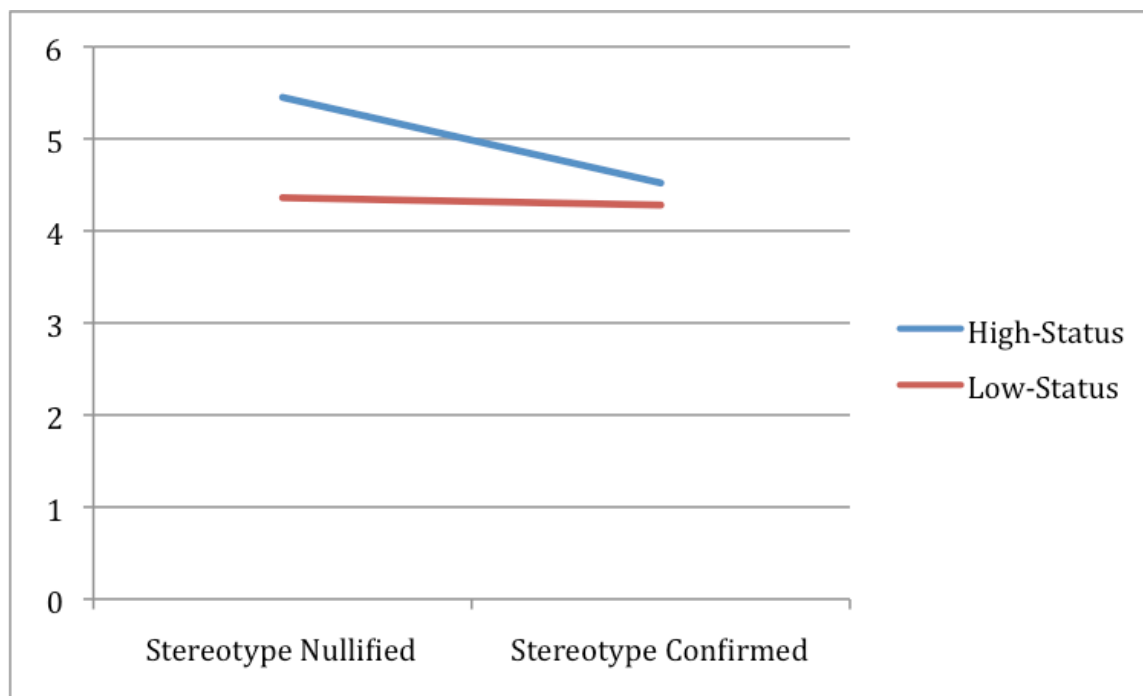
Figure 7

Allocation of funding to programs designed to improve men's performance in liberal arts majors in Study 1.
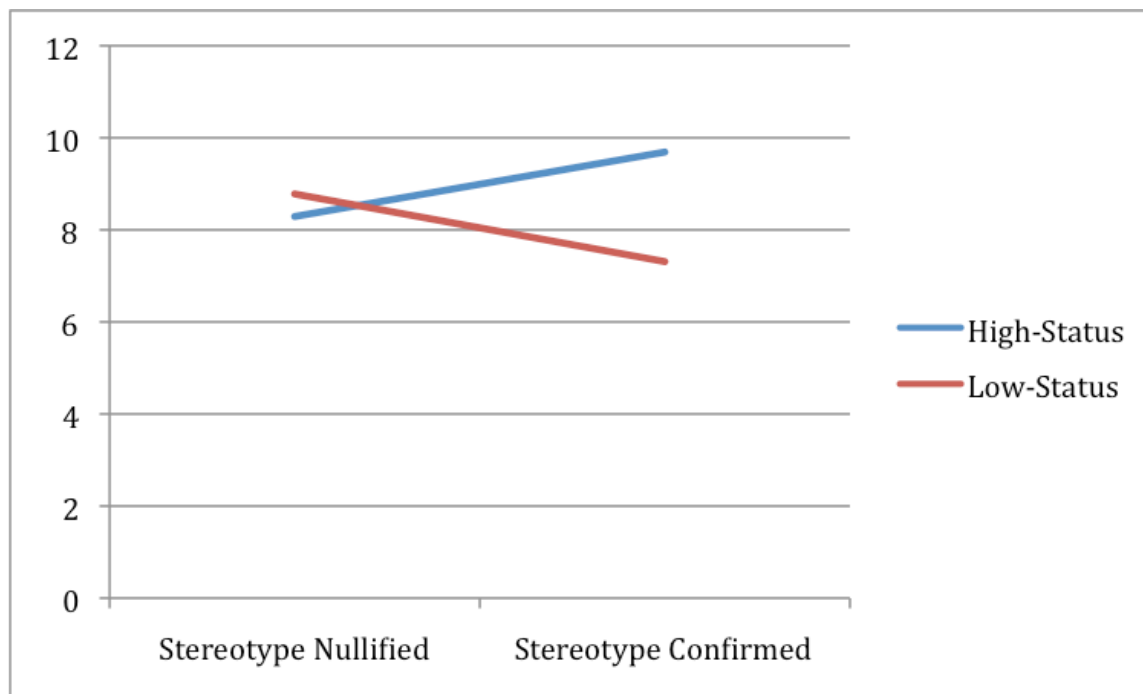
Figure 8

Willingness to write a letter in support of math programs in Study 1.
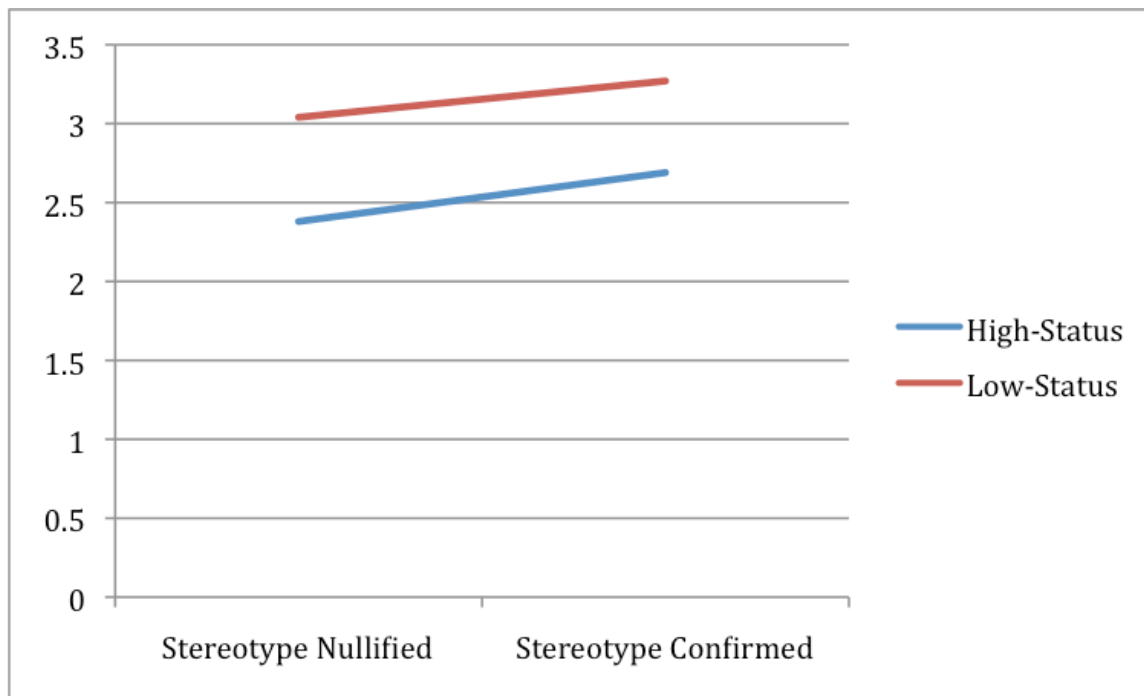
Figure 9

Willingness to volunteer at a math tutoring center in Study 1.
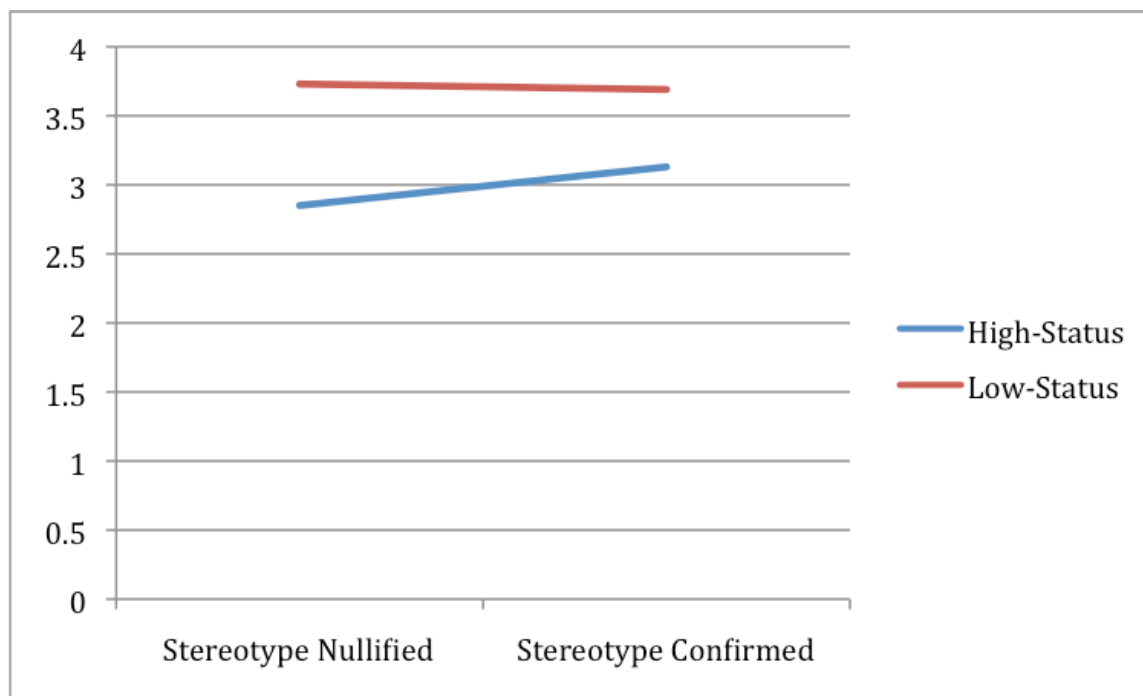
Figure 10

Willingness to donate money to a math education program in Study 1.
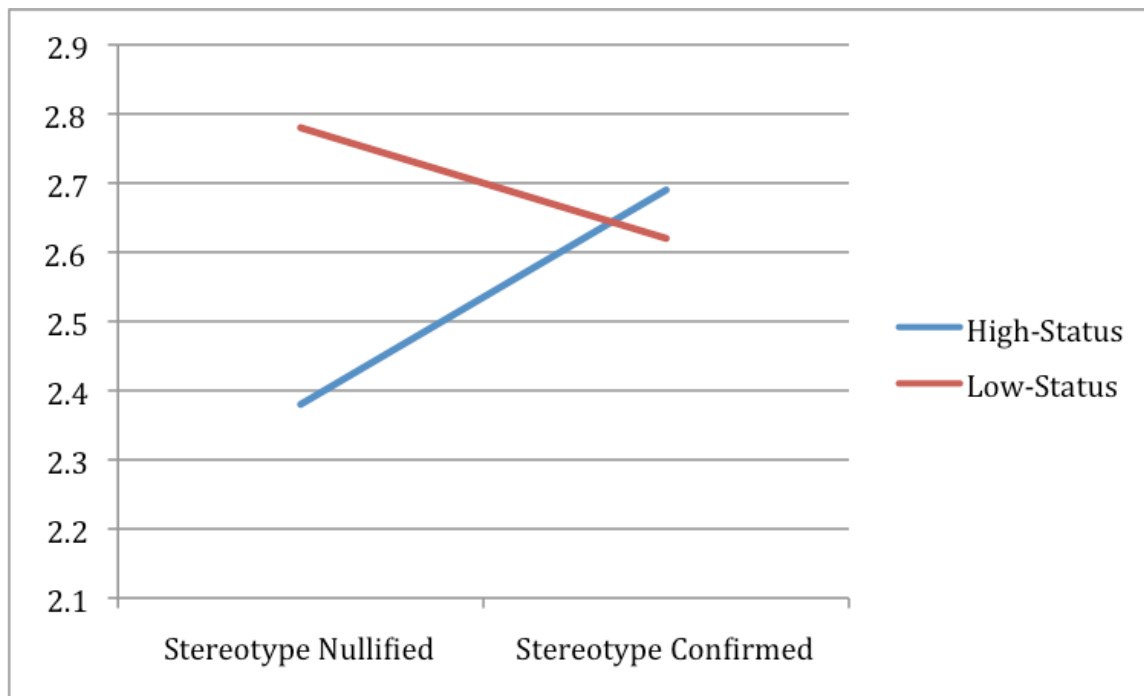
Figure 11

Replication of Stereotype Threat performance effects in the second verbal test in Study 2.
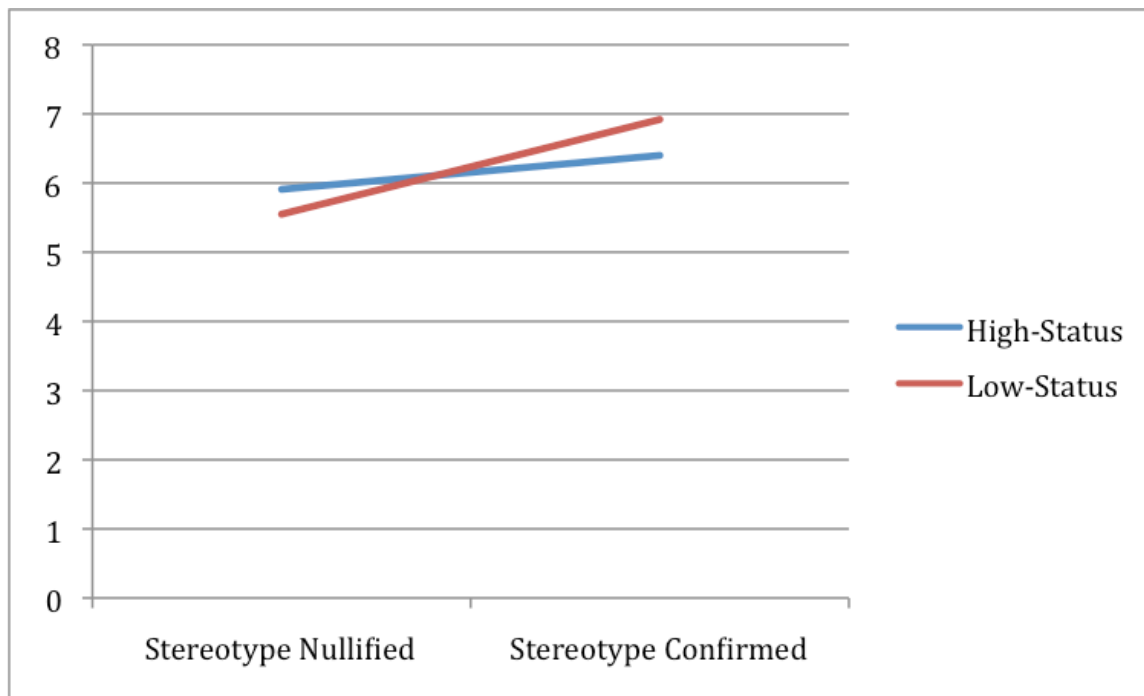
Figure 12

Intelligence-specific implicit theory change between Time 1 and Time 4 among high-status participants in Study 2.
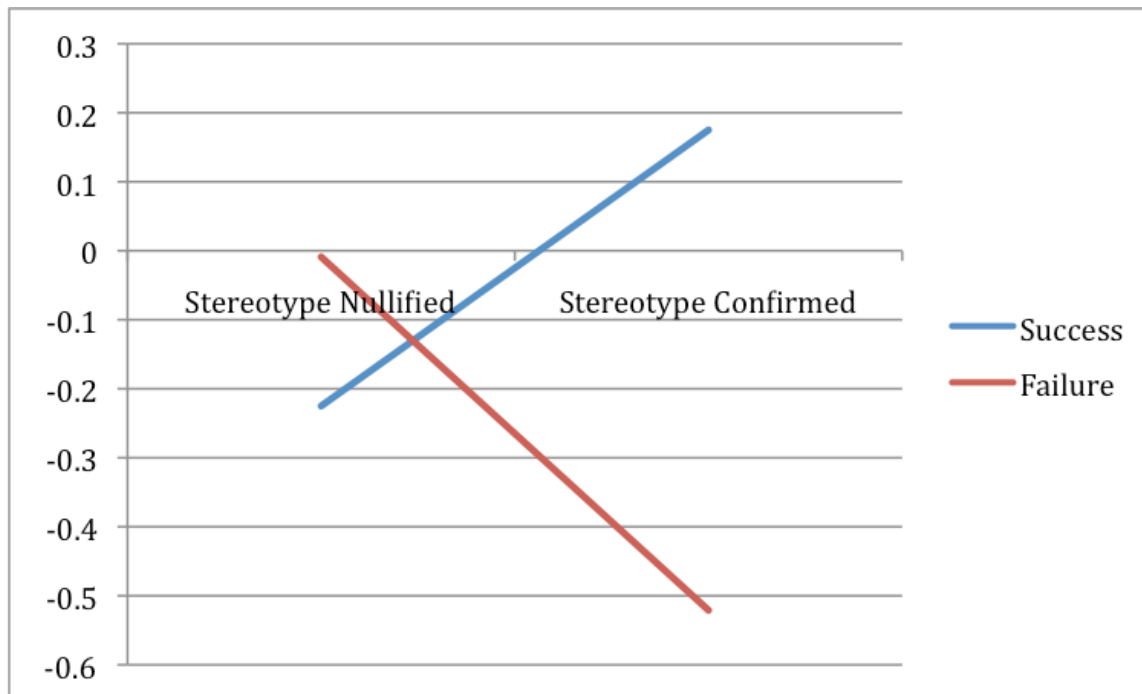
Figure 13

Intelligence-specific implicit theory change between Time 1 and Time 4 among low-status participants in Study 2.
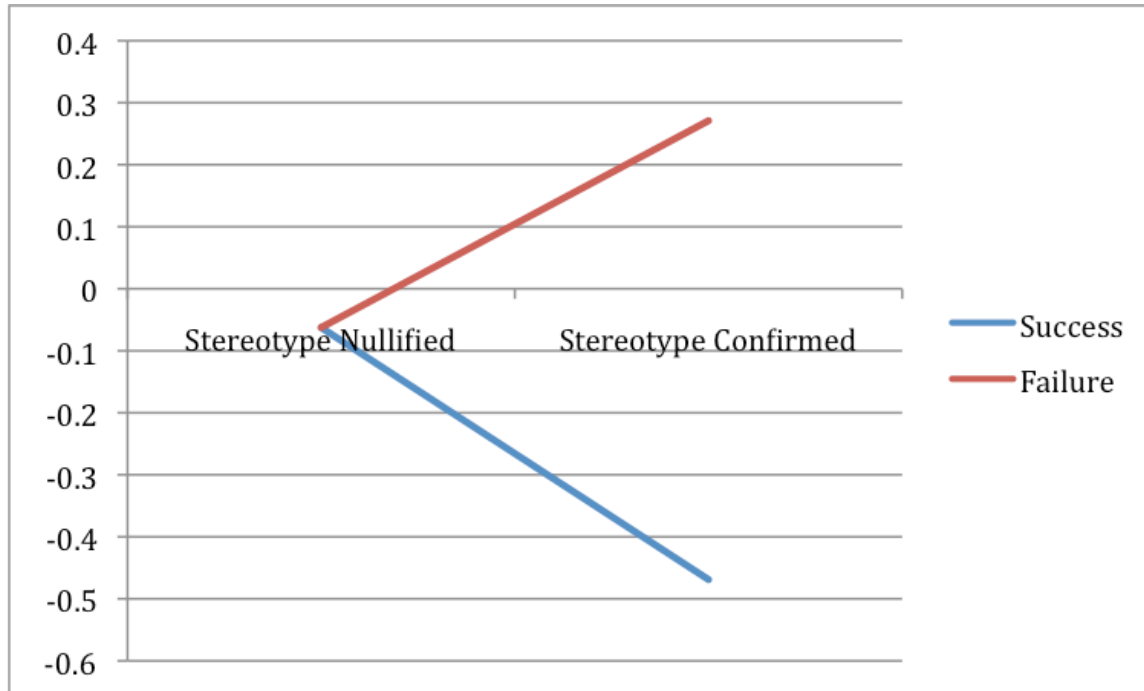
Figure 14

Domain-general implicit theory change between Time 1 and Time 4 among high-status participants in Study 2.
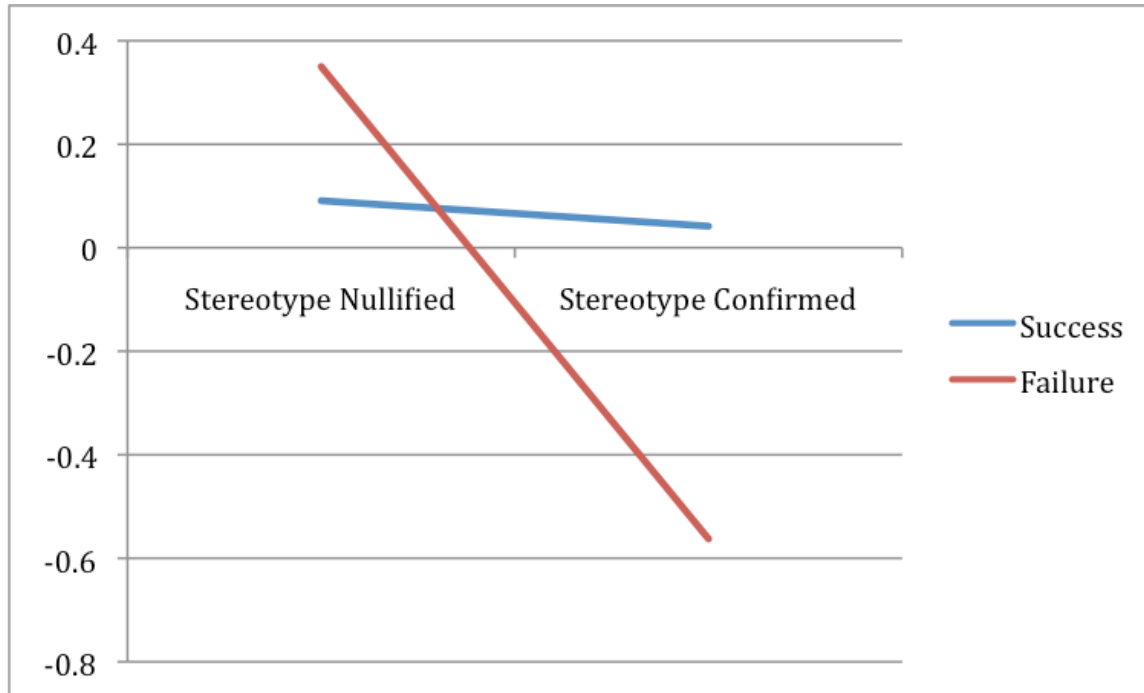
Figure 15

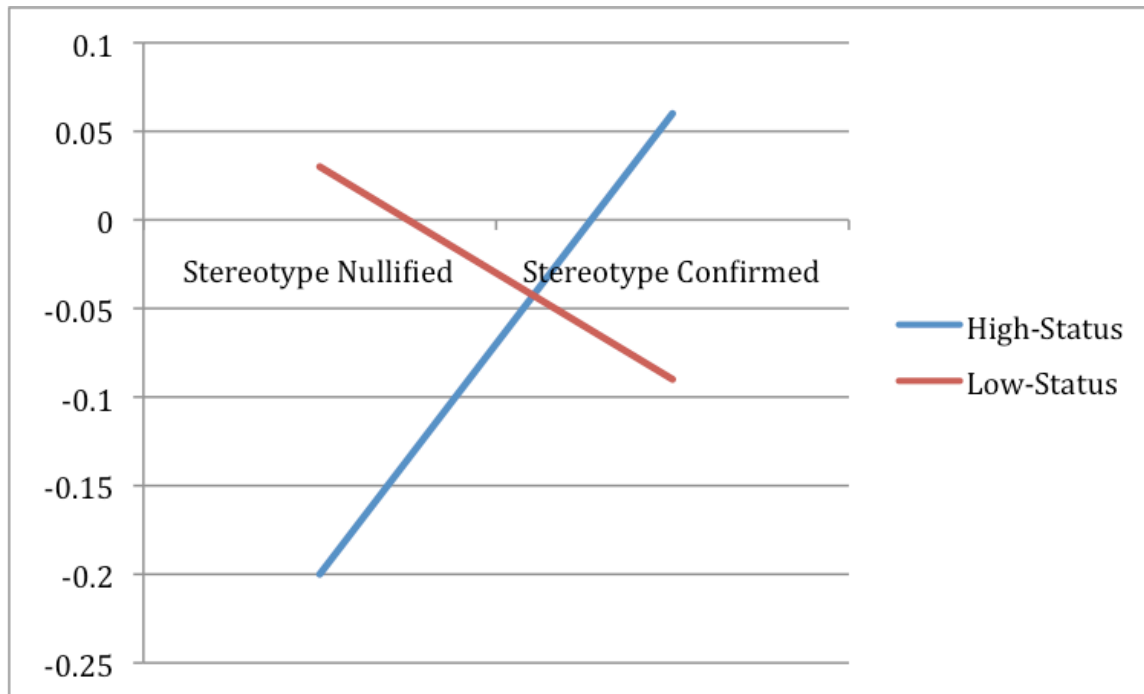Guilt composite change between Time 1 and Time 3 among low-status participants in Study 2.
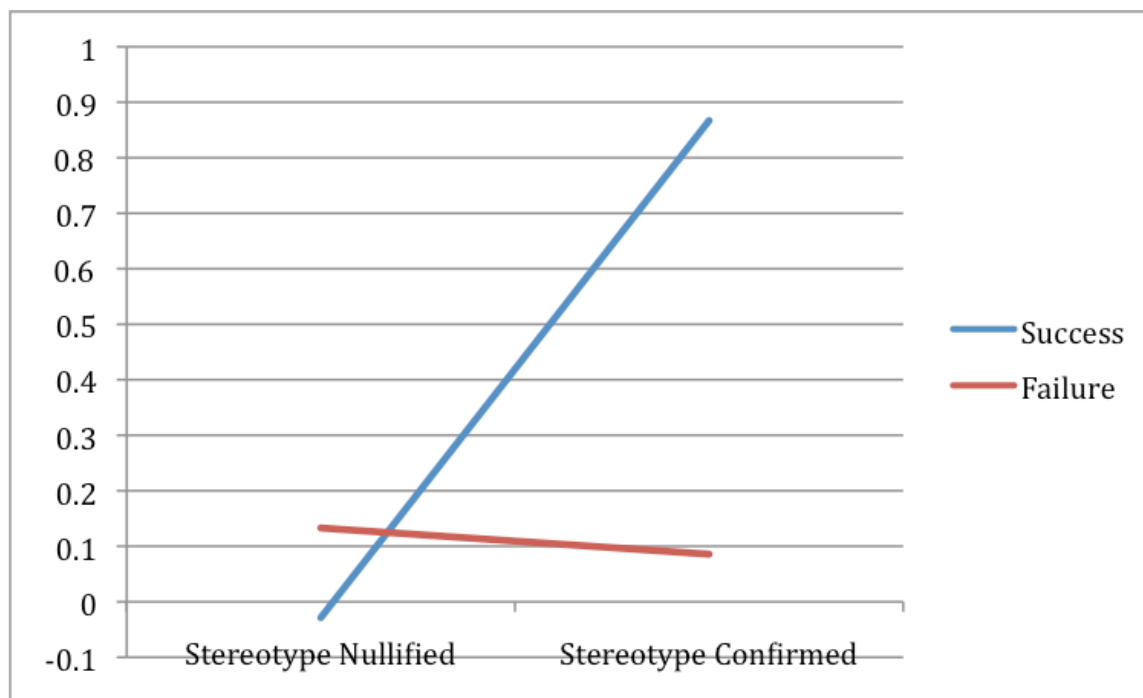
Figure 16

Shame composite change between Time 1 and Time 3 in Study 2.
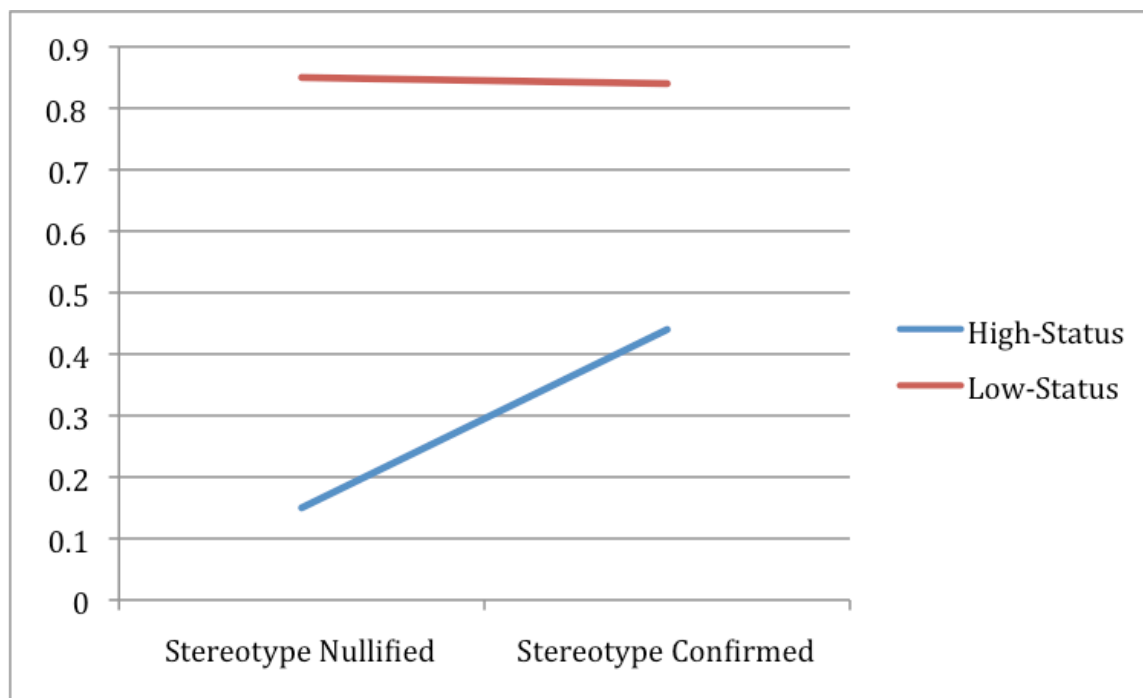
Figure 17

Ascription of counterstereotypical traits to the low-status target in Study 2.
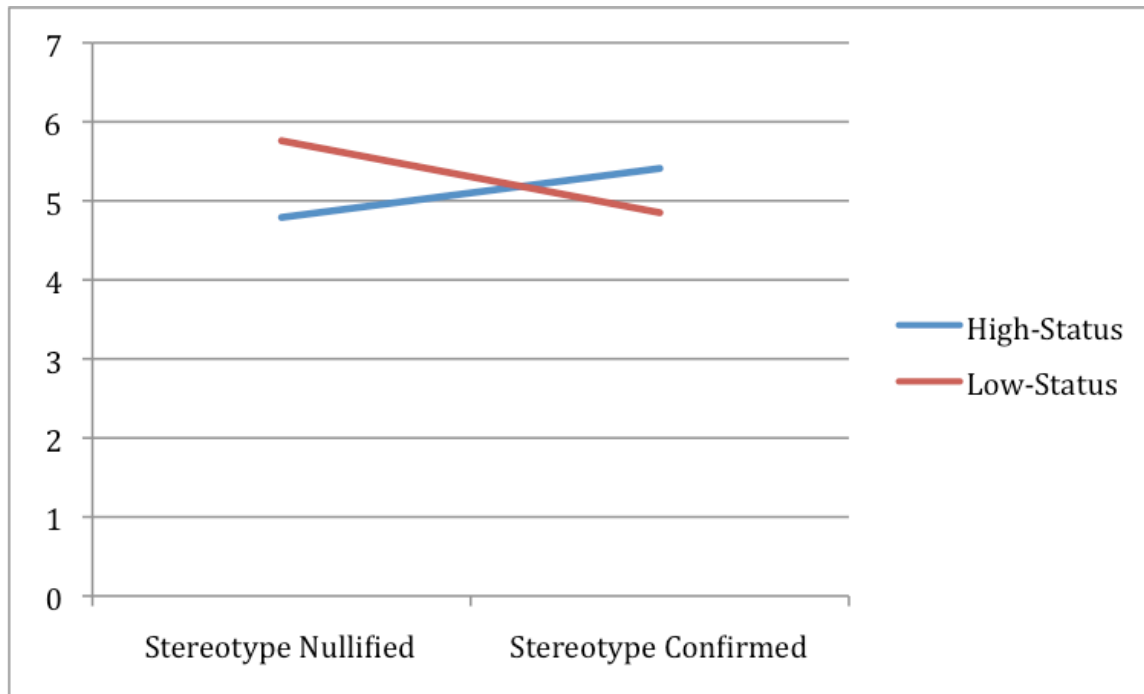
Figure 18

Willingness to write a letter in support of verbal programs among high-status participants in Study 2.
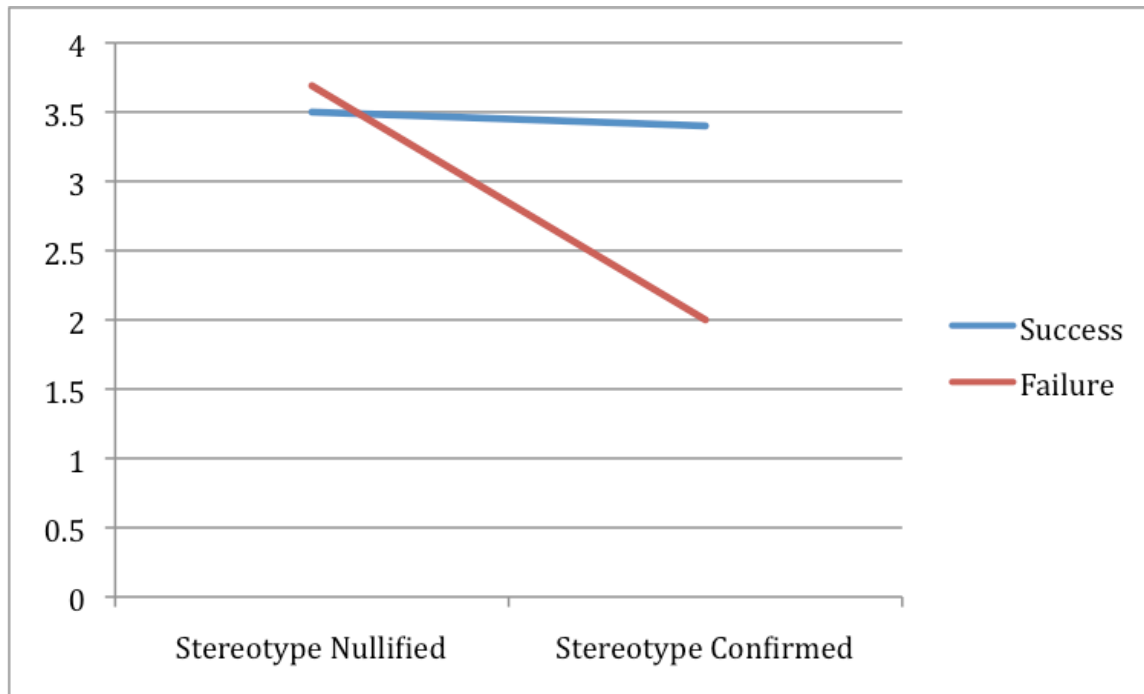
Figure 19

Willingness to protest for increased verbal education among high-status participants in Study 2.
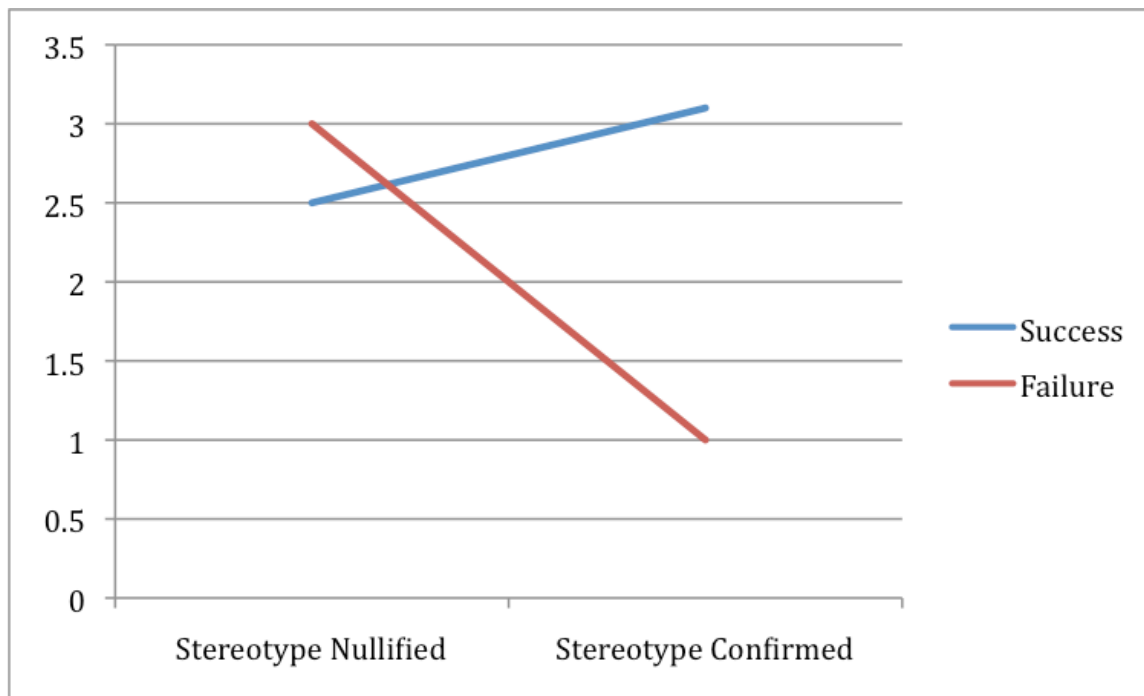
Figure 20

Willingness to volunteer at a verbal tutoring center in Study 2.
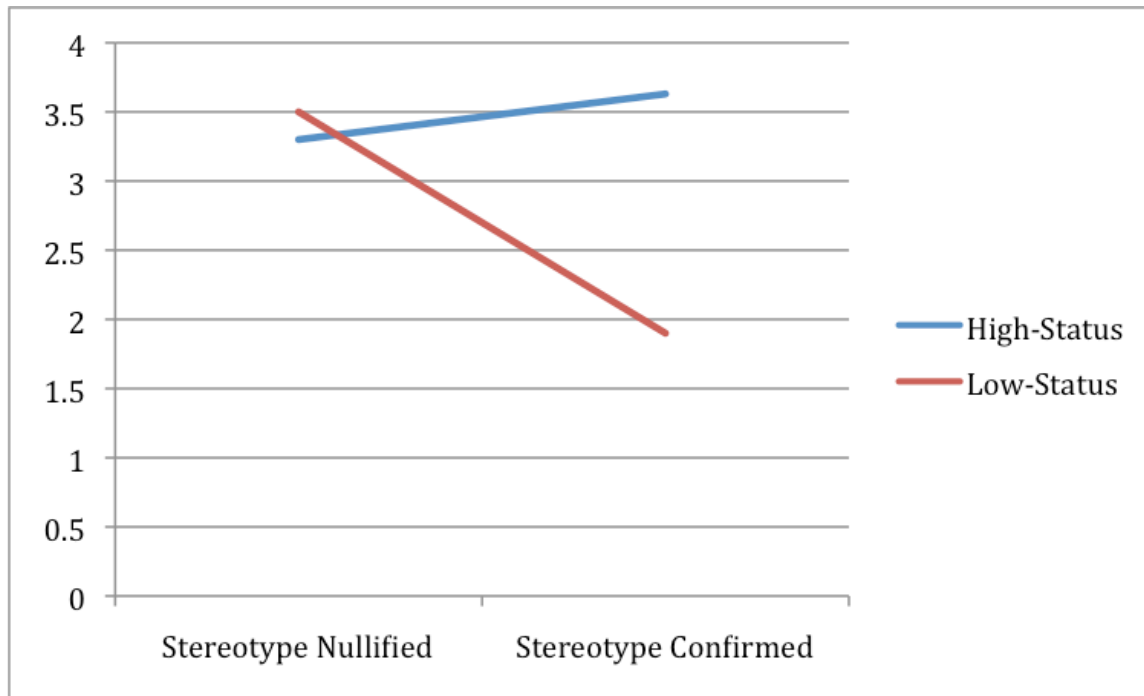
Appendix A: Short personality survey used in each of the four time points in both Study 1 and 2.

Thank you for participating in this experiment. First you will be asked to complete several personality questionnaires.

Please rate the extent to which the following statement describes you RIGHT NOW.

	Extremely Uncharacteristic					Extremely Characteristic
I have high self-esteem.	1	2	3	4	5	6

Please rate the extent to which you **currently** feel:

	Not really	A little	Moderately	Quite a bit	Extremely
Anxious	1	2	3	4	5
Guilty	1	2	3	4	5
Regret	1	2	3	4	5
Remorse	1	2	3	4	5
Responsible	1	2	3	4	5
Have a bad conscience	1	2	3	4	5
Ashamed	1	2	3	4	5
Embarrassed	1	2	3	4	5
Disgraced	1	2	3	4	5
Humiliated	1	2	3	4	5
Angry	1	2	3	4	5
Annoyed	1	2	3	4	5
Hostile	1	2	3	4	5
Indignant	1	2	3	4	5
Resentful	1	2	3	4	5
Outraged	1	2	3	4	5
Pride	1	2	3	4	5
Successful	1	2	3	4	5
Happy	1	2	3	4	5
Sympathy	1	2	3	4	5
Compassion	1	2	3	4	5

Double-sided sheet: Please continue on back.

Please rate the extent to which you agree or disagree with each of the following statements CURRENTLY.

	Strongly Disagree			Neutral			Strongly Agree
People have a certain amount of intelligence, and they really can't do much to change it.	1	2	3	4	5	6	7
Your intelligence is something about you that you can't change very much.	1	2	3	4	5	6	7
No matter who you are, you can significantly change your intelligence level.	1	2	3	4	5	6	7
You can always substantially change how intelligent you are.	1	2	3	4	5	6	7
To be honest, you can't really change how intelligent you are.	1	2	3	4	5	6	7
You can learn new things, but you can't really change your basic intelligence.	1	2	3	4	5	6	7
No matter how much intelligence you have, you can always change it quite a bit.	1	2	3	4	5	6	7
You can change even your basic intelligence level considerably.	1	2	3	4	5	6	7
The kind of person someone is, is something very basic about them, and it can't be changed very much.	1	2	3	4	5	6	7
People can do things differently, but the important parts of who they are can't really be changed.	1	2	3	4	5	6	7
Everyone, no matter who they are, can significantly change their basic characteristics.	1	2	3	4	5	6	7
As much as I hate to admit it, you can't teach an old dog new tricks. People can't really change their deepest attributes.	1	2	3	4	5	6	7
People can always substantially change the kind of person they are.	1	2	3	4	5	6	7
Everyone is a certain kind of person, and there is not much they can do to really change that.	1	2	3	4	5	6	7
No matter what kind of person someone is, they can always change very much.	1	2	3	4	5	6	7
All people can change even their most basic qualities.	1	2	3	4	5	6	7

Appendix B: Distractor articles used in Study 1 and Study 2.

Article # 1

Previous research has demonstrated that organizational principles become functional over different time courses of development: Lightness similarity is available at 3 months of age, but form similarity is not readily in evidence until 6 months of age. We investigated whether organization would transfer across principles and whether perceptual scaffolding can occur from an already functional principle to a not-yet-operational principle. Six- to 7-month-old infants (Experiment 1) and 3- to 4-month-old infants (Experiment 2) who were familiarized with arrays of elements organized by lightness similarity displayed a subsequent visual preference for a novel organization defined by form similarity. Results with the older infants demonstrate transfer in perceptual grouping: The organization defined by one grouping principle can direct a visual preference for a novel organization defined by a different grouping principle. Findings with the younger infants suggest that learning based on an already functional organizational process enables an organizational process that is not yet functional through perceptual scaffolding.

References:

Quinn, P. C., & Bhatt, R. S. (2009). Transfer and Scaffolding of Perceptual Grouping Occurs Across Organizing Principles in 3- to 7-Month-Old Infants. *Psychological Science, 20, DOI 10.1111/j.1467-9280.2009.02383.x*

Article # 2

Previous studies have demonstrated the involvement of spatial codes in the representation of time and numbers. We took advantage of a well-known spatial modulation (prismatic adaptation) to test the hypothesis that the representation of time is spatially oriented from left to right, with smaller time intervals being represented to the left of larger time intervals. Healthy subjects performed a time-reproduction task and a time-bisection task, before and after leftward and rightward prismatic adaptation. Results showed that prismatic adaptation inducing a rightward orientation of spatial attention produced an overestimation of time intervals, whereas prismatic adaptation inducing a leftward shift of spatial attention produced an underestimation of time intervals. These findings not only confirm that temporal intervals are represented as horizontally arranged in space, but also reveal that spatial modulation of time processing most likely occurs via cuing of spatial attention, and that spatial attention can influence the spatial coding of quantity in different dimensions.

References:

Frassinetti, F., Magnani, B., & Oliveri, M. (2009). Prismatic Lenses Shift Time Perception. *Psychological Science, 20, DOI 10.1111/j.1467-9280.2009.02390.x*

Appendix C: Stereotype information articles used in Study 1.

Article # 3

Previous research has demonstrated that math skills are crucial to performance in many important subjects in college. This research is aimed at better understanding what makes some people better at math than others. Although at some top schools, male students outnumber the female students in math majors and majors with math as a prerequisite, a good deal of research indicates that men in fact *do not* score higher than women on standardized tests of math. There is no evidence of a quantitative performance gap between men and women; indeed, most standardized tests of quantitative skill are highly gender neutral (Kenney, 1999).

References:

Kenney, C. (1999). Mathematic gender differences eliminated: A step forward. *American Researcher Quarterly, 23,* 123-129.

Article # 3

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References:

Kenney, C. (1999). Mathematical gender differences exemplified: A step forward. *American Researcher Quarterly, 23,* 123-129.

Appendix D: Stereotype information articles used in Study 2.

Article # 3

Previous research has demonstrated that verbal skills are crucial to performance in many important subjects in college. This research is aimed at better understanding what makes some people better in language skills than others. At some top schools, female students outnumber the male students in liberal arts majors and majors with English as a prerequisite, and a good deal of research indicates that women in fact consistently score higher than men on standardized verbal tests. There is evidence of a growing verbal performance gap between men and women; indeed, most standardized tests of verbal skill are highly gender skewed (Kenney, 1999).

References:

Kenney, C. (1999). Verbal gender differences exemplified: A step forward. *American Researcher Quarterly, 23,* 123-129.

Article # 3

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References:

Kenney, C. (1999). Verbal gender differences eliminated: A step forward. *American Researcher Quarterly, 23,* 123-129.

Appendix E: Math tests used in Study 1.

1.

Jim is 3 years older than Jonathan.
Myra is 5 years older than Melissa.
Jonathan is 2 years older than Melissa.

A. Jim's age   B. Myra's age

(A) if the quantity in Statement A is greater

(B) if the quantity in Statement B is greater

(C) if the two quantities are equal

(D) if the relationship cannot be determined from the information given

2.

O is the center of the circle
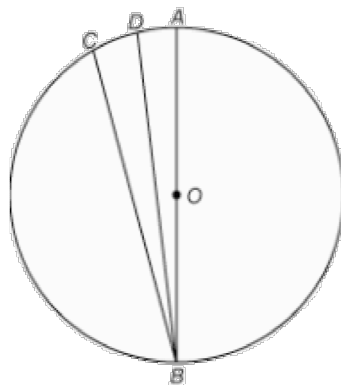
A. AB   B. the average (arithmetic mean) of CB and DB

(A) if the quantity in Statement A is greater

(B) if the quantity in Statement B is greater

(C) if the two quantities are equal

(D) if the relationship cannot be determined from the information given

3.   If membership in the Elks Club increases from 120 to 150, what is the percent increase?

  (A) 15%
  (B) 25%
  (C) 30%
  (D) 40%

___

4.

$$x + k = 8$$
$$x - k = 4$$

A. x   B. k

(A) if the quantity in Statement A is greater

(B) if the quantity in Statement B is greater

(C) if the two quantities are equal

(D) if the relationship cannot be determined from the information given

___

5.
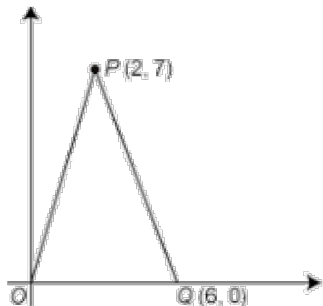
The area of triangle OPQ in the figure above is

  (A) 6
  (B) 12
  (C) 14
  (D) 21
  (E) 42

___

6.

If x is an integer and $y = 9x + 13$, what is the greatest value of x for which y is less than 100?

    (A) 12
    (B) 11
    (C) 10
    (D) 9
    (E) 8

7.

                A. 90 percent of 30   B. 13.5 percent of 200

(A) if the quantity in Statement A is greater

(B) if the quantity in Statement B is greater

(C) if the two quantities are equal

(D) if the relationship cannot be determined from the information given

---

8.   Chris gave Jane x cards. He gave Betty one card more than he gave Jane and he gave Paul two cards fewer than he gave Betty. In terms of x , how many cards did Chris give Betty, Jane, and Paul altogether?

    (A) $3x + 1$
    (B) $3x$
    (C) $3x - 1$
    (D) $x - 1$
    (E) $\dfrac{x}{3}$

---

9.   If an integer y is subtracted from an integer x and the result is greater than x, then y must be

    (A)   equal to x
    (B)   less than 0
    (C)   less than x
    (D)   greater than 0
    (E)   greater than x

---

10.   If the average (arithmetic mean) of 16, 20, and n is between 18 and 21,
inclusive, what is the greatest possible value of n ?

(A) 18
(B) 21
(C) 27
(D) 54
(E) 63

1.

Column A	Column B
5/3 X 0.60	1

(A) if the quantity in Statement A is greater

(B) if the quantity in Statement B is greater

(C) if the two quantities are equal

(D) if the relationship cannot be determined from the information given

2.

The average (arithmetic mean) of 12 and 20 is equal to the average (arithmetic mean) of 15 and x.

Column A	Column B
X	16

(A) if the quantity in Statement A is greater

(B) if the quantity in Statement B is greater

(C) if the two quantities are equal

(D) if the relationship cannot be determined from the information given

3.

The total surface area of cube C equals 150.

Column A | Column B
The length of one edge | 4.5
of cube C.

(A) if the quantity in Statement A is greater

(B) if the quantity in Statement B is greater

(C) if the two quantities are equal

(D) if the relationship cannot be determined from the information given

4.

Column A | Column B
$(x-1)(x+1)$ | x^2

(A) if the quantity in Statement A is greater

(B) if the quantity in Statement B is greater

(C) if the two quantities are equal

(D) if the relationship cannot be determined from the information given

5.

If $(2x-1)^2 = 0$, then x =

(a) -1/4

(b) -1/2

(c) 0

(d) ½

(e) ¼

6.

	Column A	Column B

The total savings on 20 $1.80

Gallons of gasoline

Purchased for $1.169 per

Gallon instead of $1.259

Per gallon

 (A) if the quantity in Statement A is greater

 (B) if the quantity in Statement B is greater

 (C) if the two quantities are equal

 (D) if the relationship cannot be determined from the information given

7.

A retail business has determined that its net income, in terms of x, the number of items sold, is given by the expression $x^2 + x - 380$.

	Column A	Column B

The number of items that   10

Must be sold for the net

Income to be zero.

 (A) if the quantity in Statement A is greater

 (B) if the quantity in Statement B is greater

 (C) if the two quantities are equal

 (D) if the relationship cannot be determined from the information given

8.

$(M + n) / (4 + 5) =$

(a) $(m+n)/4 + (m+n)/5$

(b) $(m+n)/9 + (m+n)/9$

(c) $m/5 + n/4$

(d) $m/4 + n/5$

(e) $m/9 + n/9$

9.

Column A   Column B

$1 - 1/7$ $1 - 1/8$

(A) if the quantity in Statement A is greater

(B) if the quantity in Statement B is greater

(C) if the two quantities are equal

(D) if the relationship cannot be determined from the information given

10.

If x can only have the values -3, 0, and 2, and y can only have the values -4, 2, and 3, what is the greatest possible value for $2x + y^2$?

(a) 13

(b) 15

(c) 16

(d) 20

(e) 22

Appendix F: Survey packet of cognitions and reparative action.

I'd like to get your feelings towards some groups and people. Please rate each of the below groups and people using the "feeling thermometer".

Ratings between 50 and 100 degrees mean that you feel favorable and warm towards that group or person.

Ratings between 0 and 50 degrees mean that you don't feel favorable towards the group or person, and that you don't care that much for the group or person.

	Cold		Warm
People in group A on the painting rating task	0	50	100
People in group B on the painting rating task	0	50	100
Your average female student at Cal	0	50	100
Your average male student at Cal	0	50	100
Other participants in this study	0	50	100

Following are several statements about various social issues. Please indicate whether you agree or disagree with the statements by using the following scale. There are no right or wrong answers so please answer the questions as honestly as possible.

-3   -2   -1   0   +1   +2   +3

Disagree   Neither   Agree

Strongly   Agree nor   Strongly

Disagree

For example if you agreed strongly with the first question you would write a +3 in the space in front of the first question but if you disagreed strongly you would write a -3 in this space.

___ 1. Women often miss out on good jobs due to sexual discrimination.

___ 2. It is rare to see women treated in a sexist manner on television.

___ 3. Society has reached the point where women and men have equal opportunities for achievement.

___ 4. It is easy to understand the anger of women's groups in America.

___ 5. Over the past few years, the government and news media have been showing more concern about the treatment of women than is warranted by women's actual experiences.

___ 6. Discrimination against women is no longer a problem in the United States.

___ 7. On average, people in our society treat husbands and wives equally.

___ 8. It is easy to understand why women's groups are still concerned about societal limitations of women's opportunities.

Below you will find three brief descriptions of college students. Please read these descriptions and try to form an impression of each student. After you read the descriptions, please rate to what degree you find each adjective to be descriptive of the student.

1. Jill is 20 years old, 131 lbs., and 5'4" tall. Jill lives in Berkeley. One of her major goals in life is security. And while she has some personality weaknesses, she is generally able to compensate for them. Jill prefers a certain amount of change and variety and becomes dissatisfied when hemmed in by restrictions and limitations. Over time she has found it unwise to be too frank in revealing herself to others.

How well do each of the following adjectives describe Jill?

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

not at all descriptive   **moderately descriptive**   **extremely descriptive**

___makes decisions easily	___gullible	___boastful
___imaginative	___gentle	___outgoing
___helpful to others	___sloppy	___aggressive
___considerate	___independent	___cynical
___emotional	___self-confident	___dissatisfied
___approval-seeking	___loud	___forgetful

2. All in all, Mark is quite a traditional kind of man. He has some personality weaknesses, but he has some very good qualities too. I think he has many talents that he has not yet turned to his advantage. He is disciplined and self-controlled on the outside, but sometimes he seems to be worrisome and insecure. He's the kind of person that prefers change and variety, and becomes dissatisfied when hemmed in by restrictions and limitations. To his close friends, he shares his inner thoughts and feelings, but he does not open himself up so easily with strangers. At times, he is extroverted, affable, and sociable, while at other times he is introverted, wary, and reserved. He is a modest person, but he does not hesitate to show his talents. You can say he is a dreamer, but one with a sense of reality.

How well do each of the following adjectives describe Mark?

1	2	3	4	5	6	7	8	9

not at all descriptive   **moderately descriptive**   **extremely descriptive**

___makes decisions easily   ___gullible   ___boastful

___imaginative   ___gentle   ___outgoing

___helpful to others   ___sloppy   ___aggressive

___considerate   ___independent   ___cynical

___emotional   ___self-confident   ___dissatisfied

___approval-seeking   ___loud   ___forgetful

3. Jonathan is 19 years old and is currently a student at Stanford University. He has a need for other people to like and admire him, and yet he tends to be critical of himself. At times he has serious doubts as to whether he had made the right decision or done the right thing. He also prides himself as an independent thinker; and does not accept others' statements without satisfactory proof. Some of his aspirations tend to be rather unrealistic.

How well do each of the following adjectives describe Jonathan?

	1	2	3	4	5	6	7	8	9

not at all descriptive　　　　　**moderately descriptive**　　　　　**extremely descriptive**

___makes decisions easily　　　　___gullible　　　　___boastful

___imaginative　　　　___gentle　　　　___outgoing

___helpful to others　　　　___sloppy　　　　___aggressive

___considerate　　　　___independent　　　　___cynical

___emotional　　　　___self-confident　　　　___dissatisfied

___approval-seeking　　　　___loud　　　　___forgetful

Imagine that the University of California has received additional government funding to improve academic achievement. If you were to make recommendations to the Regents, what percentage of the total additional funding would you allocate to the following activities?

Minimum 0%, maximum 100%, must sum up to 100%.

a) Hire more faculty members for teaching core requirements
b) Address the underrepresentation of women in math and science majors
c) Address the underrepresentation of men in liberal arts majors
d) Improve the quality and availability of academic advising
e) Address the graduation rates of first-generation college students

On a scale of 1-6, where 1 = (very unwilling) and 6 = (very willing), how willing are you to engage in one of these tasks?

1. Write the Chancellor to request more funding for math and science tutoring programs.
2. Write the Chancellor to request more funding for writing and composition tutoring programs.
3. Volunteer your time for a math and science tutoring program.
4. Volunteer your time for a writing and composition tutoring program.
5. Donate money for a math and science tutoring program.
6. Donate money for a writing and composition tutoring program.
7. Help organize a protest on campus for more funding for math and science tutoring programs.
8. Help organize a protest on campus for more funding for writing and composition tutoring programs.

Appendix G: Verbal tests used in Study 2.

<u>Directions:</u> In each of the following questions, a related pair of words or phrases is followed by five lettered pairs of words or phrases. Select the lettered pair that best expresses a relationship similar to that expressed in the original pair.

1. LOGIC : REASONING ::

       (a) sensitivity : morality
       (b) arrogance : leadership
       (c) ethics : behavior
       (d) creativity : enthusiasm
       (e) bravery : charisma

2. APPREHENSION : TERROR ::

       (a) interest : conspiracy
       (b) affection : adoration
       (c) indifference : animosity
       (d) reluctance : termination
       (e) anxiety : faith

<u>Directions:</u> Each question below consists of a word printed in capital letters, followed by five lettered words or phrases. Choose the lettered word or phrase that is most nearly <u>opposite</u> in meaning to the word in capital letters.

3. PLACATE:

       (a) avert
       (b) antagonize
       (c) procure
       (d) subside
       (e) revolt

<u>Directions:</u> Each sentence below has one or two blanks, each blank indicating that something has been omitted. Beneath the sentence are five lettered words or sets of words. Choose the word or set of words for each blank that <u>best</u> fits the meaning of the sentence as a whole.

4. Trapped thousands of years ago in Antarctic ice, recently discovered air bubbles are ------- time capsules filled with information for scientists who chart the history of the atmosphere.

      (a) inconsequential

      (b) broken

      (c) veritable

      (d) resplendent

      (e) impenetrable

Directions: In each of the following questions, a related pair of words or phrases is followed by five lettered pairs of words or phrases. Select the lettered pair that best expresses a relationship similar to that expressed in the original pair.

5. SUPERIMPOSE : ABOVE ::

      (a) permeate : beside

      (b) focus : around

      (c) insert : between

      (d) splice : below

      (e) fuse : behind

Directions: Each sentence below has one or two blanks, each blank indicating that something has been omitted. Beneath the sentence are five lettered words or sets of words. Choose the word or set of words for each blank that best fits the meaning of the sentence as a whole.

6. Science advances in ------- spiral in that each new conceptual scheme ------- the phenomena explained by its predecessors and adds to those explanations.

      (a) a discontinuous . . . decries

      (b) a repetitive . . vitiates

      (c) a widening . . embraces

      (d) an anomalous . . captures

      (e) an explosive . . questions

Directions: In each of the following questions, a related pair of words or phrases is followed by five lettered pairs of words or phrases. Select the lettered pair that best expresses a relationship similar to that expressed in the original pair.

7. TANGO : DANCE ::

(a) arabesque : theme

(b) tonality : instrumentation

(c) rhyme : pattern

(d) stanza : line

(e) elegy : poem

Directions: Each sentence below has one or two blanks, each blank indicating that something has been omitted. Beneath the sentence are five lettered words or sets of words. Choose the word or set of words for each blank that best fits the meaning of the sentence as a whole.

8. How could words, confined as they individually are to certain ------- meanings specified in a dictionary, eventually come, when combined in groups, to create obscurity and actually to prevent thought from being -------?

(a) indefinite . . articulated

(b) conventional . . conceivable

(c) unlikely . . classified

(d) archaic . . expressed

(e) precise . . communicable

9. Even though they tended to be ------- strangers, fifteenth-century Europeans did not associate ------- and danger.

(a) trusting of . . diversity

(b) haughty with . . nonconformity

(c) interested in . . enmity

(d) antagonistic to . . rudeness

(e) hostile to . . foreignness

Directions: In each of the following questions, a related pair of words or phrases is followed by five lettered pairs of words or phrases. Select the lettered pair that best expresses a relationship similar to that expressed in the original pair.

10. ABACUS : CALCULATE ::

> (a) organ : worship

> (b) patent : invent

> (c) calipers : regulate

> (d) manuscript : edit

> (e) sextant : navigate

Directions: Each question below consists of a word printed in capital letters, followed by five lettered words or phrases. Choose the lettered word or phrase that is most nearly opposite in meaning to the word in capital letters.

11. PLETHORA:

> (a) deterioration

> (b) embellishment

> (c) scarcity

> (d) vacillation

> (e) affirmation

Directions: Each question below consists of a word printed in capital letters, followed by five lettered words or phrases. Choose the lettered word or phrase that is most nearly opposite in meaning to the word in capital letters.

12. FACILITATE:

> (a) evict

> (b) thwart

> (c) define

> (d) make excuses for

> (e) call attention to

13. FRACAS:

     (a) functional compromise

     (b) reasonable judgment

     (c) peaceable discussion

     (d) plausible exception

     (e) theoretical approach

<u>Directions:</u> Each sentence below has one or two blanks, each blank indicating that something has been omitted. Beneath the sentence are five lettered words or sets of words. Choose the word or set of words for each blank that <u>best</u> fits the meaning of the sentence as a whole.

14. Though many medieval women possessed devotional books that had belonged to their mothers, formal written evidence of women bequeathing books to their daughters is scarce, which suggests that such bequests were ------- and required no -------.

     (a) unselfish . . rationalization

     (b) tangential . . approval

     (c) customary . . documentation

     (d) covert . . discretion

     (e) spurious . . record

15. Although their initial anger had ------- somewhat, they continued to ------- the careless worker who had broken the machine.

     (a) blazed . . assail

     (b) diminished . . appease

     (c) abated . . berate

     (d) subsided . . condone

     (e) intensified . . torment

Directions: In each of the following questions, a related pair of words or phrases is followed by five lettered pairs of words or phrases. Select the lettered pair that best expresses a relationship similar to that expressed in the original pair.

16. SCRIPT : PLAY ::

       (a) refrain : song

       (b) assignment : course

       (c) score : symphony

       (d) collection : story

       (e) debate : candidate

Directions: Each question below consists of a word printed in capital letters, followed by five lettered words or phrases. Choose the lettered word or phrase that is most nearly opposite in meaning to the word in capital letters.

17. JOCULAR:

       (a) active

       (b) serious

       (c) unknown

       (d) equable

       (e) destructive

18. IMPEDE:

       (a) assist

       (b) entreat

       (c) dislodge

       (d) ascribe

       (e) avow

<u>Directions:</u> Each sentence below has one or two blanks, each blank indicating that something has been omitted. Beneath the sentence are five lettered words or sets of words. Choose the word or set of words for each blank that <u>best</u> fits the meaning of the sentence as a whole.

19. Before 1500 North America was inhabited by more than 300 cultural groups, each with different customs, social structures, world views, and languages; such diversity ------- the existence of a single North American culture.

> (a) complements
>
> (b) implies
>
> (c) reiterates
>
> (d) argues against
>
> (e) explains away

20. In the early twentieth century, the discovery of radium ------- the popular imagination; not only was its discoverer, Marie Curie, idolized, but its market value ------- that of the rarest gemstone.

> (a) stormed . . sank to
>
> (b) horrified . . approached
>
> (c) taxed . . was equal to
>
> (d) enflamed . . exceeded
>
> (e) escaped . . was comparable to