Research Report

STEREOTYPE SUSCEPTIBILITY: Identity Salience and Shifts in Quantitative Performance

Margaret Shih, Todd L. Pittinsky, and Nalini Ambady

Harvard University

Abstract—*Recent studies have documented that performance in a domain is hindered when individuals feel that a sociocultural group to which they belong is negatively stereotyped in that domain. We report that implicit activation of a social identity can facilitate as well as impede performance on a quantitative task. When a particular social identity was made salient at an implicit level, performance was altered in the direction predicted by the stereotype associated with the identity. Common cultural stereotypes hold that Asians have superior quantitative skills compared with other ethnic groups and that women have inferior quantitative skills compared with men. We found that Asian-American women performed better on a mathematics test when their ethnic identity was activated, but worse when their gender identity was activated, compared with a control group who had neither identity activated. Cross-cultural investigation indicated that it was the stereotype, and not the identity per se, that influenced performance.*

Recent studies have found that the implicit activation of a sociocultural stereotype can influence the performance of the stereotyped individual. Steele and Aronson (1995) found that African-American students, who are stereotyped to be poor students, underperformed relative to white students when they were told that a test was diagnostic of their abilities. In addition, Levy (1996) found that elderly people performed worse on a memory task if they had previously been primed with a negative stereotype of the elderly than if they had been primed with a positive stereotype of the elderly.

In this article, we expand the work on the powerful effects of automatic and unconscious activation (see, e.g., Banaji & Greenwald, 1994; Banaji, Hardin, & Rothman, 1993; Bargh, Chen, & Burrows, 1996) and self-application of stereotypes by examining whether the implicit activation of particular identities can facilitate as well as debilitate academic performance. We focus on two issues that social psychologists have largely overlooked but that merit investigation—the effects of the activation of various identities an individual may have and the positive effects of some stereotypes on performance.

Past research on self-stereotyping has focused almost exclusively on only one dimension of participants' identity. For example, both Levy's (1996) and Steele and Aronson's (1995) studies classified participants along only one dimension of social identity, age and race, respectively. Yet people carry with them many rich dimensions of social identity (Hewstone, 1996), and different social situations and goals trigger different identities (Richeson & Ambady, 1998). For example, a white, male, Christian accountant may be identified as a male, as white, as a Christian, or as an accountant. Because different social identities are associated with different stereotypes, individuals may be susceptible to different, and in some cases even conflicting, stereotypes.

A second neglected issue in the research on self-stereotyping is the effect of positive stereotypes. Focusing only on the negative effects of stereotypes associated with particular social categories means that critical dynamics of how stereotypes affect individuals in the real world are ignored.

In the studies we report here, we considered both positive and negative stereotypes associated with different identities that can coexist within an individual. Can implicit activation of different dimensions of identity lead individuals to access and behave in accordance with different stereotypes that might help or hinder their academic performance? We examined whether subtly activating different self-stereotypes would affect the quantitative performance of Asian-American women. A common cultural stereotype of women, supported by data on test performance, is that they have inferior quantitative skills compared with men (Benbow, 1988; Hedges & Nowell, 1995). A common stereotype about Asians, also supported by data on test performance, is that they have superior quantitative skills compared with other ethnic groups (Steen, 1987). These stereotypes suggest that the performance of Asian-American women in a quantitative domain is susceptible to two very different stereotypes.

STUDY 1

Overview

In Study 1, we asked undergraduate Asian-American women to take a quantitative test. We hypothesized that their performance would be depressed when their female identity was made salient and enhanced when their Asian identity was made salient, compared with a control group of Asian-American women for whom no particular identity was made salient.[1] Identity salience was manipulated by having participants complete different versions of a questionnaire about residential life at their university. Participants randomly assigned to the *female-identity-salient* condition had to indicate their sex and answer questions related to their gender identity. Participants in the *Asian-identity-salient* condition were asked to indicate their ethnicity and to answer questions related to their ethnic identity. In the *no-identity-salient* control condition, participants were not asked to indicate their gender or their ethnicity, but were asked to answer questions unrelated to either identity. The questionnaires were constructed to make salient the identity of interest (ethnic or gender) implicitly,

Address correspondence to Margaret Shih, Department of Psychology, Harvard University, 33 Kirkland St., Cambridge, MA 02138; e-mail: marg@wjh.harvard.edu.

1. One can conceive of a fourth condition in which both gender and ethnicity are made salient in order to see if one identity would predominate. This is a provocative question, but beyond the scope of the present study, in which we tested whether we could alter performance by making one identity more salient than another.

without directly priming the actual stereotype (superior or inferior quantitative skills).

Procedure

Forty-six Asian-American female undergraduates were run individually in a laboratory session. First, an experimenter blind to the manipulation asked them to fill out the appropriate manipulation questionnaire. In the female-identity-salient condition, participants (n = 14) were asked (a) whether they lived on or off campus, (b) whether they had a roommate, (c) whether their floors were coed or single sex, (d) whether they preferred coed or single-sex floors, (e) to list three reasons why they would prefer a coed floor, and (f) to list three reasons why they would prefer a single-sex floor. In the Asian-identity-salient condition, participants (n = 16) were asked (a) whether their parents or grandparents spoke any languages other than English, (b) what languages they knew, (c) what languages they spoke at home, (d) what opportunities they had to speak other languages on campus, (e) what percentage of these opportunities were found in their residence halls, and (f) how many generations of their family had lived in America. In the control condition, participants (n = 16) were asked (a) whether they lived on or off campus, (b) whether they used the university telephone service, (c) to rate on a 7-point scale how satisfied they were with the service, (d) whether they would consider subscribing to cable television, (e) how much they would be willing to pay per month for cable television, and (f) to list one or two reasons why they would or would not subscribe to cable television.

After the questionnaire, participants were given a quantitative test that consisted of 12 math questions from the Canadian Math Competition[2] and were told that they would have 20 min to complete this task. At the end of the session, participants completed a final set of questions, indicating, among other things, their own score on the quantitative section of the Scholastic Aptitude Test (SAT), how much they enjoyed participating in the experiment, how talented they were at mathematics, and their thoughts about the goals of the research. Participants were then paid and debriefed.

Results and Discussion

The main dependent variable was accuracy, which was the number of mathematical questions a participant answered correctly divided by the number of questions that the participant attempted to answer (Steele & Aronson, 1995). As shown in Table 1, our predictions were supported: Performance on the quantitative test was best in the Asian-identity-salient condition, intermediate in the control condition, and worst in the female-identity-salient condition. The performance increment associated with activation of the Asian-American dimension of identity was similar in magnitude to the performance decrement associated with activation of the female dimension of identity. These findings are particularly compelling because the effect was exhibited among students with excellent quantitative skills (the mean reported Quantitative SAT score of the participants was 750.9, SD = 46.53).

Participants in the Asian-identity-salient condition answered an average of 54% of the questions that they attempted correctly, participants in the control condition answered an average of 49% correctly, and participants in the female-identity-salient condition answered an average of 43% correctly. A linear contrast analysis testing our prediction that participants in the Asian-identity-salient condition scored the highest, participants in the control condition scored in the middle, and participants in the female-identity-salient condition scored the lowest revealed that this pattern was significant, $t(43) = 1.86$, $p < .05$, $r = .27$. Participants in the Asian-identity-salient condition performed significantly better than participants in the female-identity-salient condition, $t(29) = 2.02$, $p < .05$, $r = .35$. When we considered only the number of questions answered correctly, we found the same, albeit less statistically significant, pattern of results. Participants in the Asian-identity-salient condition answered the most questions correctly (M = 5.37), participants in the female-identity-salient condition answered the fewest questions correctly (M = 4.71), and participants in the control condition were in the middle (M = 5.31), $t(43) = 0.89$, $p = .19$, $r = .13$. Accuracy, however, is a more meaningful dependent variable than the number of questions answered correctly because it takes into account not only the number of questions answered correctly but also the number of questions attempted.

Interestingly, the salience manipulation did not affect the level of motivation of the participants, which was similar across all conditions: A one-way analysis of variance (ANOVA) showed no significant differences across conditions in (a) the number of questions participants attempted to answer (the effort that they exhibited), (b) the number of questions for which participants reported guessing the answers, (c) participants' liking of the test, (d) their assessment of how well they did on the test, (e) their assessment of the test's difficulty, and (f) their assessment of their mathematical skills.

The findings of no differences across conditions on these variables raise important issues for understanding the effects of stereotypes on participants' performance. It appears unlikely that the negative effects of self-stereotyping could have been decreased by simply encouraging participants to try harder. Performance in this study was significantly poorer among participants in the female-identity-salient condition, yet compared with participants in the other conditions, participants in this condition attempted similar numbers of questions and were similarly confident in their performance.

Our data also suggest that participants were not aware that their performance was being affected. There were no differences across conditions in how well participants thought they did. Further, participants were not aware that there was a target identity being made salient in this study and were unable to guess the study's hypothesis.

There were also no significant differences in participants' reported Quantitative SAT scores across conditions. The mean for the sample was 750.9, with a minimum score of 600 and a maximum score of 800, an extremely restricted range of scores. The mean score for the general population on the quantitative scale of the SAT for 1996 was 508, with a standard deviation of 110 (Educational Testing Service, 1998). The narrow range of scores and the high scores for this sample indicate that these women were all highly gifted. Obtaining significant changes in performance with an implicit identity-activation task is all the more striking with such a highly gifted sample. Correcting for restricted range makes the effect stronger (Snedecor & Cochran, 1980). Using the SAT standard deviation reported by the Educational

2. The Canadian Math Competition is a prestigious annual competition for high school students sponsored by the University of Waterloo.

Table 1. *Mean accuracy by condition in Study 1 and Study 2*

	Condition		
Study	Asian identity salient	No identity salient	Female identity salient
1: United States	.54 (0.17)	.49 (0.20)	.43 (0.16)
2: Canada	.44 (0.17)	.59 (0.20)	.28 (0.16)

Note. Standard deviations are shown in parentheses.

Testing Service (1998) to correct for restriction of range, we found the effect to be even larger and more significant for the main hypothesis, $t(43) = 2.37$, $p = .01$, $r = .34$.

STUDY 2

Overview

Study 2 examined the hypothesis that it was the stereotype associated with an identity (i.e., Asians are talented at math) and not the identity itself (i.e., Asian) that drove the performance differential we obtained. In order to do this, we replicated the study in a second culture where different stereotypes are associated with the same identities. In Vancouver, Canada, the Asian community is largely recently immigrated. Using a questionnaire designed to examine prevailing ethnic and gender stereotypes, we confirmed that the stereotype that Asians are quantitatively gifted prevails more in America than in Canada, $t(81) = 2.07$, $p < .05$, $r = .22$.[3]

Using the same paradigm as in Study 1, we predicted that the quantitative test performance of Asian women from Vancouver would be depressed, relative to that of a control group, when their gender identity was made salient. We also predicted that their performance would not be enhanced relative to performance of a control group when their Asian identity was made salient (unlike in the U.S. sample). The procedure was the same as for Study 1. Participants were 19 Asian-American female students in high school.

Results and Discussion

The results support the hypothesis that stereotypes, and not just identities, influence performance. In this population, the stereotype that Asians possess superior quantitative skills is not prevalent. As predicted (see Table 1), participants in the female-identity-salient condition performed the worst (28% accuracy) of the three groups. Participants in the Asian-identity-salient condition (44% accuracy) also performed worse than a control group (59% accuracy), contrast $t(16) = 4.55$, $p < .0005$, $r = .75$.

When considering only the number correct, we found a similar pattern: Participants in the female-identity-salient condition answered the fewest questions correctly ($M = 3.00$). Participants in the Asian-identity-salient condition also answered fewer questions correctly ($M = 4.50$) than the control group ($M = 5.00$). A contrast using lambda weights of 1, 1, and –2 revealed that the pattern was significant, $t(16) = 2.43$, $p = .01$, $r = .52$.

Combination of the Two Samples

When we combined the two studies and ran an ANOVA on the percentage accuracy, we found a significant country-by-condition interaction, $F(2, 60) = 2.78$, $p = .069$, eta = .30,[4] indicating that the pattern of performance across the three conditions was significantly different in the two countries. This suggests that the identity-salience manipulation had different effects on the performance of the U.S. and Canadian participants.

OVERALL DISCUSSION

This work demonstrates the powerful influence of sociocultural stereotypes on individual performance. In the present studies, participants were not explicitly primed with stereotype content, but simply had a sociocultural category to which they belong subtly activated. Perhaps most significant we found evidence that when an identity is made salient at an implicit level, performance can be facilitated as well as debilitated. Previous work has shown that the performance of women on a quantitative task is impeded when they are told that the task generally shows gender differences but not when they are told that the task is insensitive to gender differences (Aronson, Quinn, & Spencer, 1998; Steele, 1997). The present research indicates that women's quantitative performance can be affected both positively and negatively without any explicit instructions. Although it remains disturbing that implicitly activating a female gender identity can inhibit performance, it is encouraging that implicitly activating certain ethnic identities can help some individuals perform.

Our results speak to a number of applied areas of great concern to the scientific community as well as the general public, including

3. Randomly selected people ($n = 50$) in Vancouver, British Columbia, and Cambridge, Massachusetts, were asked to rate (on a scale from 1 to 7) how common the stereotype "Asians are good at math" is in their society.

4. There was no significant country-by-condition interaction when we considered only the number of questions answered correctly. This is not surprising because of the difference in education level of the two samples. The Canadian participants were high school students, whereas the American participants were university students. The American participants answered significantly more questions correctly ($M = 5.12$) than the Canadian participants ($M = 4.11$), $F(1, 60) = 3.84$, $p = .05$, eta = .25.

women's performance in quantitative fields such as math and science. They suggest that more attention needs to be paid to sociocultural influences on the performance of women (Barinaga, 1994), particularly in light of recent findings regarding sex differences in mathematics and science (Hedges & Nowell, 1995) in a number of different cultures (Lummis & Stevenson, 1990; Stevenson, Chen, & Lee, 1993).

The results of this study also suggest that when the fact that people have multiple identities is addressed, self-stereotyping effects may be approached far more strategically than previously recognized. To date, individuals have been largely cast as victims of self-stereotyping. But the possibility exists that interventions—in this case, an experimental manipulation that made one dimension of identification salient over others—could be used to strategically influence performance. The present finding also hints at intriguing unexplored questions about how individuals may experience identity salience and self-stereotyping processes. Brewer's (1991) theory of optimal distinctiveness posits that individuals identify along particular dimensions to achieve a state of optimal distinctiveness. It seems plausible that individuals may also identify themselves along dimensions in order to achieve "optimal adaptiveness."

Finally, finding that academic performance can be helped as well as hindered through implicit shifts in identification raises important challenges to notions of academic performance and intelligence. Although there is considerable debate about the nature of intelligence (Fraser, 1995; Neisser et al., 1996), strong supporters of genetic differences in IQ assume that ability is fixed and can be quantified through testing (Herrnstein & Murray, 1994). The results presented here clearly indicate that test performance is both malleable and surprisingly susceptible to implicit sociocultural pressures.

Acknowledgments—We gratefully thank J. Richard Hackman, Bob Rosenthal, and Karen Ruggiero for their comments and guidance. We also thank Tina Chen, Stacey DiCicco, Andrea Lewis, and Karen Shih for assistance with data collection. This work was supported, in part, by Grant No. R03 MH05H549-01 from the National Institutes of Health (United States) and by the Social Sciences and Humanities Research Council (Canada).

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(RECEIVED 12/16/97; ACCEPTED 3/5/98)