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"RACE," SEX AND SOCIAL CLASS DIFFERENCES IN COGNITIVE ABILITY: TOWARDS A CONTEXTUAL RATHER THAN GENETIC EXPLANATION

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ABSTRACT

Are "race," sex and social class differences in cognitive ability a matter of brain size or genes? Some researchers answer with an unequivocal "yes" to this question. The aim of our review is to demonstrate that differences among social groups in terms of cognitive ability are largely illusory. Because these group differences are contextually dependent, they rather reflect the social context in which they are assessed rather than any real intrinsic differences. From this perspective, the genetic/brain size hypothesis seems to be largely irrelevant. We also demonstrate that data used by advocates for the genetic/brain size hypothesis to illustrate a reliable cognitive ability differential among racial groups are weak.

INTRODUCTION

There has perhaps never been a more universal value than the current commitment to cultural relativism: Groups are judged to be different not inferior or superior (see Bloom, 1987). As a result, explanations for the lack of achievement among certain groups take the form of group members having to integrate discontinuous cultures (see Taylor, 2002 for review). Nevertheless, there remains a subgroup of scientists who vigorously promote a genetic interpretation of group-based differences in achievement. From Jensen to Rushton to Hernstein and Murray, evidence for a genetic basis to racial differences in intelligence is marshaled. Because such theorizing facilitates the rationalization of racism, social scientists have been swift to condemn genetic arguments.

However, the all but unanimous dismissal of genetic theorizing has been less than effective. Simply dismissing genetic explanations on the basis of ideology alone is bound to be ineffective since it does nothing to dissuade those who seek justification for racist beliefs. Theory and research to counter genetic interpretations of racial differences has appeared weak and defensive, compared to the apparently overwhelming research evidence presented by genetic theorists. The result is that critics of a genetic interpretation have usually limited themselves to criticizing the methods and interpretations of genetic evidence rather than proactively presenting evidence for an alternative, more socially based explanation.

In the present paper we address one major source of information upon which genetic theorists rely. Our aim is not merely to criticize, but rather offer, what we believe to be compelling evidence for a more environmentally based explanation for group differences. While our focus is limited to a single issue, our hope is that a thorough analysis of one of the important building blocks of genetic theorizing may stimulate further proactive attempts to address other dimensions of the genetic position.

The observation we address is that differences in physical brain size between social groups explain differences in cognitive ability. For example, Rushton and Ankney (1996) argue that there is convincing evidence that "cognitive ability varies by sex, social class and race" (p. 21). Moreover, they argue that differences in brain size account for these differences in cognitive ability. They thereby conclude that racial, and indeed gender and social class differences, in academic achievement are related to physical brain size. The aim of our review is to demonstrate that differences among social groups in terms of cognitive ability are largely illusory. Because these group differences are systematically associated with crucial contextual variables associated with the assessment of cognitive ability, we argue that the differences reflect the social context in which they were assessed rather than any real intrinsic differences. There is now relatively compelling evidence to suggest that even apparently minor aspects of the social context can have a dramatic impact on tests of cognitive ability. Specifically, the framing of a task and characteristics of the tester can have a dramatic effect on performance. Moreover, we suggest that these "contextual effects" can, and do, account for performance differences between social groups.

We begin our analysis with an outline of the genetic/brain size argument that certain theorists use to explain a reliable performance differential among social groups across situation. Section II is devoted to demonstrating that performance differences in cognitive ability among racial groups are contextually dependent. Conversely, it will be demonstrated that the data used by advocates of the genetic/brain size hypothesis in order to illustrate a reliable performance differential among racial groups are weak. The third section extends our contextual analysis in order to explain gender and social class differences in cognitive ability. We conclude by emphasizing the importance of the social context that is so often neglected in classical research on social group differences in cognitive ability.

THE GENETIC/BRAIN SIZE HYPOTHESIS

A prototypic genetic argument is one proposed by J. P. Rushton (1997). Rushton (1997) argues that there is a consistent and persistent pattern of "racial" differences in cognitive ability: Mongoloid (Oriental) greater than Caucasian (White) greater than Negroid (Black). He asserts that the average Oriental IQ is approximately 106, the IQ for Whites hovers close to 100, and the average IQ score for Blacks lies in the 85 range. Moreover, Rushton suggests that this pattern is universal, with Blacks in Africa having a lower IQ than Blacks in America. Rushton (1997) links these group-based differences in cognitive ability directly to genetics as they are reflected in physical brain size. Apparently ignoring studies that suggest a different ordering (Cain & Vanderwolf, 1990; Cernovsky, 1990), Rushton maintains that Orientals average 1 cubic inch more brain matter than Whites, and Whites average a relatively large 5 cubic inches more than Blacks (see Rushton, 1997, Table 6.6, p. 130). Finally, because brain size is reliably correlated with cognitive ability, he suggests that differences in brain size among groups are causally related to differences in terms of cognitive ability. For example, Rushton reports that recent MRI studies reveal an overall correlation of .44 between IQ and brain size, a relationship that is noticeably higher than the .20 correlation found in studies using simple head size measures. In summary, Rushton proposes the following hypothesis: "race" is related to brain size gap, which is related to cognitive ability gap. Lynn (1991) focuses on specific genes. Specifically he suggests that the genes or alleles for low intelligence are more present among "Negroids" than other ethnic groups. Consequently, it is not surprising that "Negroids" score lower than other ethnic groups on IQ tests.

These forms of genetic arguments have been, and continue to be, vigorously criticized (see for example, Cernovsky, 1990, 1995; Cain & Vanderwolf, 1990; Dasen, 1993; Kamin & Omari, 1998; Lieberman, 2001; Peters, 1995; Peters, Jancke, Staiger, Schlauge, Huang, Steinmetz, 1998). Indeed, the entire debate is part of the larger ongoing nature/nurture controversy that is central to the social sciences. While the nurture argument has held the ideological upper hand, the recent explosion in genetic research has led to a new generic theorizing in areas ranging from schizophrenia to alcoholism.

In terms of group differences in cognitive ability, some researchers argue for a genetic explanation of "race" differences (see for example, Garrett, 1961; Herrnstein & Murray, 1994; Jensen, 1969; McGurk, 1956; Shuey, 1958) while others argue that differences in cognitive ability are based on environmental factors (Flynn, 1984, 1987; Gould, 1978, 1981; Kamin, 1974; Pettigrew, 1964; Tobias, 1970). Lynn (1991) summarized the key environmental factors by noting that "environmentalists have pointed to a variety of factors which they consider capable of explaining the low Negroid IQ, of which the most important are bias in the tests, the adverse social and economic living conditions experienced by blacks, discrimination and prejudice from white majorities and the historical legacy of slavery which has demoralized blacks and destroyed their family structure" (p. 256).

The purpose of the present paper is not to review these well-articulated criticisms of genetic models. Our aim is to show that advocates of the genetic/brain size hypothesis do not appreciate the powerful contextual factors associated with cognitive testing that have group-based performance implications.

THE ROLE OF CONTEXTUAL FACTORS ASSOCIATED WITH COGNITIVE TESTING

We propose that studies revealing "race" differences in cognitive ability are extremely difficult to interpret, because of chronic methodological biases in their procedures. For example, in one of the most recent studies purporting to support a genetic interpretation of racial differences in cognitive ability (i.e. Rushton & Skuy, 2000), the procedure involved a description which explained that "students were invited to take part in an international study of the widely used Standard Progressive Matrices" of Raven (p. 254). Clearly, participants were explicitly placed in a context of anticipated comparison (i.e. international study). As well, they were acutely aware that their "intelligence" was being assessed (i.e. SPM of Raven). Finally, with respect to characteristics of the experimenters, there were five whites (including the authors) and two were Africans. There was no indication that co-ethnic experimenters tested participants. Results revealed that White participants scored significantly higher (IQ = 104) than Blacks students (IQ = 84). We argue that this procedure suffers from at least, three main methodological biases that make any genetic interpretation of the results problematic. Specifically, we review evidence to demonstrate that the anticipation of social comparison, the ethnicity of the experimenter, and the belief that one is being tested with an instrument purportedly designed to measure intellectual ability, can have a dramatic and systematic effect on performance. We need to underscore that we have chosen the Rushton and Skuy's (2000) study to illustrate these systematic biases first, because it is one of the most recent studies and one of the most representative, and second because it is if anything less biased than the majority of studies where White experimenters administer tests to Black participants.

The "White Anticipated Comparison Effect"

In an early study by Katz, Epps and Axelson (1964) , relatively easy and difficult digit-symbol tasks were administered to 116 Black and 96 White males under three types of instructions: no anticipated comparison, local anticipated comparison (i.e. own college) and national comparison (i.e. comparison with white colleges). For all participants, a Black faculty member administered the digit-symbol task. Results revealed that Blacks scored highest when told they would be compared with other students (Blacks) at their own college, at an intermediate level when anticipating comparison with national (presumably White) norms, and lowest under non evaluative instructions. Moreover, these differences tended to be more pronounced for the difficult task as compared to the easy task. By comparison, Whites demonstrated the same level of performance in both the local and national experimental conditions. In this study regardless of comparison condition Whites did not score higher than Blacks. The clear implication of this study is that the anticipation of comparisons with White students has deleterious effects on the performance of Black students.

Katz et al. (1964) proposed two hypotheses in order to explain their main effect. First, on the basis of Easterbrook's (1959) theory, they argued that in the "national (presumably White) comparison" condition, Blacks, in a manner consistent with "stereotype threat" (Steele & Aronson, 1995) were so focused on the racial comparison that it distracted them from being attentive to task-relevant cues. Mandler and Sarason (1952) have offered an alternative explanation. They propose that Blacks may be fearful of comparative failure, and this fear may have disrupted their performance. Regardless of the explanation, an apparent minor aspect of the context such as anticipated comparison with Whites can have a dramatic effect on the test performance of Blacks

The Experimenter Ethnicity Effect

In a study conducted by Katz, Henchy and Allen (1968), it appears that cognitive ability (i.e. verbal learning task) of 148 Black children aged 7-10 was significantly affected by the ethnicity of the experimenter who administered the test. Specifically, Black children learned more rapidly with a Black examiner than with a White examiner (for similar results, see Pettigrew, 1964, p. 117). This study is particularly interesting for us, because in many cases classic studies assessing the cognitive ability of Blacks, use White experimenters. Katz et al. (1968; see also Katz, 1972) propose that contact with a White experimenter possess a social threat component for Blacks that is detrimental to their performance.

More recently, Danso and Esses (2001) revealed that experimenter ethnicity can also have an effect on the intellectual performance of White participants. One hundred White undergraduates were asked to perform a reasoning ability test (French, Ekstrom & Price, 1963). Results indicated that participants who where tested by a Black experimenter performed better on the ability test than did those who where tested by a White experimenter. Moreover, this effect was moderated by social dominance orientation (i.e. a scale assessing the degree to which individuals desire and support social inequality and group-based dominance). Specifically, the tendency to perform better when tested by a Black experimenter was especially evident among high SDO participants. Danso and Esses (2001) interpreted these findings in terms of perceived threat of competition from minority group members by dominants that are motivated to maintain their group dominance. Independent of interpretation, the study strongly confirms that experimenter ethnicity is not a benign issue, and even minor situational variation can have a dramatic effect on cognitive ability.

In summary, both the Katz et al. (1968) and Danso et al. (2001) studies suggest that experimenter ethnicity needs to be considered seriously when conducting research designed to assess cognitive abilities. It is important to note that the Danso and Esses study suggests that the performance of Oriental participants might also be affected by the ethnicity of the experimenter. Extrapolating from their findings, we would expect Oriental participants to perform better with a White experimenter than with an Oriental one. We are not aware of any research designed to address this possibility, but many studies on the cognitive ability of Oriental participants have been conducted by Whites researchers (see Lynn, 1991, Table 2). This hypothesis needs to be empirically tested directly.

The "Intellectual Test Awareness Effect"

In another study, Katz, Roberts and Robinson (1965) revealed that the meaning of a task can have a marked effect on cognitive ability. In this study using digit-symbols tasks, the task was described as a test of intelligence in the first experimental condition and as a motor coordination test in the second condition. All participants were Black undergraduates (N = 184). First, the results revealed that instruction manipulation had no significant effect on participant's performance when the experimenter was Black. However, when the experimenter was White, Blacks scored significantly higher under the "motor coordination" instruction than under the "intelligence" instruction, although the task was identical in both conditions. This study seems to indicate that altering the meaning of a task is sufficient to impact cognitive performance. At the very least the findings suggest that the cognitive abilities of Black are relatively malleable.

Consistent with this perspective, a recent study by Steele and Aronson (1995) confirms the earlier findings of Katz et al. (1965), but in addition demonstrates that this "instruction effect" is strong enough to erase the Black/White cognitive ability gap. Specifically, in their two first studies, Black and White undergraduate students were randomly assigned to two main experimental conditions: in the first condition, the task (i.e. Scholastic Aptitude Test, SAT) was presented as a measure of intelligence (i.e. reading and verbal abilities). In the second condition, the same task was described as a task designated to understand the psychological factors involved in solving verbal problems (i.e. psychological task). In these studies, while Whites scored significantly higher than Blacks under the "intellectual" instruction, there was absolutely no difference between the two groups when the test was presented as a psychological task. This suggests that if Blacks are aware, or suspect, that they are engaged in an intellectual test, they perform poorly. Interestingly, the magnitude of the effect seems sufficiently strong to explain the Black/White gap in North America.

According to Steele (1997) "where bad stereotypes about these groups apply, members of these groups can fear being reduced to that stereotype. And for those who identify with the domain to which the stereotype is relevant, this predicament can be self-threatening" (p. 614). Stereotype threat can impair performance in different ways: distraction, anxiety, self-consciousness, evaluation apprehension, or loss of motivation (Steele & al., 1995). For example, Blascovich, Spencer, Quinn, and Steele (2001) have examined the effect of stereotype threat on blood pressure. As with the previous research of Steele and Aronson (1995), Black and White participants were randomly assigned to a high versus low stereotype threat condition. As expected, Blacks exhibited greater blood pressure increases in the high stereotype threat condition than in the low stereotype condition. In addition, they performed more poorly on difficult items, but only in the stereotype threat condition.

As we have seen, "stereotype threat" can account for the Black/White performance gap, but interestingly it can also explain the White/Oriental difference on academic tests. In a study conducted by Aronson, Lustina, Good, Keough, Steele and Brown (1999; study 1), White males with high scores on the mathematics section of the Scholastic Aptitude Test (SAT) were invited to take part in a very challenging math test. In the first experimental condition, before the test, participants were explicitly confronted with the stereotype that Asians students outperform Caucasians students in mathematics. In the control condition, participants were not confronted with the stereotype. The main dependent variable was the number of items correctly solved. As predicted, the results revealed that participants solved a significantly higher number of items in the control condition than in the "Asian stereotype salient" condition. This study strongly suggests that "stereotype threat effect" requires neither a history of stigmatization, nor internalized feelings of intellectual inferiority. Other research has provided strong evidence in favor of this situational explanation (Leyens, Desert, Croizet & Darcis, 2001; Stone, Lynch, Sjomeling, & Darley, 1999). That is, situational pressures alone are sufficient to damage cognitive abilities. Interestingly, recent studies suggest that activation of the idea that Asians are superior in mathematics may also improve the performance of Asians themselves (Ambady, Shih, Kim & Pittinsky, 2001; Shih, Pittinsky & Ambady, 1999). Specifically, when Asian girls or women were reminded of their gender, they did not perform well compared to a control condition where neither their gender or Asian identity was activated. However, when they were reminded of their Asian identity, they did better than in the control condition (Ambady & al., 2001; Shih & al., 1999).

Regardless of the specific explanation one supports, the consistent pattern to the findings has important implications. How can the results be explained from a genetic perspective? As Lynn (1991) has argued: "the genetic theory requires that there should be a reasonably high degree of consistency of the intelligence levels shown by populations of the same race in a variety of geographical locations. Thus, Negroids should universally have lower intelligence levels than Caucasoids and this difference should be found in Africa and the West Indies as well as in the United States and Britain" (p. 256). Clearly the studies presented in this section invalidate the genetic explanation. Ethnic differences in term of cognitive ability are simply erased in more controlled laboratory settings. However, several studies suggest that there is existing evidence in the literature showing reliable intrinsic differences between "Mongoloid, Caucasoid and Negroid" (see Lynn, 1991, for a review). In fact, if we look more precisely, it appears that support for this relatively shared knowledge is relatively weak. The next section is devoted to this issue.

REVISITING LYNN (1991)

According to Rushton (1997), there is convincing evidence in the literature showing reliable cognitive ability differences between racial groups. For the most part, this assertion is based on Lynn's (1991) review of 120 studies designed as a review of the "world literature on racial differences in intelligence" (p. 254). Specifically, on the basis of an obscure race theory, Lynn (1991) categorized the reported studies into six racial groups: "Mongoloid, Caucasoid, Negro-Causasoid Mixed-Race, Negroid, Amerindian and South Est Asian." For example, he differentiated Negroids living in occident (i.e. "Negro-Caucasoid") from the "pure Negroid of Africa" because he proposes that "Negroids in the United States and in Britain are nearly all Negroid-Caucasoid hybrids" (p. 256).

Table 1 presents the mean scores of cognitive ability for each of these six ethnic groups (the number of studies for each group is also presented, see N). To test if these groups differ significantly, an analysis of variance has been performed with general cognitive ability as a dependent variable. As Table 1 shows, these groups differ significantly (see F). However, if we examine the studies more carefully, it appears that this effect is very difficult to interpret in term of genetic differences between groups.

Table 1. Recapitulative Bias of Lynn's (1991) Review

	Mongo-loid	Caucasian	Negroid-Caucasoid Mixed-Race	Negroid	Amer-indian	South East Asian	F	r/IQ
General cognitive	105.3	99.3	82.3	74.4	87.4	90.7	58.7***	-
Ability	N= 23	N= 41	N= 16	N= 11	N= 15	N= 6		
Verbal	96.4	97	83	60	78.7	84	9.6***	-
	N= 12	N= 3	N= 10	N= 1	N= 15	N= 5		
Visuo-spatial	107.1	102.2	81.5	75	98.5	87	32.3***	-
	N= 14	N= 5	N= 6	N= 2	N= 14	N= 1		
Date of publication of reported studies	1981.4	1974.3	1974.2	1966.2	1973.7	1972.9	2.45*	.30***
Human Development Indicators (HDI)								
Life time	78.4	76.3	75.1	50.6	-	-	150***	.65***
Adult alphabetization (%)	97	97.6	95.5	75.5	-	-	35.5***	.53***
Combined Scholarship (%)	84.4	92.6	89.4	69	-	-	7.6***	.22*
GDP corrected by purchasing power	23289.5	18743.9	20531.5	4413.9	-	-	20.4***	.49***

Note: *** $p < .001$; ** $p < .01$; * $p < .05$.

First, it is interesting to note that the date of publication of the studies reported vary significantly by group (see Table 1). Moreover, date of study correlates positively and strongly with general cognitive ability ($r = .30$, $p < .001$). This result is consistent with the Flynn effect showing that general cognitive ability increases over time (Flynn, 1984; 1987). Not surprisingly, the "Negroid" group, who scored lowest on cognitive ability, are also the oldest studies.

Second, the age of the participants representing the different groups vary systematically by ethnicity (see Table 1). However, this effect is less detrimental to the genetic hypothesis because age does not vary systematically with cognitive ability.

Third, there is no test in common among the six groups. For the 120 studies reported, 32 different tests were used (see Lynn, 1991, Table 1 to Table 6). This means that the six groups are compared on cognitive tests that differ in important respects.

Fourth, the review by Lynn (1991) totally neglects important environmental variability among the studies considered. For example, if the difference between Blacks and Whites living in the United States in terms of cognitive ability is due to genetic factors, it follows that no matter what the variability in environmental factors, the cognitive ability gap should remain consistent between these groups. Similarly, Lynn (1991) argues that concerning "Negroid-Caucasoid" hybrids, "their Caucasoid genes should, under the genetic hypothesis, raise their intelligence level compared with the pure Negroids of Africa" (p. 256). Following this perspective, because pure "Negroids" are those who have the highest proportion of deficient genes in terms of intelligence, they should have lower scores on cognitive ability tests than "Mixed-Negroid, Caucasoids or Mongoloids". This suggests that "pure Negroids" would always score lower on cognitive ability tests, and this should not depend on environmental factors. This hypothesis can indeed be tested. The world report on human development in 1998 suggests that four main indicators best assess human development: life time, adult alphabetization, combined scholarship, and the GDP corrected by purchasing power. The human development indicators (HDIs) for each country including Lynn's review (1991) are presented in Table 1. Specifically, for each study we have reported the HDI for the country in which the study was conducted.

Table 1 shows HDI scores averaged by ethnic group. As Table 1 indicates, while studies reported for "Mongoloids, Caucasoids and Mixed-Negroids" reveal similar levels of human development, studies reported for "pure Negroids" show a significantly lower level of human development. Interestingly, each HDI is strongly and positively correlated with cognitive ability. In order to examine if this environmental difference can account for the difference in terms of cognitive ability, the scores for "Mongoloids, Caucasoids and Mixed-Negroids" have been averaged. As predicted, this new group scores higher on cognitive ability ($M = 97.6$) than "pure Negroids" ($M = 74.4$), $F = 56.25$, $p < .001$, Eta = .39. However, controlling for HDI, this effect becomes non significant, $F = 1.3$, $p > .25$, Eta = .016. In other words, the reason why "pure Negroids" score lower than other groups in terms of cognitive ability is simply because the reported studies have been conducted in a country that differs significantly in terms of human development indicators. Similarly, we might hypothesize that if life condition differences between Blacks and Whites in the USA were controlled, their differences in term of cognitive ability would be reduced, if not erased. Of course, advocates of the genetic hypothesis can always counter that human development indicators are genetically driven (see for example, Rushton and the adaptation of the r/K strategies to humans). Because it has already been extensively demonstrated that this perspective is simply false and without any scientific foundation, we do not address this issue here and instead refer to more thorough reviews (Anderson, 1991; Silverman, 1990; Weizman, Wiener, Wiesenthal & Ziegler, 1990; Zuckerman & Brody, 1988).

Fifth, Lynn's (1991) review of the data involves inconsistencies that are not commented upon by the author. For example, a study conducted by Buj (1981) reveals that Irish adults (i.e."Caucasoids") scored 78 on the Culture Fair Test (see Lynn, 1991, Table 1). Interestingly, in the same study, with the same cognitive ability test, it appears that a sample of Ghanaian adults ("pure Negroids") scored 80 (see Lynn, 1991, Table 3).

It is also interesting to note that, in many cases, "mixed Negroids," who are presumed to have a lower proportion of deficient genes related to intelligence, score equally or lower on cognitive ability than "pure Negroids". For example, in his fourth table, Lynn (1991) reports three studies showing that "mixed-Negroids" from Jamaica scored approximately 71 (range from 66 to 75). This average score is below the average for "pure Negroids" (i.e. 74.4, see Lynn, 1991, Table 3). More recently, in a study by Rushton and Skuy (2000), 173 South Africans (i.e. "pure Negroids") scored 84 on the Raven's Standard Progressive Matrices. That is, they obtained a higher score than "mixed Negroids" from Lynn's Table 4 (i.e. mean = 82.3). We agree with Lynn (1991) when he concludes that "any studies showing that pure African Negroids have higher IQs than American or British Negroid hybrids would falsify the genetic hypothesis" (p. 256). Using Lynn's own conclusion, data reported in this section falsify the genetic hypothesis and raise serious doubts about its validity.

Finally, in Lynn's review (1991), Amerindians and "Mongoloids" were differentiated and categorized into two different "races". Despite the fact that Lynn (1991) acknowledges that these two groups show important similarities (see p. 276-277), he distinguishes them. Following Groves (1991), from an anthropological perspective, Amerindians can be classified as "Mongoloids." Then, why are they separated in the Lynn's review? The reason is perhaps because if we average their scores, "Mongoloids" ($M = 98.2$) evidence the same cognitive ability as "Caucasoids" ($M = 99.3$), $F < 1$.

In summary, in addition to the fact that experimenter ethnicity, awareness that a test of intelligence is being administered, and anticipated social comparisons have never been controlled for in the studies reported by Lynn (1991), we suggest that it is simply erroneous to conclude from the data that there are cognitive ability differences among groups that refer to genetic/brain size differences.

GENDER AND SOCIAL CLASS DIFFERENCES IN COGNITIVE ABILITY

Parallel to the argument linking "race" differences in cognitive ability, Rushton and Ankney (1996) suggest that cognitive ability and brain size varies significantly by sex and social class, thereby accounting for systematic cognitive ability differences. The sex issue has already been addressed and criticized thoroughly (see for example Peters, 1993, 1995). As Rushton and Ankney (1996) themselves acknowledge, concerning gender differences, there is a clear paradox. Women have proportionately smaller brains than do men, but apparently score the same on tests of intelligence. Willerman, Schultz, Rutledge and Bigler (1991) put this to an empirical test using magnetic resonance imaging. They demonstrated that women have smaller brains than men, but indeed both groups scored equally on tests of intelligence.

Another inconsistency is the fact that while white women have smaller brains than black men (Ho, Roessmann, Straumfjord & Monroe, 1980), white women nevertheless score better on tests of intelligence. Although not demonstrated empirically, the classical rationalization of this inconsistency is to argue that sex differences in brain size have an impact on mathematical skills rather than on general intelligence (Kimura, 1992; Rushton & Ankney, 1996). If this hypothesis is true, then whatever the social context, sex differences in mathematical skills should remain constant. Similar to studies comparing racial differences in intelligence, studies have also shown that sex differences in mathematical ability depend largely on the social context in which they are assessed. One of the best illustrations is a series of three experiments by Spencer, Steele and Quinn (1999). They demonstrated that men score significantly better than women on a mathematical test only when women are told that the test produces gender differences (threat condition). When women were told that the test does not produce gender differences (no threat condition), men and women score equally in mathematical ability (see also Monteil & Huguet, 1999). Thus, gender differences in mathematical performance seem to be too malleable to support a genetic argument.

Many studies have documented that, in modern societies, socioeconomic status correlates significantly with scores on tests of cognitive ability, with higher status socioeconomic groups scoring better than lower socioeconomic status groups (Hernstein & Murray, 1994; Rushton & al., 1996). However, Croizet & Claire (1998) have shown that this is the case only when participants are aware that they are being tested for intellectual ability (threatening condition). When the identical test is presented as part of a study in cognitive psychology, participants from both low and high socioeconomic groups score equally.

To summarize, racial differences in cognitive ability, as well as gender and social class differences, are all strongly affected by the social context in which they are assessed.

CONCLUSION

The main objective of this article was to demonstrate that social group differences in cognitive ability do not refer to real intrinsic differences. In fact, there is a plethora of data to indicate that "race," gender and social class differences in cognitive ability are strongly malleable and highly sensitive to situational and contextual variables. All these studies share the common assumption that when the social context is threatening (i.e. high situational pressure), members of stigmatized groups (i.e. blacks, women and low socioeconomic status groups) perform less well than non stigmatized group members (i.e. respectively, whites, men and high socioeconomic status groups). But, when the social context is not threatening, both stigmatized and non stigmatized members perform equally in terms of cognitive ability. It is crucial that researchers take this element into consideration. As parsimony is desirable, it appears that social group differences in cognitive ability are wholly explainable without recourse to genes or brain size.

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