

for everyone," or "finding valued places if you aren't very smart." These goals can be achieved, we are assured, if the nation returns to the old neighborhood structure and regains local control. Herrnstein and Murray, despite their criticisms of contemporary social institutions, seem to forget that this is nearly the 21st century and we are now a nation with twice as many people as 50 years ago living in a worldwide network of political and economic structures and in environments that we little comprehend.

Nevertheless, the authors continue with "We have tried to point out that a small segment of the population accounts for such a large proportion of these problems. To the extent that the problems of this small segment are susceptible to social-engineering solutions at all, they should be highly targeted" (p. 549). They go on to say that group differences in cognitive ability, so desperately denied for so long, can best be handled—can only be handled—by a return to individualism. "A person should not be judged as a member of a group but as an individual" (p. 550). I presume that the judgment the authors recommend depends upon the individual's IQ score, but for over 500 pages they have been treating us to reams of data regarding "average" group differences and stressing the difficulties in changing "average" cognitive ability.

Herrnstein and Murray have taken great pains to express that everyone has different endowments though they have espoused a hereditarian doctrine of group differences throughout their book. They ignore the basics of phenotype development: human phenotypic traits, be they morphological, biochemical, or behavioral, are the complex results of genetic coding and environmental stimuli during the individual's development. Theodosius Dobzhansky, a geneticist who spent a lifetime studying biological variation, put it this way in his discussion of the myths of genetic predestination: "Correctly understood, heredity is not the 'dice of destiny.' It is rather a bundle of potentialities. Which part of the multitude of potentialities will be realized is for the environments, for the biography of the person, to decide" (1976:160).

In addition to the hereditarian issue, the question brought repeatedly before us in this book is whether we classify groups according to differences in an ill-defined trait (cognitive ability) and thereby ration access to educational and economic opportunities. The rationing is to be justified on an assumption that the trait is innate—little influenced by developmental experience, as little as 40%, by the authors' own calculations. The real danger to American society, or any society, is not simply the labeling of individuals but the revival of racist discrimination against minorities. There are many things abhorrent in such a practice but the worst is a use of labels for population groupings, be they called races, ethnic groups, or low-cognitive groups.

Aside from the real problems of establishing criteria for group membership, the difficulties magnify as the purpose of any classification scheme changes with professional need. Hence, forensics, clinical medicine, genetics, ethnology, and human paleontology all have specific purposes for particular classifications of our

species, purposes that are too detailed to elaborate here. Briefly, the identity of a race or ethnic group based on possession of certain phenotypes such as some types of blood components will not be the same if criteria of form, size, or color are selected or if frequencies of DNA markers are used. Despite all of this, many of those who would study "behavioral genetics" skip over problems of classification. They also ignore the vast accumulated knowledge of inheritance of simple traits and seize upon a population statistic, the heritability quotient (derived from twin studies), treating it as an expression of the degree of genetic influence on a phenotype. Why won't they acknowledge the accomplishments of human genetics?

At the very least Herrnstein and Murray should have consulted the other writings of Plomin, a behavioral geneticist who has been searching for genetic markers related to the neurological system which might identify gifted children. In a review of research into environment and genes, he cautioned that "the wave of acceptance of genetic influence on behavior is growing into a tidal wave that threatens to engulf the second message of this research: these same data provide the best evidence of the importance of environmental influence" (1989:105). The same point has been made by Hubbard and Wald (1993b:185) in their discussion of the "eugenics of normalcy": "By exaggerating the importance of genes, hereditarians try to find simple answers to complicated questions. But the interactions that go on inside of us, and between our environments, are too complex to be forced into simplistic patterns." Both papers are in opposition to those who would take a simple reductionist approach to the study of phenotypic development.

Finally, the components of whatever it is that makes us human are infinitely plastic and enable us to adapt to an enormous range of environmental conditions through learning. Humans have a near-limitless capacity of learning about themselves, their neighbors, and their environments. Given this human adaptability, the centuries-old arguments over nature vs. nurture have not been a very rewarding exercise. Consider each person on his or her individual merits, urge Herrnstein and Murray. But why do they not follow their own advice? Throughout the book they argue that our national social problems are, at base, caused by low cognitive ability—whatever that is. A quote from that greatest biologist of all time seems most appropriate here. As he struggled to comprehend human diversity in his later works, Darwin said, "If the misery of our poor be caused not by the laws of nature, but by our institutions, great is our sin" (quoted in Roughgarden et al. 1989:10).

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In the world of ideas, *The Bell Curve* is a blockbuster with the capacity to alter the way we view the world—a fact not lost on its critics. By predicting success and

failure at age 30 from IQ test scores measured at age 17, it confirms a general model of social stratification and thus improves on exclusively sociocultural and economic models. Many of the empirical relations reported in the book have been known for a long time by those of us who are both familiar with the technical literature and interested in individual differences. It uses a unique, multifarious set of data to strengthen these findings. Herein, I limit my comments to the scientific issues and leave it to others to grapple with its policy prescriptions.<sup>1</sup>

Many interesting questions could be asked of the book—for example, whether downward mobility is as predictable by IQ as is upward mobility. However, it is the topic of race that has attracted all the attention because, when it comes to explaining racial stratification, analyses of IQ test scores are normally taboo. The predictive value of IQ is denigrated because the mean IQ on the bell curve is 1 standard deviation lower for African-Americans than it is for European-Americans (and 1.3 to 2 standard deviations lower than it is for Asian-Americans and Jews [p. 275]). Extensive surveys carried out in the 1980s by Snyderman and Rothman (p. 295) show that a plurality of experts in psychological measurement consider the white-black IQ difference partly genetic in origin. *The Bell Curve* (p. 311) does not dispute this majority opinion.

My great admiration for the book is overshadowed by the fact that it does not deal thoroughly enough with the genetic basis of race differences. Equivocation is displayed even on whether “races” exist (p. 297), and the position taken is unnecessarily vulnerable to environmentalist attack. Accordingly, my commentary sifts the evidence it presents and sets out, within the space available, a basis for why the matrix of Asian-white-black differences can only be understood fully from a gene-based evolutionary perspective. The origins of race differences need to be considered as fairly from the hereditarian as from the environmentalist perspective.

This commentary is based on my own book *Race, Evolution, and Behavior* (1995), in which I describe distinct racial profiles ranging over 60 anatomical and social variables including brain size, personality, speed of maturation, crime, family structure, and sexual behavior. The racial matrix found within the United States, with East Asians at one end of the continuum, Africans at the other, and Europeans intermediate, is found in other multiracial countries such as Brazil and Canada and is internationally generalizable. I conclude that if all people were treated the same most race differences would not disappear.

1. *Universality of IQ test score differences.* Following Lynn (1991), *The Bell Curve* reviews this international literature (pp. 271–75) but plays down the way in which, by going beyond the cultural particulars of the United States, the data incline to support the genetic hypothesis. East Asians measured in North America and in Pa-

cific Rim countries have average IQs in the range of 101 to 111. Caucasoid populations in North America, Europe, and Australasia have average IQs of from 85 to 115, with an overall mean of 100. African populations living south of the Sahara, in North America, in the Caribbean, and in Britain have mean IQs of from 70 to 90. *The Bell Curve* (p. 289) takes the IQ of the less racially mixed blacks in Africa to be 75, the *median* of the 11 studies reviewed by Lynn (1991) rather than the *mean* of 70 estimated by Lynn. Two more recent studies support Lynn's (1991) lower value. Zindi (1994) administered the Wechsler Test to a representative sample of children in Zimbabwe, and Lynn (1994) examined Ethiopian immigrants in Israel; both found black Africans to have mean IQs of ~70. Language was probably not the mediator in the Zimbabwe study, because the racial disparity was as large on “performance” and “culture-fair” tests as on “verbal” tests.

*The Bell Curve* (pp. 281–82) examines the validity of using test scores for racial comparisons. Because the tests show similar patterns of internal item consistency and predictive validity for all groups and because the same differences are found on relatively culture-free tests, many psychometricians think the tests *are* valid measures of racial differences. Speed of decision making (reaction time) in 9–12-year-olds shows the same three-way racial pattern as do test scores, but *The Bell Curve* (p. 284) mentions only some of these data, particularly the white-black comparison by Jensen (1993) in California. It omits Jensen's analysis of Asians (Jensen and Whang 1993) and Lynn's (1991) international data on Asians, whites, and blacks (despite referring to Lynn's paper for other information). Children were asked to decide which of several lights was on or stood out from others and move a hand to press a button. All of the children could perform the task in less than a second, but children with higher IQ scores performed it faster than those with lower scores. Lynn (1991) found that Asian children from Hong Kong and Japan were faster in reaction time (controlling for movement time) than Caucasoid children from Britain and Ireland, who in turn were faster than black children from South Africa.

2. *Heritabilities.* *The Bell Curve* (p. 298) does not make the case for generalizing the high heritabilities found within groups to differences between groups as is typically done with environmental factors. For example, if environmentalists find that poor nutrition has an effect *within* whites and blacks, then they will reasonably think that nutrition has an effect on differences *between* whites and blacks. As *The Bell Curve* notes, moderate to high heritabilities for within-race differences are well established for numerous traits by adoption, twin, and family studies. Noteworthy are the 80% heritabilities for IQ test scores found in adult twins reared apart. Not noted in the book, however, is that genetic influence on mental ability is also found among nonwhites, including African-Americans, Chinese-Americans, and the Japanese in Japan. Additionally, genetic research has built a strong case for the importance of heritable factors in personality, psychopathology, violent crime, and other social variables. More important still, as I shall show,

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there is independent evidence for the operation of genetic effects on the between-group differences.

3. *Genetic weights predict racial differences.* Overlooked in *The Bell Curve* is the striking and critically important finding that although the white-black IQ gap averages 15 points, the difference is *more pronounced on highly heritable tests*. This observation is striking because it results from a *differential prediction*. Environmental theory predicts that racial differences will be greater on more culturally influenced tests, whereas genetic theory predicts that they will be greater on more heritable tests. Higher heritabilities are stronger indicators of underlying genetic substrates than lower heritabilities.

In one study of 13 tests from 543 pairs of siblings, Jensen (1973) found a 0.67 correlation between the test's heritability and the magnitude of the white-black difference. Building on Jensen's work, I carried out a study using for genetic weights the amount of inbreeding depression found on 11 tests from the Wechsler Intelligence Scale for Children (Rushton 1989). Inbreeding depression occurs when harmful recessive genes combine, an event more likely in offspring of closely related parents. Estimates of inbreeding depression had been calculated from 1,854 cousin marriages in Japan. I found that these inbreeding depression scores directly predicted the magnitude of the white-black difference on the same 11 Wechsler tests. The genetic relationship was sufficiently strong to overcome generalization from the Japanese in Japan to whites and blacks in the United States and so constituted a conservative test of the genetic hypothesis. There really is no explanation other than a genetic one for the inbreeding effect and its ability to predict white-black differences on IQ tests.

*The Bell Curve* (pp. 301–3) points out that white-black differences are most pronounced on tests more loaded on *g*, that is, the general factor common to diverse cognitive tests, and it correctly reports that *g* loadings are related to heritability. But this is not as powerful a demonstration of genetic influence on racial differences as showing the prediction directly from the estimates of genetic influence.

4. *Transracial-adoption/mixed-race-offspring studies.* Several studies other than Frydman and Lynn's (1989) of Korean and Vietnamese children adopted into white American and white Belgian homes are omitted from the book's account (e.g., Clark and Hanisee 1982, Winick, Meyer, and Harris 1975). These show that although many had been hospitalized for malnutrition as babies they eventually had IQs ten or more points higher than their adoptive national norms. Although *The Bell Curve* (pp. 309–11) does review evidence that, by contrast, black and mixed-race children adopted into white middle-class families typically perform at a lower level than white siblings with whom they have been raised, additional details would have strengthened the genetic argument. For example, the race differences went beyond IQ scores. By age 17, in the well-known Minnesota Study, adopted white children had an average IQ of 106, an aptitude based on national norms at the 59th percentile, and a class rank at the 54th percentile; mixed-race chil-

dren had an average IQ of 99, an aptitude at the 53rd percentile, and a class rank at the 40th percentile; and black children had an average IQ of 89, an aptitude at the 42nd percentile, and a class rank at the 36th percentile (Weinberg, Scarr, and Wildman 1992).

Not all transracial studies find the white-black difference. *The Bell Curve* (pp. 309–10) describes null findings from a German study and from the Minnesota Study at a time when the children were only 7 years old. But these apparent exceptions may "prove the rule." In general, behavior genetic studies show that as people age, trait heritability increases while environmentality decreases. Differences not apparent before puberty often emerge by age 17.

Because African-Americans have about 25% European genes, genetic correlates of IQ can be estimated from skin color and blood groupings. Lighter skin typically correlates with higher IQ. Shockley (1973) estimated that for low-IQ black populations, there is a one-point increase in average "genetic" IQ for each 1% of Caucasian ancestry, with diminishing returns as an IQ of 100 is reached. These effects, however, could be due to social factors and so do not provide a definitive test. Studies of blood groups show little predictive power but so far have serious methodological shortcomings including small unrepresentative samples and inappropriate controls for skin color, thereby inadvertently removing genetic effects. Studies of racial admixture using DNA samples could eventually prove definitive.

5. *Race differences in brain size.* *The Bell Curve* bypasses this vital data base even though it demonstrates the now familiar three-way racial ordering. A review of 100 years of scientific literature (Rushton 1995) reveals that across a triangulation of procedures (autopsies, endocranial volume, external head measures), the brains of East Asians and their descendants average about 17 cm<sup>3</sup> (1 in.) larger than those of Europeans and their descendants, whose brains average about 80 cm<sup>3</sup> (5 cu. in.) larger than those of Africans and their descendants. Using brain mass at autopsy, Ho et al. (1980) summarized data for 1,261 adults and reported a sex-combined difference between 811 European-Americans with a mean of 1,323 g and 450 African-Americans with a mean of 1,233 g. Using endocranial volume, Beals, Smith, and Dodd (1984: 307, table 5) analyzed about 20,000 skulls and found sex-combined differences by continental area, excluding Caucasoid areas of Asia (e.g., India) and Africa (e.g., Egypt), 19 Mongoloid populations averaged 1,415 cm<sup>3</sup>, 10 Caucasoid groups averaged 1,362 cm<sup>3</sup>, and 9 Negroid groups averaged 1,268 cm<sup>3</sup>. Using external head measurements, Rushton (1992) found, in a stratified random sample of 6,325 U.S. Army personnel measured in 1988 to determine head size for fitting helmets, Asian-Americans, European-Americans, and African-Americans averaged 1,416, 1,380, and 1,359 cm<sup>3</sup>, respectively. Similarly, using cranial measures from tens of thousands of men and women aged 25 to 45 collated by the International Labour Office from around the world, Rushton (1994b) found that Asians, Europeans, and Africans averaged 1,308, 1,297, and 1,241 cm<sup>3</sup>, respectively.

Racial differences in brain size show up early in life.

Data from the National Collaborative Perinatal Project on 19,000 black children and 17,000 white children show that black children have a smaller head circumference at birth and, although black children are born shorter in stature and lighter in weight than white children, by age 7 "catch-up growth" leads black children to be larger in body size than white children but still smaller in head circumference (Broman et al. 1987).

6. *Brain-size/IQ relations.* *The Bell Curve* (p. 772) relegates it to the briefest of footnotes, but magnetic resonance imaging (MRI) techniques that create a three-dimensional picture of the brain *in vivo* clearly confirm a brain-size/IQ relation. Six studies have found an average correlation of about 0.40 (Willerman et al. 1991, Andreasen et al. 1993, Raz et al. 1993, Egan et al. 1994, Harvey et al. 1994, Wickett, Vernon, and Lee 1994). This 0.40 correlation is a significant improvement over the correlation of about 0.20 found in studies carried out since the turn of the century using head circumference as an estimate of brain size. The relation is apparent early in life. For example, in the National Collaborative Perinatal Project, head circumference at birth, 1 year, and 4 years correlates with IQ test scores at age 7 from  $r = 0.13$  to  $0.24$  (Broman et al. 1987).

Additional analyses show that white-black differences in brain size are correlated with white-black differences in mental ability. In a sample of adolescents, Jensen (1994) found that the greater the difference between white and black children on 17 cognitive tests, the higher was that test's correlation with head size ( $r = 0.533$ ,  $p < .05$ ; with unreliability of measurement controlled,  $r = 0.715$ ,  $p < .01$ ). In another sample of 14,000 4- and 7-year-olds, Jensen and Johnson (1994) found that white and black children differed by about 1 standard deviation in IQ and significantly ( $p < .001$ ) also in head size (white > black), even with age, height, and weight statistically controlled, and that there was *no difference in average head size* between white and black children who were matched on IQ scores (and on age, height, and weight).

7. *Other variables.* *The Bell Curve* devotes several chapters to predicting crime and sexual behavior outcomes from IQ scores and shows that white-black differentials are often reduced by controlling for IQ (e.g., p. 308, in rate of incarceration, from 6.5:1 to 2.5:1). But it fails to note that once more the Asian-white-black matrix holds worldwide. For example, with regard to violent crime, I averaged statistics from several INTERPOL yearbooks to find rates of murder, rape, and serious assault to be three times higher in African and Black Caribbean countries than in Pacific Rim countries, again with European countries intermediate (Rushton 1990). Clearly, the causes of the racial disparities must lie beyond U.S. particulars.

One neurohormonal contributor to crime and reproductive behavior is testosterone. Studies show 3% to 19% more testosterone in black college students and military veterans than in their white counterparts, with the Japanese showing lower amounts than whites. Sex hormones go everywhere in the body and have been shown to activate many brain-behavior systems involving crime and reproduction. For example, around the

world, the rate of dizygotic twinning per 1,000 births, caused by a double ovulation, is less than 4 among East Asians, 8 among Europeans, and 16 or greater among Africans. The differences in multiple birthing are known to be heritable through the race of the mother regardless of the race of the father, as found in East Asian-European crosses in Hawaii and European-African crosses in Brazil. Also, worldwide surveys show more sexual activity in Africans compared with Europeans and especially with East Asians. Differences in sexual activity translate into consequences. International fertility rates show the racial pattern; so does the pattern of AIDS both within and between countries.

8. *Evolution produces geographic races.* *The Bell Curve* (p. 271) is ambivalent about the use of the word "race," often preferring the word "ethnic" instead. "What does it mean to be 'Black' in America in racial terms," it asks, "when the word Black (or African-American) can be used for people whose ancestry is more European than African?" Let us be clear about what the word "race" means. Populations of a nonhuman animal species evolving in diverse geographic areas begin to differentiate via natural selection for adaptation to their specific environments. When such geographic populations become differentiated on various morphological, behavioral, and physiological traits they are called geographic races; if given a taxonomic name they are called subspecies. Zoologists have identified two or more races in many mammalian species.

Among humans the three major races of Mongoloids, Caucasoids, and Negroids are typically considered. These can be distinguished on the basis of obvious differences in skeletal morphology, hair and facial features, and molecular genetic information. Forensic anthropologists regularly classify skeletons of decomposed victims by race. For example, narrow nasal passages and a short distance between eye sockets mark a Caucasoid, distinct cheekbones identify a Mongoloid, and nasal openings shaped like an upside-down heart typify a Negroid (Ubelaker and Scammell 1992). The race of a perpetrator is increasingly identified from blood, semen, and hair samples. To deny the predictive validity of race at this level is nonsensical. This does not rule out making finer distinctions within these major races. Nor does it make overly problematic the fact of mixed-race individuals, who are themselves difficult to classify.

The currently most accepted view of human origins, the "African Eve" theory, posits a beginning in Africa some 200,000 years ago, an exodus through the Middle East with an African/non-African split about 110,000 years ago, and a Caucasoid/Mongoloid split about 41,000 years ago (Stringer and Andrews 1988). Evolutionary selection pressures are different in the hot savanna, where Negroids evolved, than in the cold Arctic, where Mongoloids evolved. I proposed (Rushton 1995) that the farther north the populations migrated "out of Africa," the more they encountered the cognitively demanding problems of gathering and storing food, acquiring shelter, making clothes, and raising children successfully during prolonged winters. As these populations evolved into present-day Caucasoids and Mongoloids,

they did so in the direction of larger brains, slower rates of maturation, and lower levels of sex hormone with concomitant reductions in sexual potency, aggressiveness and impulsivity, and increases in family stability, advance planning, self-control, rule following, and longevity.

Evolutionary selection explains the how and why of the worldwide racial clustering. Recognizing that the pattern in achievement, crime, and family organization is not unique to the United States but occurs internationally shows the need for a more general (genetic-evolutionary) theory than the highly localized explanations typically provided. Traditional environmental explanations based on Asian family strength and African poverty are themselves explained by an evolutionary perspective.

I must conclude, therefore, that no reasonable doubt remains for the genetic hypothesis of racial differences in IQ test scores. I am aware of no environmental factor able to explain either the consistency of the international racial pattern across so many diverse variables or the tradeoff between brain size and gamete production in which people of East Asian ancestry average the largest brains and the lowest twinning rate, people of African ancestry average the smallest brains and the highest twinning rate, and people of European ancestry average intermediately in both. Only gene-based life-history theories predicting tradeoffs between parental care and reproductive effort fit all of the data (Rushton 1995). This does not mean that environmental factors are unimportant for individual development, but to play down or obfuscate the evidence showing a genetic basis for racial differences, as is done by many critics of *The Bell Curve* and perhaps by the book itself, does not change reality.

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The evolutionary perspective and contemporary anthropology maintain, at best, a very uneasy relationship. The appearance of *The Bell Curve* and the myriad responses to it have brought into sharp and often uncomfortable focus a number of aspects of that relationship, in particular the tendency to play out, though in reverse, various versions of the "naturalistic fallacy." Instead of trying to go from the way things are to the way they ought to be, all too many of these commentators have been wont to go the other way—from the way they think things "ought to be" to the way they are not. "Oughts" have been driving the production of pseudofacts, and reality has been the loser.

Herrnstein and Murray open *The Bell Curve* (p. xxi) by telling us that it is "about differences in intellectual capacity among people and groups and what those differences mean for America's future." Change "capacity" to "performance" and the rest of the book fulfills their promise. But it is "capacity" that they mean, and it is "capacity," especially "among groups," that has been

seen as the gauntlet they have thrown down. Few of their critics would even concede that there could be such differences and even fewer that there is any evidence that there actually are such differences. In these judgments they would be wrong—wrong because they would have forgotten, or, more likely, never appreciated in the first place, that, since at least 1859, evolution itself has been evidence. In other words, in that year evolution became the null hypothesis, and it remains so to this day. Thus we should always start with evolution, instead of having to prove it every time, and see where it takes us.

Doing so here would point out that the evolutionary process runs on and therefore also selects for functionally significant variation—no variation, no evolution. What, therefore, it is not going to produce—indeed, cannot produce—is functional equality among either individuals or groups. Why also at the group level? That groups differ in performance is a frequently demonstrated fact; what we tend to find difficult to accept is how the evolutionary process could have endowed them with significant differences in capacity.

To see how, let's open the can of worms which is brain size. It has increased some 1,000 cc over the past 2–3 million years in our lineage, and this has often been described as "an explosive rate of growth." Yet it works out to no more than 1/4 drop per generation. It could, given the degree of variation present, obviously have gone much more rapidly. That it did not implies that the huge advantages conferred by having more brain to work with must have been offset by (almost) equally large disadvantages. In other words, the adaptation here is best seen as a slowly moving compromise involving small relative differences between large forces. We should then have no expectation that those advantages and disadvantages would have balanced out in the same way in different populations at differing times and in differing ecological and cultural circumstances—and looking around confirms that they haven't. But this same argument will apply to most aspects of individual variation. Given the number of characteristics in which functional variation is present, the ways in which they will balance out in two populations evolving more or less independently of one another are almost guaranteed to be different in the two. The balancing will take place at the level of individual phenotypes, and thus there is, in general, going to be a direct, inescapable connection between individual and group variation whenever evolutionary change is taking place—that is, always.

The contrary argument usually takes something of the following form: Intellectual ability is so fundamental to the adaptation of *H. sapiens* that it in fact could not vary from population to population. An analogy would be the human trait of bipedal locomotion. Some individual humans are "better" at bipedal locomotion than others (are faster, can jump higher, etc.), but bipedalism is such a critical aspect of the human adaptation that one would not expect to see great differences either on the individual-to-individual level or between populations. All humans, to be human, have to have some minimum