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RACE AND IQ SCORES Interest in the mental characteristics of Negroid populations (blacks), who originated in sub-Saharan Africa, as compared with European (Caucasoid) populations, has a long history; its literature extends from the ancient Greek philosophers to modern times (Baker, 1974; Eysenck, 1984). Eminent philosophers of the eighteenth and nineteenth centuries, such as Hume, Kant, Rousseau, and Voltaire, discoursed on the subject.

Sir Francis GALTON, whose work directly influenced the development of differential psychology, was the first to attempt to quantify racial differences in general mental ability. In his famous work *Hereditary Genius* (1869), written well before the first intelligence test was invented, Galton assumed that intelligence within each racial population is distributed according to the normal, bell-shaped curve. On the basis of evidence that modern scientists would consider inadequate and inappropriate, he estimated that the intelligence distributions of the black African and the white English populations, although overlapping each other considerably, had a mean difference of “two grades” on his particular scale (equivalent to about 1.3 standard deviations [*SD*] or 20 IQ points on the scale of present-day intelligence tests). Galton, like most other intellectual leaders of the eighteenth and nineteenth centuries, assumed, apparently without investigating, that the average black-white difference in mental ability is hereditary or innate. Today, they are generally forgiven for their expressed belief, since the zeitgeist (the general intellectual, cultural, moral tone) of that era encouraged no awareness that the prevailing “commonsense” view of inherent racial differences in mental and behavioral traits should meet scientific standards of evidence.

It was not until the 1930s that the zeitgeist markedly changed in this respect, less for scientific than for

ideological reasons, and largely because of Hitler's aggressive racist politics and overt anti-Semitism. After World War II, in the United States, with the ascendance of cultural anthropology, the growing protest over social, political, and economic injustice for blacks, and the advent of the civil rights movement in the 1950s and 1960s, the zeitgeist favored the doctrine of equality in mental ability and other psychological traits of the races. The formerly prevailing "commonsense" belief that mental differences between blacks and whites are innate had become virtually taboo, especially in intellectual and academic circles. By the late 1960s and early 1970s, the sociopolitical stance had become both the popular and the officially sanctioned "scientific" belief—according to which objectively assessed racial differences in behavior, such as mental test scores and scholastic achievement, were and still are attributed exclusively to cultural and environmental factors. A number of well-recognized anthropologists, geneticists, and psychologists, however, voiced the view that the causal aspect of observed (phenotypic) racial differences in abilities was, from a scientific standpoint, still an open question. This debate over causation has continued, often acrimoniously, clouded by social and political ideology. Some non-ideological and empirically oriented treatments of the subject do exist, which express varied but tentative and undogmatic interpretations of the evidence (e.g., Eysenck, 1984; Flynn, 1980; Jensen, 1973; Loehlin, Lindzey, & Spuhler, 1975; Scarr, 1984).

Assuming that race and racial differences are legitimate phenomena for scientific study, it is essential to divide the field clearly into two aspects: (1) the *descriptive*, which is concerned with observable (or measurable), that is, *phenotypic*, characteristics, and (2) the *theoretical*, which is concerned with explaining the nature, causes, or origins of the empirically established phenotypic differences.

The current (early 1990s) state of these two aspects—empirical fact and causal theory—is briefly summarized in this article, which is limited to research based on the black (African-American) and white (Caucasoid of European origin) populations of the United States. To consider research done in Africa, the West Indies, or elsewhere outside the United States would introduce complications beyond the scope of

this review. The relatively few recent (1965 on) black immigrants into the United States are generally not represented in the research literature.

A substantial average difference in IQ scores between blacks and whites in the same locality has been found in every part of the world. The phenomenon is not peculiar to the United States. One generalization, however, is possible: The black population of the United States, on average, scores as least as high (and typically higher) on tests of general mental ability as do black populations in Africa, both in the absolute level of IQ and in comparison with the white population in the same localities.

Scientists recognize that black Americans cannot be considered the same, racially or genetically, as black Africans. Black Americans are a racially hybrid population; about 25 percent of their present gene pool came from Caucasoid ancestors (Chakraborty et al., 1992; Reed, 1969). The percentage of Caucasoid genes in the black population varies in the different U.S. geographical regions, with the smallest (about 10 percent) in the deep South and a positive gradient fanning out toward the North and West (Reed, 1969). This phenomenon is almost entirely the result of selective emigration out of the South, since the black gene pool received the greatest infusion of genes from Caucasoids during the period of slavery (ca. 1650–1863) (Glass & Li, 1953; Gottesman, 1968). Northern and western states and territories ended slavery earlier than did the states of the South.

DESCRIPTIVE STATISTICS

During the twentieth century, hundreds of studies were published comparing samples of blacks and whites on tests of mental abilities. Most of these tests are intended to measure general mental ability, usually scaled as the intelligence quotient (IQ), with a mean of 100 and a standard deviation (*SD*) of 15 in standardization samples that are fairly representative of the general population of the United States. The statistical results of virtually all the U.S. studies done before 1980 are published in two compendiums (Osborne & McGurk, 1982; Shuey, 1966). The number of psychometric studies of black-white differences would probably be fewer, and the differences less enduring as a

subject of investigation, if the IQ were not correlated with variables of social, economic, and, especially, educational significance—variables on which U.S. black and white populations differ visibly and markedly. Indeed, this topic cannot be divorced from the distinctive social, economic, and cultural milieu of the comparison groups, which, for the black population, has been thoroughly detailed in Jaynes and Williams (1989). The main conclusions of a purely descriptive nature that can be drawn from this vast literature can be summarized under two headings: magnitude of IQ difference and constancy of IQ difference.

Magnitude of the IQ Difference. There are four main ways to quantify the difference between two groups on a metric trait: (1) the *mean difference* expressed in *SD* units (usually the average *SD* in both groups), which is the mean difference divided by the average *SD*; (2) the *median overlap*, which is the percentage of the lower-scoring group that exceeds the median (the 50th percentile) of the higher-scoring group; (3) the *total percentage overlap*, which is the percentage of persons in one of the groups whose scores are matched by persons in the other group; and (4) the *point-biserial correlation* between the metric variable and group membership (quantitized as 0/1), which ranges between values of 0.00 and 1.00.

The many studies of IQ based on representative samples of the black and white populations show that, on average, blacks are invariably the lower-scoring group. The descriptive statistics are best presented in terms of the range of values most typically reported. The various indices shown here are all derived from the same data. They are mathematically equivalent transformations, based on the assumption of a normal distribution of IQ in both populations and *SDs* of 13 and 15 IQ points in the black and white populations, respectively. These various statistical indices are simply different ways of viewing the same data.

The mean difference is 1.0 to 1.2 *SD* (equivalent to 15 to 18 IQ points). The median overlap is 8 to 12 percent. The total percentage overlap is 55 to 60 percent. The point-biserial correlation between IQ and group membership (b/w quantitized as 0/1) is +.45 to +.51. These figures are only approximations, being based on the assumption that the distribution of IQ scores conforms to the normal, or Gaussian, curve in

each racial group. In fact, however, the observed distributions often depart slightly from the normal curve. For example, in both racial groups, there are more extreme IQs (both high and low) than would be the case if the distribution were perfectly normal, and the distribution of IQ scores in some black samples is slightly skewed to the right. But these departures from normality would have only a slight effect on the above-mentioned estimates of the average difference in IQ scores between blacks and whites. It is important to note, of course, that the range of individual IQs within each racial group is five to six times greater than the mean difference between the groups. This means that mentally retarded persons and intellectually gifted persons exist in both groups, although their percentages in each group differ markedly as a consequence of the approximately 1-*SD* average difference between the two groups' roughly normal distributions of IQ. The reason for this disparity in percentages can be seen in Figure 1, which shows two normal IQ distributions, each with the same *SD* (15 IQ points) and a mean difference of 1 *SD* (i.e., IQ 85 vs. IQ 100). It is apparent that a cut (horizontal line) made through both curves at any given IQ score results in markedly different percentages of the scores in each distribution that fall below the cut score. For example, the percentages of blacks and whites with scores below IQ 70 are 15.9 and 2.3, respectively, a ratio of nearly 7 to 1. The departures from the normal curve typically observed in the IQ distributions of representative samples of the white and black populations of the United States mainly affect the percentages falling below IQ 70 (relatively more blacks) and above IQ 130 (relatively more whites).

The *variance* (squared *SD*) of IQ in the black population is only about 75 percent of the IQ variance in the white population; this corresponds to a *SD* of 13 for blacks as compared to a *SD* of 15 for whites. When the difference between two groups' means is expressed in terms of the average *SD* within each of the two groups, the size of the mean difference is therefore partly a function of the *SD* within each group. The *SD* of IQ is typically smaller, compared to the *SD* of IQ in the general population, in any groups that have been selected on the basis of intellectual abilities or achievements, such as students in selective colleges. But the

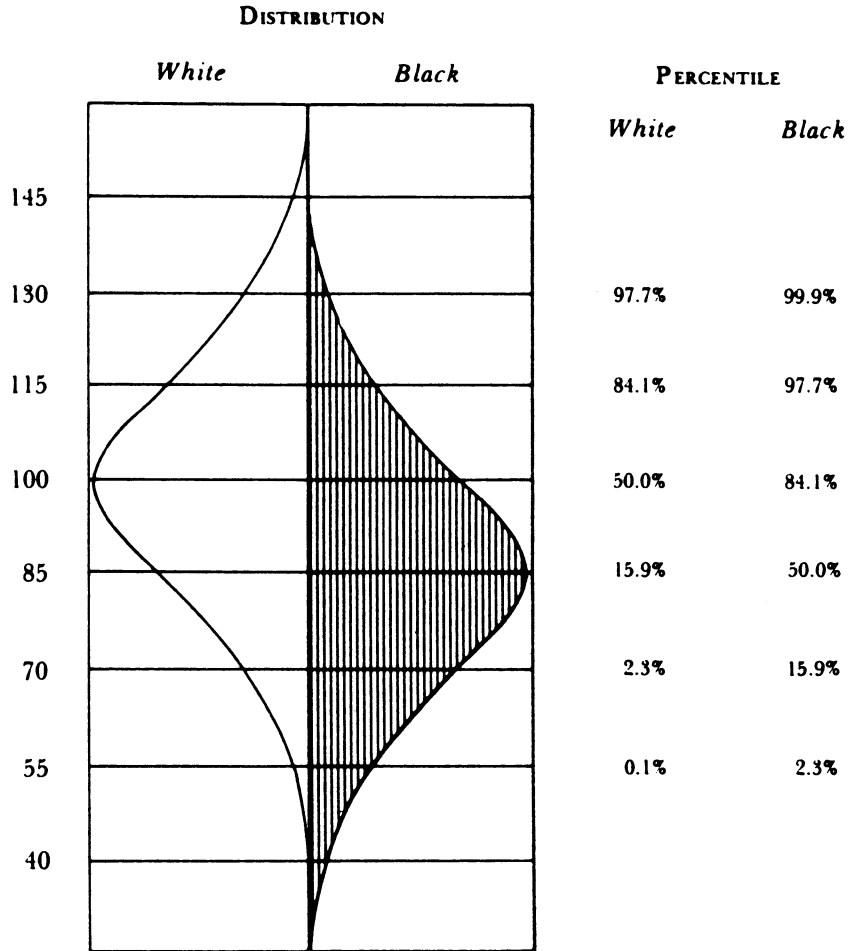


Figure 1
White and black IQ score distributions. The distributions are represented as normal curves with the same standard deviation (SD = 15), showing the percentile ranks of a given IQ in each distribution. (The percentile rank is the percentage of the total distribution that falls below a given IQ score.)

degree of selection is not always the same for blacks and whites. The ratio of the *SD* to the mean (*SD*/mean is technically known as the coefficient of variation) may not be the same within each group. This affects the size of the mean difference between the groups when it is expressed in *SD* units.

For example, black and white high school students who elect to take college admission tests, such as the Scholastic Aptitude Test (SAT) and American College Test (ACT), and college graduates who elect to take the Graduate Record Examination (GRE), Law School Admissions Test (LSAT), and the Medical College Admissions Test (MedCAT) show nationwide average dif-

ferences from one another of about 1.2 to 1.5 *SD* on these tests. Although the self-selected black and white groups are actually more similar to one another in their mean scores on these tests than are randomly selected black and white groups, the amount of variation of scores within the self-selected groups is relatively smaller than in randomly selected groups, hence increasing the self-selected groups' mean difference as expressed in *SD* units. And of course the degree of median overlap (and total overlap) between the black and white groups is related (inversely) to the mean difference expressed in *SD* units. However, when selection or admission is based on the same cut score for

blacks and whites, the resultant groups will differ in IQ very much less (typically only 0.1 to 0.3 *SD*) than do blacks and whites in the pool of self-selected applicants.

Constancy of the IQ Difference. The size of the average difference between blacks and whites on IQ tests has remained constant, at between 1.0 and 1.2 *SD*, from the earliest studies (1913) based on fairly representative samples to the present, spanning a period of about eighty years. The average IQ difference between blacks and whites is related to several variables: geographical region, age, sex, and instrument.

Geographical Region. The mean IQ of blacks varies in different parts of the United States, being generally lower in the southeastern states, and increasing on a fan-shaped gradient toward the northern and western states. (There is also a similar south-north gradient of IQ in the white population. For both blacks and whites, the gradient is mainly related to the proportions of urban and rural populations in different regions and to differences in the kinds of employment opportunities associated with this distinction.) Although the percentage of Caucasoid genes in U.S. blacks shows much the same geographical gradient as does IQ (Reed, 1969), this fact neither supports nor contradicts a genetic interpretation of the mean IQ difference between the races, because the emigration of blacks from the South may have been favored by higher mental ability *and* by white social attitudes that favored blacks whose appearance was more Caucasoid than Negroid. In recent years, there has been a trend toward greater geographical homogeneity of the black population with respect to IQ and scholastic performance, with reverse migration of blacks who have comparatively higher levels of education and occupational skills from northern states to developing urban industrialized centers in the South.

Age. Among infants, blacks score higher than do whites on developmental scales that depend mainly on sensory-motor abilities; but scores on these infant scales have near-zero correlations with children's IQs at school age because the IQ predominantly reflects cognitive, not sensory-motor, development. Between ages 3 and 4, before children normally enter school, the mean IQ difference between blacks and whites, of about 1 *SD*, is fully evident; it remains fairly constant thereafter. Therefore, schools do not create the IQ

difference; neither do they seem to increase it or reduce it.

Sex. Beginning with Alfred BINET's test in 1905, most IQ tests were designed to eliminate differences in the overall scores of males and females. Yet even tests that were not expressly designed to satisfy this aim show negligible and inconsistent sex differences in the white population. For reasons not yet known, a larger difference exists between black males and females, with females averaging about 4 to 5 IQ points above males. This difference is also reflected in scholastic achievement, college admissions and graduation, and occupational status, which all favor black females over black males (Jensen, 1971).

Type of Tests. Contrary to popular belief, blacks typically score slightly higher on verbal than on nonverbal and performance tests, even though such verbal and nonverbal tests are all equated in difficulty level in the standardization population. Generally speaking, though, on various mental tests, a considerable amount of true-score variation exists, on average, in the size of the difference between blacks and whites. It was Charles SPEARMAN (1927, p. 379) who first noted that the one aspect of tests that most consistently predicts the size of the mean difference (expressed in *SD* units) between blacks and whites is the test's loading on the psychometric factor *g* inherent in all cognitive tests and other manifestations of mental ability, which Spearman called the general factor (thus *g*) common to virtually all kinds of mental ability tests, however different they may appear superficially (Jensen, 1985, 1987). (See GENERAL ABILITY.)

The mean scoring difference between blacks and whites is essentially a difference in *g* (general ability), rather than in any specific features found in any of the wide variety of psychometric tests. The larger the test's *g* loading, the more poorly blacks score relative to whites. When the standardized mean differences between blacks and whites on a variety of tests are linearly regressed on the tests' *g* loadings, the estimated mean difference on a hypothetical pure measure of *g* is 1.2 *SD*. A test that involves some spatial ability (in addition to *g*) slightly increases the mean difference between blacks and whites, because blacks, on average, score lower than whites on the spatial factor, when blacks and whites are matched on *g* factor scores. A test that involves short-term memory decreases the

mean difference, because blacks score higher than whites on the memory factor, when blacks and whites are matched on g factor scores. A test that involves a verbal factor decreases the size of the black–white difference expressed in SD units (i.e. [mean difference]/ SD), because blacks and whites, on average, do not differ in verbal ability when blacks and whites are matched on g factor scores, but the total within-group SD on verbal tests (being composed of variance in g + variance in verbal ability) is increased, thereby decreasing the ratio (mean difference)/ SD .

These empirical findings are best understood in terms of factor analysis. Factor analyses of a wide variety of tests reveal two other factors besides g , which—independently of g —consistently show relatively small but significant mean differences between whites and blacks. On average, whites exceed blacks on a *spatial reasoning* factor (loaded in tests such as block designs, object assembly, and paper folding); on average, blacks exceed whites on a *short-term memory* factor (loaded in tests such as digit span, coding, and rote learning). It is noteworthy that their difference on the verbal factor (independent of g) is virtually nil. Despite this fact, the size of the average difference between blacks and whites on many verbal tests is still considerable (about 1 SD), because g is a much larger component of variance than the verbal factor per se in certain verbal tests (e.g., vocabulary, similarities, verbal analogies, and reading comprehension).

CAUSAL THEORIES

At present, no scientifically substantiated theory exists that explains the cause of the phenotypic differences in the mental test scores of blacks versus whites; that is, no one interpretation exists for the cause of the undisputed empirical evidence of phenotypic differences. Opinions differ mainly regarding the relative causal importance of genetic and environmental factors. A questionnaire survey (Snyderman & Rothman, 1988) of 661 experts—most of them in the fields of differential psychology, psychometrics, and behavioral genetics—reported the following percentages of responses to the multiple-choice question, “Which of the following best characterizes your *opinion* of the heritability of the black–white difference in IQ?”

15 percent: The difference is entirely due to environmental variation.

1 percent: The difference is entirely due to genetic variation.

45 percent: The difference is a product of both genetic and environmental variation.

24 percent: The data are insufficient to support any reasonable opinion.

14 percent: NQ [does not feel qualified to answer question]. (p. 294).

In science, answers to such questions are not decided by opinion polls, even when the opinions are those of scientists. Answers become recognized scientifically in terms of theory-derived hypotheses, or predictions, that are consistent with a preponderance of the empirical evidence. The present state of the evidence does not allow for a definitive ruling on any of the opinions listed above. The various causal theories and arguments that have been proposed can only be judged in terms of their coherence and plausibility in light of what is already known, with considerable certainty, about the nature of IQ in general.

GENETIC THEORY

The theory that the mean IQ difference between blacks and whites involves genetic factors is inferred from several lines of evidence. The broadest consideration is the theory of evolution by natural selection, which explains the origin of genetic differences between subspecies (in biology, races), that have been geographically separated for hundreds of generations in markedly differing environments; this results in the many physical differences among various races of plants and animals, including humans. It is generally considered implausible that the brain and its behavioral correlates would be wholly exempt from such genetic variation, and it also seems unlikely that genotypes and phenotypes for any characteristic, including general ability (g), would be *negatively* correlated with each other. (Assuming that the influence of genetic factors [technically called the broad heritability] on phenotypic IQ *within* a racial group is .70, the within-group correlation between phenotype and genotype would be $[\.70]^{1/2} = +.84$.)

Significant racial differences exist for human brain size, as measured in terms of either weight or volume, controlled for overall body size. The average difference in the size of the brain in blacks and whites is about 100 cubic centimeters, equivalent to about 0.8 *SD*. This is considered relevant, because studies of the relationship between differences in an individual's brain size and IQ show correlations of about +.30 when statistically controlled for general body size (reviewed by Jensen & Sinha, 1992). The interpretation of these facts is problematical, since males and females of the same race differ (about 100 cc) in brain size (with body size controlled), yet no good evidence exists for a sex difference in psychometric *g*.

Additionally, some 50 to 70 percent of the total variance in IQ (within racial groups) is attributable to genetic factors, indicating that genes are the major source of IQ variance *within* races. Although this does not prove that genetic factors are involved in the average IQ difference *between* races, it seems more plausible that genetic factors may be involved than would be the case if IQ had zero heritability. It is important to note, however, that this possibility cannot be tested by the same methodology of quantitative genetics that has been used to establish the heritability of IQ (and other traits) *within* a given racial group, which depends on analyzing the correlations between genetically related persons who differ in their degree of kinship—such as groups of monozygotic (identical) and dizygotic (fraternal) twins—who therefore necessarily share the same racial ancestry. Hence the method cannot apply to the heredity/environment analysis of the mean difference between racial groups.

The results of quasi-genetic studies, based on cross-racially adopted children and children of racially mixed marriages, are so vitiated by uncontrolled and confounded variables as to be virtually uninformative (Flynn, 1980; Jensen, 1973; Nichols, 1987; Scarr, 1984). Since the average difference between blacks and whites on IQ tests is mainly a difference in the *g* factor, and since among a wide variety of other mental tests it is the *g* factor that mainly accounts for their correlations with variables that are entirely outside the realm of psychometrics (such as reaction times and certain physiological variables [e.g., features of the evoked electrical potentials in the brain, the propor-

tion of genetic variance in test scores, and the purely genetic effect known as inbreeding depression]), this increases the plausibility of the hypothesis that the difference in mean IQ scores between whites and blacks involves genetic factors to some degree.

HYPOTHESIZED ENVIRONMENTAL CAUSES

A great many environmental hypotheses have been proposed concerning the lower mean IQ for blacks. Some of these have not yet been empirically tested; some may be inherently untestable; and some can be conclusively rejected by the results of extensive investigations. Researchers have not yet found any environmental factors that account for most or all of the difference. It even remains uncertain what proportion of the difference may be attributed to hypothesized environmental factors. Listed below are the most commonly hypothesized environmental, or nongenetic, factors; they are not mutually exclusive or incompatible with the hypothesis of genetic factors as a partial cause.

Culture-Biased Tests. No longer generally accepted is the assertion that racial/cultural biases in the tests cause the average IQ differences between blacks and whites. Extensive research has shown that the most widely used tests do not behave psychometrically as would be predicted from the culture bias hypothesis. For instance, the average difference is smaller on test items with scholastic and cultural content than on nonverbal tests. By and large, present-day IQ tests have the same reliability, predictive validity, item intercorrelations, factor structure, construct validity, rank order of item difficulty, item-characteristic curves, and heritability coefficients in both racial groups (Jensen, 1980; Osborne, 1980; Reynolds & Brown, 1984).

Educational Inequality. The IQ difference cannot be attributed to inequality in formal education, as the difference between blacks and whites is about 1 *SD* (15 IQ points) even before the age of school entry and remains fairly constant, at about 1 *SD*, from the primary grades through high school.

Socioeconomic Status (SES). It remains debatable to what extent SES is a cause or an effect of

IQ differences. In any case, the mean IQ difference between blacks and whites, after controlling for SES, is about 0.8 *SD*, or 12 IQ points. Also, differences between blacks and whites on various mental ability factors do not show the same pattern as SES differences (within each race). The average difference on spatial-reasoning tests between blacks and whites is larger than on verbal tests, but just the opposite is found in comparing higher and lower socioeconomic groups within either race. This fact is inconsistent with the explanation of the average differences between blacks and whites on mental tests in terms of socioeconomic status.

Teacher Expectations. Research has not supported the idea that teachers' expectations of lower test performances by blacks cause the average IQ difference between blacks and whites. Numerous experimental studies of the effects of "teacher expectancy" on IQ have failed to reject the null hypothesis, although some studies have shown modest but statistically significant effects of teacher expectancy on scholastic achievement.

Biological Environment. Certain environmental factors may have direct biological effects on the brain mechanisms involved in mental development, including the lower rates of prenatal medical care and higher rates of premature birth and low birthweight in the black population. These variables are negatively correlated with IQ. Nutritional differences simply in terms of total caloric intake are not supported by research studies as affecting blacks' IQ (Loehlin et al., 1975). Some experimental evidence does exist to show that deficiencies in certain vitamins and minerals may affect IQ. This research suggests that there are considerable individual differences, even among full siblings, in the daily requirements of certain vitamins and minerals that affect mental functioning. These specific nutritional deficiencies can be detected by means of blood tests; it is claimed that when appropriate dietary supplements are provided to children whose blood tests indicate deficiencies, they show significant gains in IQ (Eysenck & Eysenck, 1991). Although this research is considered controversial at the present stage of investigation, it seems to merit further study, particularly in relation to racial differences.

Style of Childrearing. Research on differences between blacks and whites in childrearing practices

has produced conflicting and inconclusive findings. In studies of children reared by their biological parents, parental IQ is completely confounded with differences in the characteristics of the parent-child interactions, ipso facto completely confounding genetics and environment as causal factors in children's mental development (Plomin & Bergeman, 1991). Studies of adopted children show that, within the normal range of environments—families ranging from blue collar to professional—differences in childrearing show little correlation with individual variation in children's IQs. The hypothesis that the average difference in IQ between blacks and whites results from differences in childrearing lacks conviction, because it attributes a large mean difference (1 *SD*) in IQ to weak causes. Research has found that such factors have scarcely any relation to individual variation in IQ (Plomin & Daniels, 1987).

Historical and Social Factors. White racism, a past history of slavery, consciousness of being a disliked and feared racial minority, caste status, social prejudice and discrimination, restricted opportunity that results in lowered levels of aspiration, peer pressure against "acting white," and "the black experience"—all these have been claimed as causes of the differences in average IQ and scholastic achievement between blacks and whites (Ogbu, 1978). This class of variables, however, has not been investigated scientifically, and few specific or empirically testable hypotheses have been proposed. Indeed, many of these hypothesized causes are probably not empirically testable. This is not to argue the reality of these historical conditions per se, but only to question the possibility of ever demonstrating in any scientifically acceptable way that they are causally related to the present mean difference in IQ between blacks and whites. Also, the plausibility of these hypotheses is lessened by the fact that, with the exception of the past history of slavery and its aftermath, many of these conditions have pertained to various other racial and ethnic minorities (particularly Asians and Jews) without any evidence of an enduring adverse effect on their test performance or scholastic achievement.

(See also: AFRICAN AMERICANS; ETHNICITY, RACE, AND THE MEASUREMENT OF INTELLIGENCE; RACE AND INTELLIGENCE.)

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RADEX THEORY In tests for intellectual abilities, different mental tests generally relate to each other in certain systematic ways. Radex theory is based on Louis GUTTMAN's hypothesis—which has since been verified repeatedly—that ability tests can be classified in at least two ways: differences in kind of content and differences in degree of complexity of the test items. Guttman developed radex theory in the article "A New Approach to Factor Analysis" (1954) to provide a theory of the structure of mental abilities as revealed by lawful interrelations between mental tests (see also FACET THEORY).

When dealing with aspects of mental functioning, the researcher often obtains scores on a number of