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The expected *consequences* of a score on an ability test can constrain individual performance. The authors predict that status processes, including status differences and the differences in rewards and costs that result, will produce differences in ability test scores between high-status and low-status individuals. In three controlled experiments, participants randomly assigned low status scored lower on a standard test of mental ability (the Raven Progressive Matrices) than did participants assigned high status. For both men and women, the difference in ability test score between low-status and high-status participants was about half a standard deviation. The results suggest the need to account for status differences in any attempt to measure mental ability accurately.

INTRODUCTION

Standardized tests of ability determine to a great extent who is admitted to elite institutions of higher education and increasingly who is hired and promoted in large organizations. Farkas et al. (1997) show that standardized test scores affect access to valued occupations and wages even when

[1] So many people contributed to this study that we can only thank a sample of them: Joseph Berger, Peter Burke, Thomas Fararo, Martha Foschi, Oscar Grusky, Kevin Leicht, John Skvoretz, Geoffrey Tootell, Henry Walker, Murray Webster, Jr., and David Willer. Direct correspondence to Michael Lovaglia, Department of Sociology, University of Iowa, Iowa City, Iowa 52242. E-mail: michael-lovaglia@uiowa.edu

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controlling for other factors, such as education and work experience. The use of standardized test scores rationalizes the decision process, limiting the effect of personal bias on the part of decision makers. Unfortunately, reliance on standardized test scores has not equalized opportunities for members of disadvantaged social groups. African-Americans, for example, score lower than European-Americans on many tests of mental ability, including both college entrance examinations and IQ tests. Thus, use of standardized test scores for admissions and hiring decisions effectively excludes many disadvantaged group members. Farkas et al. (1997) conclude that to understand racial or ethnic inequalities in earnings, we must understand the social origins of group differences in standardized test scores.

We demonstrate how status processes that pervade society can lower the scores of disadvantaged group members on a standardized test of mental ability. We do so by extending well-developed theories of status processes to include performance on standardized tests. Then, we test our theory in a controlled, laboratory setting. Before describing the theory and its tests, we briefly review research on social structural conditions and social processes that affect standardized test scores.

Nature *and* Nurture

The nature of intelligence is a topic of flourishing research and debate. The terms "intelligence" or "mental ability" refer to an individual's capacity to understand complex ideas, to adapt to the environment, to learn, to reason, to solve problems, and to overcome obstacles by thinking about them (Neisser et al. 1996). A number of theorists have suggested new or expanded conceptions of mental ability (e.g., Damasio 1994; Gardner 1983; Sternberg 1985; Sternberg et al. 1995). However, the psychometric approach remains dominant. It uses standardized tests—the Stanford-Binet and the Wechsler IQ tests, for example—that presume to measure an underlying stable potential for high intellectual performance. For practical purposes such as school placement and personnel decisions, intelligence *is* a score on a standardized test (Scarr 1997).

Specifying the social factors that determine individual intelligence remains a critical unsolved problem in the scientific investigation of intelligence (Neisser et al. 1996). Ironically, research into the hereditary nature of intelligence provides ample evidence that social factors are important. The debate over whether heredity or environment is more important in the determination of intelligence has produced good empirical research. Nonetheless, the debate continues without hope of resolution.

Studies employing twins or adopted children have been used in attempts to disentangle the relative contribution to intellectual ability of

heredity and environment. A recent, well-designed, large-scale study comes down firmly in favor of heredity. The Minnesota study of twins reared apart (Bouchard et al. 1990) found that intelligence scores of monozygotic twins reared apart correlated about .70 while the scores of monozygotic twins reared together correlated about .80. That is, twins who lived apart in different environments were almost as similar in intelligence as twins who shared the same environment from birth. However, twin studies are not controlled experiments. A number of other factors could be responsible for the similarity between twins reared apart and twins reared together (Eysenk and Kamin 1980).

Adoption studies also support both nature and nurture. One startling conclusion drawn from these studies is that adopted children raised in the same family may be about as different from one another as children randomly selected from the population (Plomin and Daniels 1987). However, other studies compare the IQs of children living in deprived settings with the IQs of children adopted from deprived settings into more affluent homes. These studies generally report increased IQ for children placed in enriched settings and little evidence for IQ heritability (Schiff et al. 1978). In sum, evidence from twin and adoption studies supports the conclusion that both genetics and social factors play roles in determining individual intellectual ability.

For our purposes, it is sufficient to note the large role of environment in determining intellectual ability. Proponents of genetic determinism interpret the results of the Minnesota twin study (Bouchard et al. 1990) to mean that heredity is responsible for at most 70% of differences in intellectual ability. The environment, then, would account for at least 30%. The debate continues over the proper contribution of heredity and environment implied by these percentages. Other recent studies estimate a smaller role for heredity, a contribution of about 50% of the variation in IQ scores, suggesting a larger role for social factors (Chipuer, Rovine, and Plomin 1990; Devlin, Daniels, and Roeder 1997; Loehlin 1989; Rodgers, Rowe, and May 1994; Scarr and Weinberg 1978; Scarr, Weinberg, and Waldman 1993). If both heredity and environment make important contributions to individual intelligence, then the proportion that each contributes is not as important as identifying how those contributions are made.

The potential for cultural bias in standardized tests has been a major concern for several decades. Some standardized test items may be easier for privileged members of society to answer than for the less privileged. Whereas tests based on verbal and mathematical ability cannot be completely culture free, it is more difficult to make a case for cultural bias in nonverbal tests of abstract reasoning such as the Raven Progressive Matrices. Despite years of trying to eliminate cultural bias from standardized tests and increased education for African-Americans, they still score

lower than European-Americans on standardized tests—including IQ and scholastic aptitude tests. The difference remains substantial, around three-quarters of a standard deviation for IQ (10–12 IQ points) and two-thirds of a standard deviation for scholastic aptitude tests (Herrnstein and Murray 1994). The gap persists despite attempts to statistically control socioeconomic status and other social factors (Herrnstein and Murray 1994; Jensen 1992). If social factors are responsible for differences in test scores between social groups, then it is incumbent upon social scientists to identify those factors and demonstrate their impact on standardized test scores.

Moreover, differences in intellectual ability between groups may result from social factors even if individual differences in intelligence are largely inherited. The variation in test scores among individuals is in general much higher than the variation in scores between groups (Jensen 1980). For example, Neisser et al. (1996) found little evidence for genetic differences in intelligence between races. When social factors such as socioeconomic status are controlled, however, a substantial difference remains between ability test scores of African-Americans and European-Americans. Perhaps because specific social factors have not been demonstrated to produce substantial differences in ability test scores, the controversy continues over a genetic explanation for the difference between African-Americans and European-Americans.

Environmental Correlates of Ability Test Scores

Most of the research on social factors that could account for differences in ability test scores is correlational. Relatively little research has focused on social processes that could explain how social factors could produce test score differences. This section looks at social factors found to correlate with ability test scores. The following sections focus on social processes that could produce differences in test scores.

Some environmental factors have direct biological effects that are reasonably well understood. For example, poor nutrition during child development, environmental lead, and prenatal exposure to alcohol can all lower IQ scores (Pollitt et al. 1993, Needleman; Geiger and Frank 1985; Streissguth, Barr, and Sampson 1990). Factors such as nutrition, lead exposure, and prenatal alcohol exposure have direct biological effects on brain development that suggest an approach to improve social conditions: providing adequate nutrition or removing harmful agents from a child's environment eliminates the risk of low IQ from these causes.

Social factors that correlate with test scores often provide little insight into the process by which a social category influences individual test scores. For example, if racial differences in ability test scores are not due to

genetics (and there is no reason to believe they are), then why do African-Americans score lower than European-Americans? Socioeconomic status (SES) offers a partial explanation. African-Americans have disproportionately low SES, and low SES individuals do score lower on ability tests. The correlation between SES and IQ is about .4 (White 1982). However, test score differences between African-Americans and European-Americans remain when individuals of similar SES are compared (Loehlin, Lindzey, and Spuhler 1975).

Identifying social factors correlated with ability test scores also leaves open the question of causal mechanism. For example, one way that SES might alter test scores is that children from higher income families grow up in an enriched intellectual environment. Rodgers et al. (1994) found some evidence for the benefit of an enriched home environment in general and more specifically for the number of books owned by a child. However, the magnitude of the effect was neither large nor consistent across various ability test scores (Rodgers et al. 1994). Further, it is as easy to argue that high IQ leads to the acquisition of books as that acquiring books improves IQ.

It might help to look for the social processes that lead to differences in ability test scores rather than to differences in ability. Recall that, for practical purposes, mental ability is a score on a test. Ability is one determinant of an individual's score on an ability test. There are others. For example, Milofsky (1989) found that, in a suburban, predominately white, school district, psychologists spent twice as much time testing each student as did psychologists in an urban, predominately black, school district. Thus, even if individual psychologists treat African-American and European-American students identically, individual African-Americans have less time to complete the test and get less attention from testers. One way, then, that social factors such as race and SES can affect ability test scores is through the way tests are administered.

Expectancy Effects, Self-Esteem, and Self-Efficacy

Teachers' expectations affect their students' performance. Students try to fulfill their teachers' expectations and teachers' expectations bias evaluations of student performance. *Pygmalion* is the classic literary example of the process. Professor Henry Higgins's expectations for Eliza Doolittle transform her. A self-fulfilling prophecy operates whereby members of some groups are expected to be more competent than others, and the expectancy creates conditions that produce the expected result (Merton 1948).

In Rosenthal and Jacobson's ([1968] 1992) original study of the Pygmalion effect in the classroom, researchers led teachers to believe that some

of their students were likely to "bloom" intellectually during the coming school year. At the end of the school year, those students whom teachers expected to show greater intellectual improvement did show significantly greater gains on a mental ability test than did "nonbloomers." Surprisingly, researchers also found that teachers judged "nonblooming" students unfavorably when they scored higher than expected. Rosenthal (1994) concluded that there are hazards to unexpected intellectual growth, an idea we will use later to develop our theory.

Despite the hundreds of studies that have reported expectancy effects in various social situations (Rosenthal and Rubin 1978), controversy over the importance of expectancy effects continues. The size of the effect remains unknown even among proponents (Rosenthal 1994). In addition, there is substantial opposition to the claim that teacher expectancies can influence learner intelligence. Snow (1995) reanalyzed the Pygmalion data and found only very small effects of expectancies on mental ability. He also points to the voluminous literature showing that mental abilities are not easily changed.

The expectations that individuals have for their own performance may also affect scores on mental ability tests. Social disadvantage could lead to lower ability test scores by adversely affecting self-esteem or self-efficacy. Self-esteem and especially self-efficacy are thought to improve performance by increasing the persistence with which individuals approach tasks and by reducing anxiety about possible failure (Bandura 1986). However, researchers have found no effect of self-esteem on achievement test scores (Maruyama, Rubin, and Kingsbury 1981) and only small self-efficacy effects on standardized test scores in a few studies (Multon, Brown, and Lent 1991).

The following sections develop and test a new theory that proposes a different social process to explain differences in ability test scores. Individuals in advantaged and disadvantaged groups hold different expectations about the personal *consequences* of an ability test score. Expectations about the personal consequences of a test score, rather than expectations about personal ability, may explain differences in ability test scores between social groups.

Status Processes and Rational Choice

We extend status characteristics theory to explain the difference in intelligence scores between advantaged and disadvantaged groups in society. Two elements of the status process work to the advantage of high-status individuals and the disadvantage of low-status individuals who take mental ability tests. First, previous social interaction as a high- or low-status individual may produce different expectations for performance on the test.

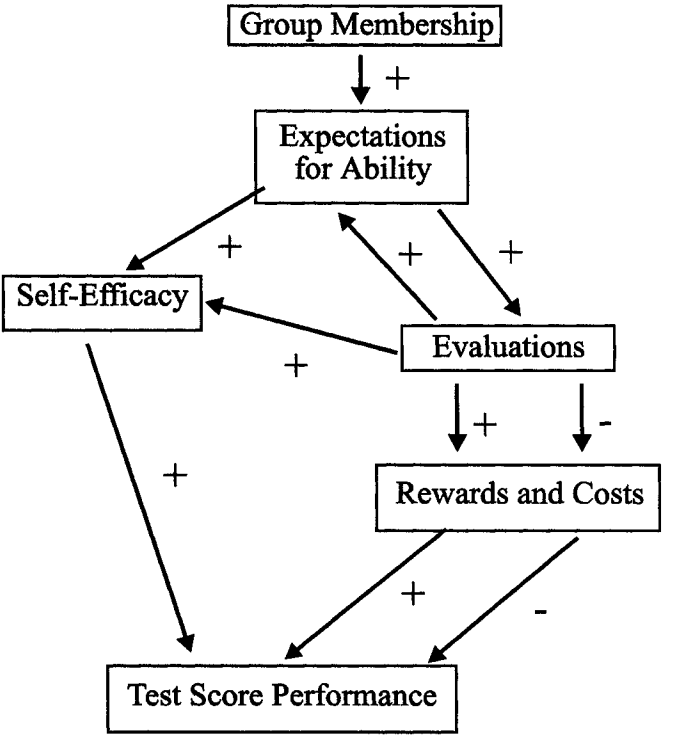

FIG. 1.—The status process

High-status individuals are evaluated more highly for their performances than are low-status individuals. Thus, in test situations, high-status individuals may have higher self-efficacy than low-status individuals. Second, according to status characteristics theory, status processes produce a social structure that provides rewards based on status. Those with high status come to expect high rewards for a competent performance. Those with low status expect not only low rewards but may anticipate punishment for competent performance that challenges the group's status hierarchy. Thus in some situations, it is in the interest of low-status individuals to underperform. Taking a standardized test may be one of those situations. A rational low-status individual may score lower on a standardized test rather than be penalized for a higher score.

The social process that produces status differences results in higher rewards and lower costs for identical performances depending on an individual's status (see fig. 1). Given different rewards and costs for identical performances, a rational choice perspective would suggest that increased

rewards and decreased costs would motivate a rational actor to do better when rewarded highly and worse when punished for a performance. We briefly introduce status characteristics theory, extend its scope to apply to individual performance on standardized tests, then show how the differential rewards and costs that result from the status process can further separate the IQ scores of high-status and low-status actors.

Status Characteristics Theory and Individual Performance

Status refers to an individual's standing in the hierarchy of a group based on the prestige, honor, and deference accorded her by other members. Status characteristics are features of individuals that influence group members' beliefs about each other. Different "states" of a status characteristic are assumed to have differential value, esteem, and honor. For example, in the United States, European-Americans are privileged over African-Americans. Race is a diffuse status characteristic because it carries with it expectations for competence in a wide variety of situations. Status characteristics can also be as specific as grade point average in high school or the score on a standardized test. Status characteristics help determine group members' relative status by altering expectations for competence that members hold for one another.

Status characteristics produce status rank through a chain of four logically connected assumptions (Webster and Foschi 1988):

1. A status characteristic becomes salient in a task situation if it differentiates among group members or is directly related to the task.
2. Salient status characteristics, even if not directly related to the task, will become relevant unless they are specifically dissociated from the task.
3. The effects of relevant status characteristics combine to form an aggregated performance expectation for each member.
4. Status rank is a direct function of the aggregated performance expectations of group members: The higher the aggregated performance expectation for a member, the higher is that member's status rank in the group.

The scope of status characteristics theory is confined to task-oriented groups where the contributions of all members are needed to accomplish some task. That is, status characteristics theory applies to groups where members are collectively oriented and task oriented. In groups meeting its scope conditions, the theory states that a status hierarchy will form

consistent with statuses that members possess in society at large.[2] High-status members (1) are given more opportunities to perform, (2) perform more often, (3) are given higher evaluations for their performances, and (4) have more influence over group decisions than do low-status members (Berger, Rosenholtz, and Zelditch 1980). Thus, status processes produce a self-fulfilling prophecy. Expectations for competence determine status rank, and high-status members are evaluated as more competent because they have high status. High evaluations lead in turn to higher rewards for high-status individuals (Berger, Fişek, et al. 1985).

Status characteristics theory also explains why low-status group members may be penalized for demonstrating they are more competent than their low status would suggest. Recall that teachers judged students unfavorably when the students violated teachers' expectations by performing at a higher level (Rosenthal 1994). Performance by high-status and low-status group members is perceived differently. While high-status individuals are given high evaluations for their performances, performances by low-status individuals are devalued and ignored despite their objective merit. Thus, while some low-status members may have very high ability, status hierarchies based on expectations for group members' ability are maintained as stable social structures. Very competent performances by low-status individuals do not produce comparable increases in expectations of their ability. Instead, unexpectedly competent performances by low-status individuals are seen as illegitimate (Ridgeway 1988; Ridgeway and Berger 1986, 1988) and subject to negative sanctions (Berger et al. 1998). Also, Ridgeway (1978) proposed and later demonstrated (Ridgeway 1981, 1982; replicated by Shackelford, Wood, and Worchel [1996]) that contributions of low-status group members are perceived to be selfishly motivated, while contributions of high-status group members are assumed to be group motivated. A high score on an ability test might well be negatively sanctioned if it were perceived as an illegitimate and selfish attempt to grab status. An expression used in the southeastern United States succinctly captures how group members feel about a competent performance by a low-status group member: Overachievement by those of low status is considered *uppity* and, therefore, subject to a number of social sanctions.

A story told by John Lamont, a successful African-American physicist, illustrates how displays of competence by low-status individuals can be sanctioned (Benjamin 1991). Lamont's father was a self-taught aeronauti-

[2] We present only those parts of status characteristics theory necessary to our argument. For more thorough exposition see Berger, Fişek, Norman, and Zelditch (1977), Markovsky, Smith, and Berger (1984), Webster and Foschi (1988), Berger, Fişek, and Norman (1989), or Berger, Norman, Balkwell, and Smith (1992).

cal engineer who invented a number of devices for use on airplanes during the 1930s and 1940s. However, given the prevailing racial climate, he supported his family working as a janitor at a gas company in Washington, D.C. When job opportunities opened up after the Depression, he decided to try for a better job. He told the foreman he would like to be a machinist. The foreman was skeptical of his ability to operate the machines. So Lamont's father demonstrated his ability as a skilled craftsman by operating the machines easily. His display of competence enraged the foreman who fired him on the spot from his job as a janitor.

Extending the Scope of Status Characteristics Theory

Status characteristics theory explains how group members expect superior performance from high-status members and evaluate their performance as superior even when performances by high- and low-status members are identical. However, the theory has not been used to predict the objective level of group members' performances. In particular, status effects on individual performance on standardized tests have been ruled out because such situations lack collective orientation and thus fall outside the scope of the theory. That is, because individual performance on standardized tests is independent of the contributions of other group members, the theory cannot predict that status information will alter the performance of test takers. To use the theory to predict differences in ability test scores, we must show how it can apply to individual performances.

Ridgeway and Walker (1995) note that status processes have been observed to constrain individual performances independent of actual ability. Hints of a role for status processes in performance on ability tests can be found in the research literature. Elizabeth Cohen and her colleagues have designed school programs to integrate students of diverse backgrounds in a cohesive classroom (Cohen 1986, 1993; Cohen, Lotan, and Leechor 1989). They succeed by carefully controlling status processes and by breaking down existing status distinctions (Cohen and Roper 1972, 1985; Rosenholtz 1985; Rosenholtz and Cohen 1985). An interesting by-product of the program is improved performance on standardized achievement tests for all students but especially for lower-status students (Cohen et al. 1989).

IQ gains made by children adopted into enriched environments have been found to fade by early adulthood (Scarr and Weinberg 1978). This has been seen as evidence of the genetic basis for intelligence (Herrnstein and Murray 1994). However, it also is possible that the IQ gains of young adoptees fade because status processes in school and work situations become more important as children age and counter the effects of an enriched home environment.

Steele and Aronson (1995) gave African-American and European-American students a test composed of items from the verbal portion of the Graduate Record Exam. In one condition, students were told the test measured their verbal ability. In another condition, students were told the test merely was a means of familiarizing them with verbal problems they might encounter. European-American students did equally well on the test in both conditions. In contrast, African-American students did worse when told the test measured their ability. This suggests that the status of African-Americans plays a role in their performance on standardized tests: their scores may drop when they know the results can be used to compare their performance with that of European-Americans. Our goal is to explain the mechanism behind such stereotype vulnerability.

We propose that status processes constrain individual performances when those performances are expected to have an impact on the relative status of the performer in the future (Lovaglia and Lucas 1997). Status makes a difference on an individual performance when the results of the performance have status value, that is, when the performance is expected to be used to determine status rank in future group interaction. According to status characteristics theory, status rank is a direct function of the aggregated expectations of group members for each other's competent performance on collective tasks. Those expectations are determined in part by individual performances. For example, achievement test scores produce general expectations of competence. We expect a person who scored 1600 on her combined math and verbal Scholastic Assessment Test (SAT) before entering college to be able to contribute more than a person who scored 750. Standardized test scores have a significant impact on the future academic and work careers of Americans. Thus, we propose that status processes will affect ability test scores in the United States. There are several ways this could occur.

Individuals' expectations for performance on a test could affect their performance directly. Here the mechanism suggested by status characteristics theory is similar to that proposed by self-efficacy research. Individuals who perceive themselves to be more capable of success on a test will persevere in trying to solve problems and experience less fear of failure. There is a major difference between status characteristics theory and self-efficacy with regard to expectations of competence. Self-efficacy has to do with *beliefs* or *conceptions* about personal capability. The implication is that perceptions of self-efficacy are consciously held. In contrast, status characteristics theory makes no assumption that expectations of competence are consciously held. Individuals may or may not be aware that they expect more competent performances from those with high status (Berger, Wagner, and Zelditch 1985). Still, the advantages accruing to high-status individuals on ability tests from increased perseverance and reduced anxi-

ety would probably produce only a small effect. We would not expect any greater effect for expectations of ability than the small effect of self-efficacy found by Multon et al. (1991).

William Foote Whyte ([1943] 1981) documented other ways that status processes affect individual performance in his classic *Street Corner Society.* Low-status gang members rarely beat gang leaders at bowling even when low-status members had superior bowling ability. If by chance a low-status member did beat one of the leaders, the low-status member could be taunted, ridiculed, and talked into losing a return match. This reaffirmed the status hierarchy of the group. An individual's bowling score is not dependent on a collective process and so would fall outside the scope of status characteristics theory, yet status processes seem to operate. It could be argued that there is a collective metatask—the task of maintaining the status hierarchy. A goal of bowling may be maintenance of status hierarchies, just as a goal of ability testing is the maintenance of status hierarchies. Thus, the same processes that affected bowling scores could affect scores on standardized tests. Low-status members underperformed at bowling because of the consequences of bowling well. In society, there also may be negative consequences for low-status individuals who do well on standardized tests.

Rational Choice

Individuals occupying different status ranks may come to expect quite different outcomes from the same performance on an objective, standardized test. These expectations may then affect how an individual performs on such a test. From a rational choice perspective, if people expect to receive large rewards for success on a test, they may do better on the test than they would if they expected a smaller reward. For example, some might expect a good score on the SAT test to lead eventually to a position as a prominent doctor or lawyer. But others, coming from different backgrounds, might expect a more modest reward, a steady job with the post office or as a teacher.

Members of different groups also may expect different costs to result from a score on an ability test. If people expect to pay substantial costs for success on a test, they may do worse than they would if they expected costs to be trivial. For some the costs of success might be trivial. A high score and going off to college entail little disruption in the life of the son or daughter of a doctor. Others may expect much higher costs. For example, a minority student who does well on a test and plans to go to college might be shunned by peers for trying to be "too white" (Fordham and Ogbu 1986; Steinberg, Dornbusch, and Brown 1992). African-Americans are particularly concerned about the costs of academic success. Arroyo

and Zigler (1995) showed that, for African-Americans, attitudes conducive to high academic achievement were associated with introjective depression and especially with concerns about losing the approval of others. Moreover, going away to college involves immersion in an alien culture, cut off from social support (Morris 1979; Blackwell 1981; Fleming 1981; Fordham 1988).

There also is evidence that teachers penalize low-status individuals for scoring higher on tests than teachers think they should. The original Pygmalion study found that intellectual ability is penalized when it violates expectations (Rosenthal and Jacobson 1968). If members of a disadvantaged group are expected to possess lower mental ability, then disadvantaged individuals who do well on ability tests face increased criticism. Rubovits and Maehr (1973) conducted a follow-up to the Pygmalion study that compared teachers' reactions to African-American and European-American students. African-American students thought to be "gifted" were criticized the most and given the least attention. European-American students thought to be "gifted" were praised the most and given the most attention. African-American students thought to be nongifted received almost as much praise and attention as did European-American students thought to be nongifted. Rosenthal's (1994) conclusion that a penalty is imposed on those who show unexpected intellectual ability holds true for race. African-Americans with high IQ scores were criticized more and praised less than other students, both black and white. That is, African-Americans were penalized for high scores on a standardized test.

We conclude from the above evidence that African-Americans not only expect to be penalized for a high score on standardized tests but actually do bear a cost for success. Fordham and Ogbu (1986) suggest that African-Americans grow up with a double message about intellectual achievement: (1) work twice as hard to get half as far, and (2) keep your head down, do not stand out. As a result, African-Americans experience ambivalence and dissonance toward intellectual effort and success (Fordham and Ogbu 1986). Thus, underperformance on an ability test represents an adaptive response by African-Americans. Getting a low score on a test would be a reasonable way to avoid those costs. However, it is possible, even likely, that low-status individuals would work as hard as anyone when taking an ability test. We propose that people taking an ability test try hard to get the best score possible without incurring an unacceptable cost. In the face of a possible severe penalty for success, low-status individuals should be extremely motivated to get just the right mediocre score.

Because the expected *consequences* of ability test scores have implications for status hierarchy formation, we propose an extension to status characteristics theory that allows its application to individual performances. If the extension proves valid, then an individual's rank in the

status hierarchy and the resulting rewards and costs associated with success on achievement tests may affect scores on such tests. We tested the following hypothesis for situations in which differences in an ability test score have implications for future work in a task group:

HYPOTHESIS. *If the performance expectations and reward expectations of ability test takers correspond to their status, then their performance is a positive function of their status.*

METHOD

We used an experimental approach to test our theory that the expected consequences of a score on an ability test partially determine the score that an individual receives. Researchers have recently pointed to the need for social research to control possible genetic or biological influences on social phenomena (Scarr 1997; Udry 1995). Eysenck (1995) and Turkheimer (1991) argue that the experimental investigation of differences in intelligence is now not only needed but possible. Experiments provide strong evidence for the causal direction of a relationship between two variables. We use laboratory experiments to investigate whether a fundamental social process—status hierarchy formation and maintenance—can produce differences in ability test scores. Experimental control allows us to pinpoint the cause of any test score differences we find and rule out competing genetic or biological explanations.

Along with its strengths, the experimental approach has disadvantages, as do all research designs. For maximum effectiveness, the experimental approach dictates, for example, that research participants are assigned randomly to the conditions thought to produce an effect. By randomly assigning participants to conditions, we obtain strong evidence that those conditions, and not something else, produced any observed differences in test scores. We can screen out extraneous systematic differences between experimental groups, while statistically controlling random differences. The disadvantage is that the kinds of conditions we can create in the laboratory are limited. For example, it is not possible to assign participants to a race randomly. It is not feasible to assign participants to any major social category associated with differences in ability test scores. We cannot randomly assign participants to different religions, to wealth or poverty, to different home environments. The problem of alternative plausible explanations that plagues other research methods is present in experiments where participants cannot be randomly assigned to conditions. For example, we could administer a standardized test to carefully matched African-American and European-American students. The results would likely show that African-American students scored lower, but we would not be any closer to finding out why. To effectively investigate the social process

that produces differences in ability test scores, we must assign participants randomly to either high-status or low-status conditions.

In a laboratory, we can create status differences that have social consequences. We can create conditions where high-status participants expect higher rewards and lower costs than low-status participants for a high score on an ability test. Once created, we can assign participants randomly to those conditions. Then we can administer a standardized test of mental ability and look for differences in test scores between conditions. That is, we can model the social process theorized to produce differences in ability test scores. If we find theoretically predicted differences, then we have strong evidence that the social process being modeled does produce differences in ability test scores.

The logic of experimental design is indirect. Results of experiments do not generalize to naturally occurring situations the way that survey questionnaire results do (Zelditch 1980). For example, surveys conducted before elections predict more or less accurately who will win the election. We know how accurate those surveys will be. The more representative of the population of voters is the sample used in the survey, the more accurate the results will be. Experiments do not work that way at all. It seems reasonable to ask, How can an experiment on white university undergraduates tell us anything about racial differences in test scores?

The logic of the experimental approach is commonly understood in other fields of research. Most of us are familiar with its application to medical research. For example, medical researchers cannot randomly assign people to be exposed to suspected cancer-causing agents, then wait to see who gets cancer. They use laboratory animals instead. Researchers paint tobacco tar on the skin of randomly selected mice, while randomly selecting other mice as controls. They then wait to see if mice painted with tobacco tar get cancer more often than do the control mice who were not exposed. When the painted mice get cancer much more often than the control mice, researchers are confident that the tobacco tar caused the cancer. The study is replicated under different conditions with different animals to investigate the process by which tobacco tar produces cancer. For example, dogs can be taught to smoke cigarettes and the cancer rates of smoking and nonsmoking dogs compared. However, as has often been said by executives of tobacco companies and their lawyers, studies on laboratory animals do not prove that smoking tobacco causes cancer in humans.

While laboratory studies have not proved that smoking tobacco causes cancer in humans, they have shed light on the physiological process that does. If the same physiological processes take place in humans and in particular laboratory animals, and if those processes have been shown to produce cancer in those animals, then we have reason to suspect that

cancer will result in humans as well. Added to the evidence of laboratory studies is the correlational evidence from human populations. People who smoke cigarettes get cancer at a much higher rate than nonsmokers do. Smokers who quit smoking for a number of years have a reduced chance of getting cancer. It is true that smoking tobacco has not been proved to cause cancer in humans. However, few people think that smoking is safe. The evidence linking smoking to cancer is overwhelming.

Laboratory studies of social phenomena employ the same logic. Experiments are best used to test theories of social processes (Mook 1983; Zelditch 1980). Experimental evidence is then used to develop better theories in a research program. In research programs, the relationship between theory and empirical investigation is reciprocal. Empirical research both tests theory and prompts theoretical development that then requires further tests. Research programs facilitate the cumulative growth of knowledge (Wagner and Berger 1985, 1986, 1993; Szmatka and Lovaglia 1996). We feel we understand a social process when the theory explaining it has been supported by many experimental tests of various aspects of the process. Then, when we understand an underlying social process, we gain confidence that theoretically derived predictions will hold in diverse situations that conform to the conditions specified by the theory (Webster and Kervin 1971).

We apply the logic of the experimental approach to the study of differences in ability test scores between groups. To do so we extended a well-tested theory of an underlying social process. Status characteristics theory explains how the process of status hierarchy formation operates to produce different ability test scores for high-status and low-status individuals. The theory has been supported by hundreds of tests of its various aspects.[3] We designed experiments to test the specific prediction that status processes can produce differences in ability test scores for high-status and low-status individuals. If the experiments find higher ability test scores for high-status than for low-status individuals, then we will gain confidence that we understand how status processes produce different ability test scores for advantaged and disadvantaged groups.

There is ample evidence that race operates as a status characteristic (Cohen and Roper 1972; Webster and Driskell 1978). Thus, if racial differ-

[3] See Berger, Wagner, and Zelditch (1985) for a review of the first 20 years of status characteristics and expectation states research. Berger et al. (1992) review more recent work and describe an extensive test. Cohen and Zhou (1991) found status characteristics to influence behavior in research and development teams that had existed for years in organizations. Recent theoretical developments relating status processes to other areas of social research have also been supported in experimental tests (Lovaglia and Houser 1996; Biernat and Kobrynowicz 1997; Troyer and Younts 1997; Willer, Lovaglia, and Markovsky 1997).

ences in society are characterized by the conditions specified by the theory to produce differences in ability test scores, then we will gain confidence that we understand how status processes produce racial differences in ability test scores. The theory specifies three general conditions for its application to racial differences in ability test scores: if (1) racial differences are such that African-Americans are expected to be less competent in a variety of work settings than are European-Americans, and (2) test scores have status consequences for future work in groups, and (3) African-Americans expect lower rewards and higher costs to result from success on tests of mental ability, then the theory proposes that status processes will produce test score differences between racial groups.

DESIGN

We created status differences in the laboratory and randomly assigned participants to either a high-status or low-status condition. Then we administered a standard test of mental ability to all participants. Differences in test scores between the high-status and low-status conditions represent strong evidence that status differences produced differences in test scores. We also collected data from participants for several relevant variables that can act as statistical controls.

The creation of status differences in the laboratory is the key to the experimental demonstration of the effect of status differences on ability test scores. Studies of naturally occurring status distinctions such as race inevitably confound social and hereditary causes. Steele and Aronson (1995) conducted experiments that show how test scores of African-Americans but not European-Americans are adversely affected by expected comparison with national norms. Thus, African-Americans are vulnerable to their social position, scoring lower when their scores could affect their social relations. Racial vulnerability appears to be a purely social effect, produced by test conditions in the laboratory. Randomly selected African-Americans in the comparison condition had lower scores than African-Americans in the no-comparison condition. However, even controlled laboratory experiments on race allow alternative explanations. The source of African-American vulnerability has yet to be determined. Would other students be as vulnerable in circumstances similar to those faced by African-Americans? Again we run into the random assignment problem. We cannot tell whether European-American students would respond similarly given similar experiences because we cannot randomly assign race.

Creating a Status Characteristic

To investigate whether status processes produce differences in ability test scores and to rule out alternative explanations, we created a status charac-

teristic in the laboratory as proposed by Ridgeway (1991; Ridgeway et al. 1995). We started with a status-neutral characteristic, handedness, that we felt would be an integral part of participants' identities. Because mental ability is a stable trait that has been reported to resist attempts to change it, we wanted to create a strong status effect. We felt that the status effect would be enhanced if participants identified with the characteristic, if the characteristic, like handedness, was part of them. We first established that handedness was a status-neutral characteristic. Survey responses from 384 undergraduates in the subject population showed no differences in expectations for the competence of left- and right-handed persons.[4] We then set out to imbue a person's handedness with status value.

When students arrived for the study, they were asked if they were right- or left-handed, and a brightly colored wrist band was placed on the preferred wrist. (Handedness was later confirmed by a series of computerized questions.) Students were told they would be working in a group to solve difficult problems that required intense cooperation among group members. Computerized instructions informed students in one condition that research showed right-handedness to predict high ability in the kind of group work to be performed, while left-handedness predicted low ability.[5] Right-handedness was further associated with several positive personal traits, while left-handedness was associated with several negative traits. The instructions explained that research has shown right-handers to be better in the kinds of group work to be done and that "certain psychological processes having to do with the left and right brain are thought to cause this effect." Students were told that research had shown left- handers to be more impulsive, disorganized, and prone to inattention. Further, students were told that research had shown some positive traits of left-handers, such as creativity, could increase the resentment of those who worked under them.[6] In another condition, left handedness was associated with high ability and characterized positively, while right-handedness was associated with low ability and characterized negatively. Thus, students

[4] The analyses are available on request from Michael Lovaglia.

[5] The program to run the experimental setting is available from Michael Lovaglia on request.

[6] We checked during debriefing to see whether the information on handedness was plausible. In only a few cases did students say they were suspicious to the point that they did not try their best on the ability test. Data for these students were removed before analysis. Much more common was the reaction by low-status individuals during debriefing who said they knew they were being discriminated against and tried harder on the test to prove discrimination would have no effect on them. These students generally scored below average on the test.

could be randomly assigned to a condition in which their handedness created expectations of either high or low status in the upcoming work with their group.

Altering Expectations of Rewards and Costs

We also wanted students to expect different rewards and costs to result from the status we assigned them. To do so, we set up three levels of occupational status, each with a different pay level, in their work groups: Supervisors were to be paid $17 per hour; analysts, $8; and menials, $4.50. Students were informed of two criteria for assigning them to an occupation, both of which were purported to predict success at the task: (1) their status as a right- or left-hander and (2) their score on an aptitude test. High-status individuals who scored high on the aptitude test would be supervisors. High-status individuals who scored low on the test and low-status individuals who scored high on the test would be analysts. Low-status individuals who scored low on the test would be menials.[7] Thus, while all students had a monetary incentive to do well on the test, the incentive was greater for high-status students.

On the cost side, students were told that low-status individuals were seldom appointed supervisor because of the conflict that sometimes erupted between low-status supervisors and other group members. They were told that low-status analysts were also harassed but not as severely. They were warned not to harass low-status group members. Further, students were warned against cheating and told that cheaters were often caught when low-status individuals scored abnormally high on the test. Thus, low-status students expected costs to result from a high score on the test while high-status students did not expect those costs.

In sum, students assigned high status expected higher rewards and lower costs to result from a high score on an aptitude test.[8] We could then administer a standard ability test to determine whether students assigned high status would score higher than students assigned low status.

[7] It can be argued that similar discrimination against African-Americans is effectively outlawed now in the United States. However, we propose that lower test scores result from the expectations of low-status individuals for lower rewards and higher costs. Thus the expectations of individuals, not the legality of discrimination, is the issue. We predict race, as a status characteristic, to produce differences in test scores to the extent that African-Americans expect lower rewards and higher costs to result from a high score.

[8] We used several kinds of rewards and costs because we were unsure of our ability to produce a significant difference in ability test scores after a brief and relatively mild laboratory manipulation.

Raven Progressive Matrices Test

We chose to administer the Raven Progressive Matrices test to students for several reasons. First, it has been an accepted test of mental ability for many years (see Raven, Court, and Raven [1992] for a summary of standardization research as well as tests of reliability and validity). Second, Raven scores correlate highly with other measures of general mental ability and are considered closely related to Spearman's *g*, or general intelligence (Jensen 1992). Third, no reading is required, which makes the Raven less culture bound than some other tests of mental ability. Fourth, because it involves deciphering patterns, students' a priori expectations for their performance on verbal and quantitative problems would be less salient than on a scholastic aptitude test. Fifth, it is self-administered, and thus scores are not as subject to the bias of test givers as is the case for some intelligence tests.

Students were seated at computer terminals in individual lab rooms for the experiments. After approximately 15 minutes of computerized orientation about their status in the upcoming group task, students were given the Raven Progressive Matrices test. Upon completing the test, they were debriefed and paid.

Data Collection

During the computerized orientation, students answered several questions to confirm their identity as left- or right-handers. Data for those few who identified themselves as ambidextrous were removed from the study because assignment to the high- or low-status condition could not be determined. Students also reported their age, gender, high school grade point average (GPA), and score on the ACT test required for admission to the university. Other control variables of possible interest included father's and mother's levels of education and the estimated number of books in their home when they were 10 years old. During a post-test debriefing, students were questioned to determine whether they held expectations for their performance in group work that conformed to their assigned status.

STUDY 1

Altogether, 47 students (23 men and 24 women) took part in the first experiment. Participants were recruited from large survey courses at the University of Iowa. Data were not analyzed for three students because they reported that their suspicions regarding the status assignment caused them not to try their best on the test. That left data for 44 participants,

TABLE 1

ANALYSIS OF COVARIANCE, STUDY 1

Effects	*F*	*P*
Status	5.23	.028
Gender	.67	.417
ACT	5.97	.019
GPA	.02	.895
Status × gender	3.29	.077

N = 44 men and women.

11 men and 11 women in each status condition. Except for two students of Asian descent, all were European-American.[9]

The mean Raven score for students in the high-status condition was 55.63 (SD = 3.03), significantly higher than the mean Raven score for low-status students (53.91; SD = 3.60; $t[42] = 1.72$; $P = .046$, one-tailed).[10] A difference between conditions also appeared on one control variable. Low-status students reported a *higher* GPA in high school than did high-status subjects. Thus, overall means on the Raven test may understate the effect of status assignment.

Table 1 shows the results of analysis of covariance to estimate the effect of status assignment on the Raven score while controlling for students' ACT score, GPA, and gender. Note that the status effect remains ($F = 5.23$; $P = .028$). Score on a previous ability test also has an independent effect ($F = 5.97$; $P = .019$). Note also the marginal interaction between status and gender ($F = 3.29$; $P = .077$). We looked at the mean Raven scores of men and women separately to determine the nature of the interaction. Women, it appeared, were not affected by status assignment in the same way as were men. The mean Raven score for women was essentially the same in high-status ($M = 54.18$; SD = 3.49) and low-status ($M = 53.82$; SD = 2.52) conditions.

DISCUSSION

The discovery of gender differences concerned us because gender itself is a status characteristic (Pugh and Wahrman 1983; Johnson, Clay-Warner,

[9] Although the lack of African-Americans avoids a possible confounding of race and status, we did not plan it. There were few African-American students in the subject pool and none volunteered for this study.

[10] Results from a nonparametric test, the Mann-Whitney U, are similar ($Z = 1.92$; $P = .028$, one-tailed).

and Funk 1996). Most standard tests of intelligence are constructed to equalize scores of males and females. We did not expect any difference in scores between males and females on the Raven test. However, in study 1, high-status women scored about the same as did low-status men. The theoretical implications are interesting. If status has an effect on ability test scores, and gender is a status characteristic, then women should score lower than men on ability tests. If status differences do constrain ability test scores, then why do women not score lower than men on most mental ability tests?

To speculate about the effect of status processes on ability test scores for status groups in society, it is necessary to estimate how each group conforms to the conditions of the theory. Gender and race are status characteristics but much else as well. They are fundamental social categories in society. For example, we have shown that African-Americans conform well to the model. African-Americans are expected to be less competent than European-Americans on a variety of tasks and can expect lower rewards for the same level of ability. Perhaps most important, African-Americans face penalties, sometimes severe, for high scores on ability tests. Women are in a different situation. They may be expected to be less competent than men, and they can expect lower rewards. Women, however, do not face the penalties for high test scores that African-Americans do. Social conventions may require women to conceal their intelligence in certain situations, but a high-ability test score will not be penalized. The accepted path to success for women lies in doing well in school, getting high scores on tests, and going to an elite university to meet the right people. Women do not experience greatly increased costs relative to men until they enter the workforce full time, get married, and have children. Then the ambivalence toward personal achievement typical of African-Americans becomes apparent in women as well (Simon 1995). An example of the lower productivity of women compared to men can be seen in the lower publication rates for female scientists even though female scientists have IQs at least as high as male scientists (Cole 1987). Because women do not experience the same penalties for a high score on an ability test that African-Americans do, they are not likely to feel the profound ambivalence to a high score that the theory predicts for African-Americans.

Because Raven scores for women are not in general different from those of men we must examine the experimental situation for the cause of the emerging gender differences in study 1. We do so in study 3 when we investigate status differences in all-female work groups. First, however, we wanted to confirm that the differences found for men in study 1 were reliable.

TABLE 2

RAVEN SCORE REGRESSIONS, STUDY 2

Variable	b	SE b	*P*
Status	2.04	.99	.047
ACT	.32	.16	.059
GPA	.11	.40	.785

N = 40 men.

STUDY 2

To avoid confounding gender with assigned status, we continued study 1 with only men to try to confirm the original result. Altogether, 43 men participated in the study. Data were discarded for three men, including two who identified themselves as ambidextrous and one who was suspicious of the status assignment and said he did not try hard on the ability test. Data for 40 men remain to be analyzed, 20 in each status condition. All men added to the study were European-American.

Male students assigned to the high-status condition scored significantly higher on the Raven test (M = 56.20; SD = 2.88) than did male students assigned low status (M =54.00; SD = 3.58; t[38] = 2.14; P = .020, one-tailed).[11] No difference was found between status conditions on any control variable. We used multiple regression analysis to estimate the size of the effect of status assignment on Raven Score while controlling for students' high school GPA and ACT score. Table 2 shows that, controlling for these other measures of mental ability, the effect of status assignment on the Raven score remains about as large as the difference in overall means, that is, 2.04 points. Having established a significant difference in raw Raven scores between status groups, we transformed Raven scores into IQ scores (M = 100, SD = 15) for illustrative purposes only, to give a feel for the magnitude of the effect. Mean IQ for students assigned to

[11] Results from a nonparametric test, the Mann-Whitney U, are similar (Z = 2.37; P = .009, one-tailed). Data are censored at the high end of the scale for the Raven test. Because the test is designed for the general population, scores in our college student sample are quite high. The mean score for the high-status group is over 56. A perfect score is 60. Students who score a perfect 60 may have been able to score higher had the test allowed them. A possible result would be the *under*estimation of the difference between high- and low-status groups. However, the upper limit to Raven scores had little effect in this study. Only one subject in the high-status group and one in the low-status group scored a perfect 60 on the test.

the high-status condition was 120, while mean IQ of students assigned low status was 112, an eight-point difference in IQ (Raven 1990).

We conclude that randomly assigning male students to a high- or low-status position altered their scores on the Raven Progressive Matrices test. In study 1, however, no effect of the status assignment was found for female students.

STUDY 3

We altered the experimental setting to account for the status of women in society. The design of study 1 may have inadvertently imposed added costs on women in the high-status condition. Gender is a status characteristic. Women are expected to be less competent than men at a wide variety of tasks. But if women are low in status compared to men, the prospect of a leadership position in a mixed-sex work group would likely engender the same ambivalence in women as it would in individuals assigned low status. The gender composition of work groups was not specified in study 1. However, it is likely that many participants assumed work groups would be composed of both men and women. If so, Raven scores of female participants in study 1 might have been depressed in the high-status condition. Women may have expected higher costs to accompany a supervisory position than did men. That is, women in the high-status condition facing the prospect of being appointed supervisor may have expected the same kinds of harassment in the work group as low-status supervisors.[12]

If high-status women scored lower on the Raven test because their status as women would place them in an uncomfortable position as supervisor of a mixed-sex work group, then the solution is straightforward. For study 3, we changed the computerized instructions to make clear that women would work in groups composed only of women. To lessen male orientation in the group task, we changed the work group scenario from a business setting to a mental health treatment setting. The three levels of occupational status in work teams were changed: Psychotherapists were to be paid $17.00 per hour; technicians, $8.00; and orderlies, $4.50.

We also added another cost to low-status students who scored high on the aptitude test. We informed students that low-status individuals with high scores on the test would be given the chance to become psychotherapists if they wrote and delivered a short speech to a professor and several graduate students. This increased the cost of a high test score for low-status students because many people fear public speaking. We also felt it would increase the involvement of low-status students, giving them a

[12] We thank Kevin Leicht for pointing this out.

TABLE 3

RAVEN SCORE REGRESSIONS, STUDY 3

Variable	b	SE b	*P*
Status	2.31	.92	.017
ACT	.31	.15	.052
GPA	.33	.40	.412

$N = 40$ women.

chance to become supervisor. However, we hypothesized that despite any increased involvement, low-status students would still score lower on the mental ability test than would high-status students.

There were 44 women students in the study. Data for four students were discarded: one because she identified herself as ambidextrous, another had missing data, and two suspected the status assignment and said they did not try hard on the test. One woman, assigned to the high-status condition, said she was so upset at the unjust treatment of low-status students that she could not concentrate on the test. We included her results in the analysis, somewhat depressing the mean Raven score for high-status students. We analyzed data for 40 women, 20 in each status condition. Except for one Hispanic student assigned to the high-status condition, all were European-American.[13]

The results for women in study 3 replicate closely results for men in study 2. Women assigned high status scored significantly higher on the Raven test ($M = 54.95$; SD = 2.93) than did women assigned low status ($M = 52.35$; SD = 3.39; $t[38] = 2.59$; $P = .007$).[14] We found no significant differences between women assigned high and low status on any of the control variables.

Table 3 gives results of the multiple regression analysis controlling for high school GPA and ACT score. Note that with these other indicators of mental ability controlled, the effect of status assignment remains about the same as the difference in the overall means, that is, 2.31 points. The size of the effect for women in study 3 was close to that for men in study 2, both in terms of raw Raven score and transformed IQ score. We conclude that the status assignment had similar effects on male and female students. Status processes produced a significant difference in ability test

[13] As in study 1, although the lack of African-Americans avoids a possible confounding of race and status, we did not plan it (see n. 9 above).

[14] Results from a nonparametric test, the Mann-Whitney U, are similar ($Z = 2.40$; $P = .008$, one-tailed).

score between participants assigned to high- and low-status conditions of about half a standard deviation in magnitude.

DISCUSSION

We developed a theory to explain why socially advantaged individuals score higher on ability tests than do disadvantaged individuals even though both take the test under identical conditions. We began with status characteristics theory and its propositions linking membership in socially advantaged or disadvantaged groups to inequalities in performance evaluations and rewards. In the theory, status characteristics that signal membership in advantaged or disadvantaged groups trigger expectations for ability that then produce observable differences in individual behavior. However, status characteristics theory had not been applied to individual performance on ability tests because the test situation seems to lack the collective social interaction necessary for status processes to occur.

Cohen's work using status processes to improve the academic performance of schoolchildren (Cohen et al. 1989) as well as Whyte's (1981) classic ethnographic account of status processes in a gang suggest that status processes do affect individual performances. We proposed an extension of the scope of status characteristics theory to include situations where individual performances have consequences for future interaction in work groups. These consequences of individual performances are what bring status processes to bear on those performances. For example, a high score on an ability test leads to higher expectations of ability. In status characteristics theory, status rank is a direct function of expectations of ability. Thus, high score on an ability test represents a bid for increased status. However, bids for increased status by low-status individuals may be seen as illegitimate and sanctioned. We proposed that if low-status individuals are penalized for high scores on an ability test, then it is in their interest to score lower. We predicted that the status-disadvantaged who expect low rewards and high costs to result from a high score on an ability test would score lower on the test than the status-advantaged.

Results of three experiments supported the hypothesis that participants randomly assigned low status would score lower on an ability test than would participants assigned high status. We used an accepted test of mental ability, Raven's Progressive Matrices. In study 1, men assigned low status had significantly lower Raven scores than did men assigned high status. However, no effect was found for women. In study 2, we increased the number of men who participated in the study to 40 to confirm that the effect found in study 1 was reliable. Study 2 found that men assigned high status scored about half a standard deviation higher on the Raven Progressive Matrices than did men assigned to low status. Thus, the mag-

nitude of the effect, while substantial, is below that found between African-Americans and European-Americans on such tests—about three-quarters of a standard deviation (Jensen 1980). However, the status effect found in study 2 resulted from about 15 minutes of instructions to participants that created mild differences in status and relatively small differences in rewards and costs.

Study 3 investigated why women responded differently than men to the conditions in study 1. We theorized that women may have been subjected to additional costs for a high score on a test. Women may have expected a high test score to result in leadership of a mixed-sex work group. Because of the status differences between men and women, women may have expected difficulties supervising men similar to the difficulties expected by participants assigned to the low-status condition. Thus, study 1 confounded gender with low status, explaining the result that high-status women scored about the same as participants assigned low status. In study 3, to resolve the problem, women expected to participate in work groups composed only of women. If the status of women were responsible for the lack of a result in study 1, then assigning women to work in same-sex work groups should solve the problem. In study 3, as predicted, women assigned to high status scored higher on the Raven Progressive Matrices than did women assigned to low status. The magnitude of the effect was comparable to that found for men in study 2, about half a standard deviation. While we did not anticipate the additional constraints on test scores for women produced by experimental conditions in study 1, resolution of the problem in study 3 provides independent confirmation of the effect of status processes on ability test scores.

Our studies raise several questions for future research. In our experiments, we looked for an effect of an entire status process. That is, a status process that includes both status differences and the differences in rewards and costs that result. Differences in status alone, independent of subsequent rewards and costs, may have a small effect on ability test scores. The effect would be similar to that of self-efficacy. There is some evidence that self-efficacy has a small effect on standardized test scores (Multon et al. 1991). It would be interesting to see if such an effect can reliably be produced in the laboratory by altering expectations that participants have for their ability. Also, penalties for a high score on an ability test may be the major factor in the low test scores we found for low-status individuals. Gender is a status characteristic, and women cannot expect rewards as high as men for a high score on an ability test, yet ability test scores for men and women are equal. Women, however, do not face any obvious additional penalties of a high score on an ability test. In contrast, African-Americans, who face a variety of additional costs for success, have substantially lower ability test scores. Thus, it may be the additional

penalties rather than lower expected rewards that produce most of the difference in test scores. Future experiments could systematically vary rewards and costs expected by participants to result from high-ability test scores.

Assessing the implications of our results requires care. We have discovered evidence that status processes—and the differential rewards and costs they generate—cause differences in ability test scores in the laboratory. Such evidence does not generalize directly to differences in tests scores for status advantaged and disadvantaged groups in society. Rather, we have extended a well-developed and rigorously tested theory of status processes, then tested our extension. Because our experimental evidence supports the theory, we gain confidence that the theory can be applied wherever status-advantaged and -disadvantaged groups experience conditions required by the theory. To predict that members of a status-disadvantaged group will score lower on an ability test, the theory requires that (1) disadvantaged individuals are expected to have lower ability than advantaged individuals, (2) test scores have consequences for future work in groups, and (3) disadvantaged individuals expect a high test score to result in lower rewards and higher costs than do advantaged individuals.

Given the theoretical requirements for predicting which groups will score lower on ability tests, we can then use additional sources of evidence to determine how closely a particular group corresponds to the requirements of the theory. If the group faces conditions shown by the theory to produce differences in ability test scores, then we have reason to suspect that differences found for that group result from status processes. There is substantial evidence that African-Americans face conditions required by the theory to produce differences in ability test scores. First, African-Americans are expected to be less able on a variety of tasks requiring mental ability. That is, race is a status characteristic (Cohen and Roper 1972; Webster and Driskell 1978). The lower academic performance of African-Americans is widely known. Second, ability test scores determine who is admitted to elite institutions of higher education and who is given opportunities for high-status occupations. Thus, ability test scores have status consequences for future work in groups. Third, there is evidence that African-Americans can expect to be criticized for higher-than-expected test scores (Rubovits and Maehr 1973). In addition, African-Americans expect lower rewards and actual penalties to result from higher education. In a study of high school students, Mickelson (1990) found that, while African-Americans embraced the abstract value of education even more strongly than European-Americans, African-Americans were more pessimistic than European-Americans about the concrete rewards that would result. African-Americans can expect higher costs to result from academic achievement as well. Steele (1992) describes the high personal

and emotional costs involved when African-Americans attempt to complete a college degree, as well as the lack of expectations that a degree will offer any meaningful improvement in their lives. Because ability tests are strongly related to education, African-Americans may have similar expectations for ability tests. While more systematic evidence is needed of penalties imposed on African-Americans for high test scores, substantial evidence exists that African-Americans face the conditions required by the theory. If African-Americans do face theoretically required conditions, then we have reason to suspect that status processes lower their scores on ability tests.

CONCLUSION

We have shown how status processes, by altering expected rewards and costs, can affect scores on a standard test of mental ability. In three experiments, participants were given approximately 15 minutes of computerized instruction to create status differences and attendant expectations for rewards and costs. Participants in high-status and low-status conditions received exactly the same instructions. In all studies, the brief and relatively mild intervention produced differences in scores on a standard test of mental ability approximately half of a standard deviation in magnitude. Students randomly assigned to a high-status position scored higher on the Raven Progressive Matrices test than those assigned low status. The status effect remained after individual differences in mental ability were statistically controlled. Further research is needed to ascertain the effects of the more severe and long-term status processes that operate in society at large. Our results do suggest the necessity to account for status differences—and the expectations for rewards and costs that they produce—in any attempt to measure mental ability accurately.

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