

Afterword

Race, Evolution, and Behavior describes three distinct racial profiles ranging over 60 anatomical and social variables, including brain size, personality and temperament, sexual habits and fertility, and speed of maturation and longevity. East Asians are, on average, slower maturing, higher achieving, more maintaining of family structure, more law abiding, and less sexually active than Africans, who tend to the opposite in each trait, with Europeans regularly falling between the other two racial groups. This racial matrix is internationally generalizable and therefore goes well beyond U.S. particulars. Evolutionary (and hence genetic) models are needed to reconcile the disparate sets of data. Exclusively sociocultural models will not do the job.

Following its publication, several reviewers offered positive assessments, sometimes accompanied by substantive critique (e.g., Brand, 1995; Browne, 1994; Flew, 1995; Francis, 1995; Gottfredson, 1996; Harpending, 1995; Lynn, 1996a; Ree, 1996; Salter, 1996; Snyderman, 1994; Taylor, 1994; Thiessen, in press; Whitney, in press; commentary in Jacoby & Glauberman, 1995). Other reviewers criticized the work as "bad science" (e.g., Ahmad, 1995; Armelagos, 1995; Barash, 1995; Brace, 1996; Blinkhorn, 1994; Lewontin, 1995; Palmer, 1995; Relethford, 1995; Sperling, 1994; Wahlsten, 1995; commentaries in Jacoby & Glauberman, 1995). One reviewer called the book a "betrayal of science" (Kamin, 1995). This Afterword responds by bringing the reader up to date on what has occurred, scientifically speaking, since the book went to press 3 years ago. Some of the data that have accumulated were gathered by me, some were gathered by colleagues, and some were gathered by people I don't even know. Together, however, they confirm much of what was written in the book.

Bell Curves

The simultaneous publication of Richard Herrnstein and Charles Murray's (1994) *The Bell Curve*, Seymour Itzkoff's (1994) *The Decline of Intelligence in America*, and the one you hold in your hands, all addressing the issue of race, genetics, and IQ, made it likely that they would be jointly reviewed. On October 16, 1994, Malcolm Browne, science writer at the *New York Times*, linked them in his *New York Times Book Review*. Browne concluded that "the government or society that persists in sweeping their subject matter under the rug will do so at its peril." Sweeping the topic under the rug, however, is exactly what was attempted.

The Bell Curve took most of the attention. It reported original analyses of 11,878 youths (3,022 of whom were African American) from the 12-year National Longitudinal Survey of Youth (NLSY). Most 17-year-olds with high scores on the Armed Forces Qualification Test (black as well as white) went on to occupational success by their late twenties and early thirties whereas many of those with low scores went on to welfare dependency. The average IQ for "African" Americans was found to be lower than those for "Latino," "white," "Asian," and "Jewish" Americans (85, 89, 103, 106, and 115, respectively, pp. 273-78).

The flashpoint of discussion was whether the black/white difference was partly genetic in origin. *The Bell Curve* presented a clear rendition of the usual syllogism, that (a) IQ test scores are heritable in both black and white populations, (b) white IQs average higher than black IQs, therefore probabilistically (c) the black/white IQ difference is partly heritable. This syllogism, plus other findings like the black/white IQ difference being related to a test's heritability and to its loading on the general factor, or psychometric *g*, led a plurality of experts in behavioral genetics and psychometrics to give their opinion that part of the black/white IQ difference *was* genetic in origin (see p. 9 of this book). Herrnstein and Murray's book represented the mainstream view of IQ researchers.

My great admiration for *The Bell Curve* was overshadowed by the fact that it did not deal thoroughly enough with the genetic basis of racial differences. Equivocation was displayed even on whether "races" existed, and the position taken seemed unnecessarily vulnerable to environmentalist attack. Accordingly, I sifted the evidence it presented in a special symposium on *The Bell Curve* in *Current Anthropology* (Rushton, 1996a) and set out a basis for why the differences could only be understood fully from a gene-based evolutionary perspective. In an interesting afterword to the paperback edition of *The Bell Curve*, Murray accepted that Herrnstein and he had played down the heritability of race differences. Citing *Race, Evolution, and Behavior*, Murray drew attention to the significant and substantial relationship that exists between brain size and measured intelligence, to the differential distribution of brain size across races, and to the very low IQ scores of Africans south of the Sahara.

The furor over *The Bell Curve* led the American Psychological Association (APA) to establish an 11-person task force to fill an "urgent need" for an authoritative report "about the meaning of intelligence test scores and the nature of intelligence" (Neisser et al., 1996: 77). The report is generally even-handed, but on race it concluded: "There is certainly no [empirical] support for a genetic interpretation" (p. 97). Because this conclusion is likely to be cited against *Race, Evolution, and Behavior*, I will respond in some detail.

Among the facts omitted by the APA report are the following: (1) racial differences in IQ and speed of decision making found within the United States

are paralleled by those found internationally; (2) IQ scores relate to brain size and, around the world, race differences in brain size parallel those in IQ; (3) IQ subtests high in heritability predict racial differences better than do subtests low in heritability; (4) transracial-adoption studies find that East Asian adoptees grow to score higher on IQ tests than do white adoptees whereas black adoptees grow to score lower than do white adoptees; (5) regression to the mean is greater for black children of high IQ parents and siblings than it is for white children of high IQ parents and siblings; (6) environmental influences on behavior are primarily those occurring within families rather than those occurring between families, thereby implying that factors such as racism and social class do not explain racial differences; (7) other variables such as crime, testosterone, the rate of dizygotic twinning per 1,000 births (caused by a double ovulation), and sexual behavior show the same international racial pattern as do IQ scores, with Europeans averaging intermediate to Asians and Africans, thereby implying IQ differences are part of a broader-based life history with roots deep in evolution.

The APA report assigned Asian Americans an average IQ of 98 based on a review by Flynn (1991). But Lynn (1993) showed that Flynn had "overcorrected" downwards an original review by Vernon (1982), not cited by the APA task force, which found Asian American IQ averaged 106. Omitted, too, was *The Bell Curve's* own NLSY data showing an Asian American IQ of 106. This particular lapse was especially curious given that it was the debate over *The Bell Curve* that had led the APA to set up its task force in the first place!

Although the report admitted that Asian Americans did better than European Americans on a range of aptitude tests (e.g., ACT, SAT, GRE, MCAT), which are known to measure reasoning ability and to correlate highly with IQ, these were described as "content-oriented achievement tests" and linked to the high grades Asian Americans gain in school. Higher Asian IQ scores found in Asia were also disparaged but, again, with an acceptance of their superior school achievement. The generally greater performance of Asians despite equal or lower IQ was attributed to "cultural attitudes toward learning," "structural differences in the [Asian] schools," and possibly even "spatial ability" and "gene-based temperamental factors" (p. 92).

The APA report did not balance the equation by mentioning the gene-based temperament factors (discussed in chapter 7) that may play a role in black underachievement. Instead, the report emphasized "bias" in the tests, continuing discrimination, the alleged diminishing magnitude of black/white IQ differences over time, and the nature of African-American culture, which was said to alienate black children from the kind of educational processes that work with others. One might reasonably hypothesize, however, that some dysfunctional aspects of African-American culture, including denigration of educational achievement (D'Souza, 1995), are *products* of, rather than causes of, low IQ.

The APA report did not mention the IQ scores of blacks outside the United States. From a 1991 review by Richard Lynn, and a subsequent South African study by Kenneth Owen, I followed Lynn and estimated (chapter 6) that the average sub-Saharan African IQ was about 70. Blinkhorn (1994), Peters (1995), and Wahlsten (1995), among others, concluded that the rest of the book was suspect if it was reporting without comment an IQ level that implied that, by European standards, half the population of black Africa was "mentally retarded." Two subsequent studies, however, have been published on African IQ. First, Zindi (1994), a black Zimbabwean, matched 204 12- to 14-year-old black Zimbabwean pupils and 202 white English students from London inner-city schools for sex, educational level, and "working-class" background. Zindi's (1994) analysis of a variety of tests, including of nonverbal performance, found African children consistently scored two full standard deviations lower than did English children. Second, Lynn (1994) examined scores for Ethiopian immigrants to Israel on the Raven's test, matched them against European norms, and found a mean IQ of 70.

Within the United States, additional studies have confirmed the Asian/European/African gradient. Lynn (1996b) examined the standardization data of the Differential Ability Scale for a representative sample of the population stratified by age, sex, race, geographical location, urban-rural areas, parental socioeconomic status, and educational preschool enrollment. The main sample consisted of 2,260 children aged 6 to 17 years old. The Asian children's IQ averaged 107, the white children's IQ averaged 103, and the black children's IQ averaged 89. In a younger sample of 1,000 2½- to 6-year-olds, Lynn (1996b) found that the IQ of blacks was 85 and that of whites was 100, suggesting the APA report's conclusion that the black/white difference "may be declining" (p. 97) was inconsistent with the evidence. Another study of 3-year-olds (matched on age, gender, birth order, and maternal education for the fourth edition of the Stanford-Binet Intelligence Scale) found the average IQ for blacks was 85 and for whites 100 (Peoples, Fagan, & Drotar, 1995).

The g Factor

So misleading was discussion about *The Bell Curve* on IQ and the g factor that 52 scholars (myself included) published a statement outlining some of what is known about intelligence in the *Wall Street Journal* (December 13, 1994). IQ scores predict accident proneness, child neglect, crime and delinquency, health, and many other factors in addition to educational success and job competence. Moreover, critics rarely mention that IQ is correlated with a number of brain variables such as its size (see next section), electrical potentials, speed of operation on elementary cognitive tasks, speed of neural and synaptic transmission, and rate of glucose metabolism during cognitive activity.

Theoretically intriguing is the fact that correlations among different mental tests generally range from about 0.20 to 0.80. This empirical phenomenon, which is one of the most solidly substantiated facts in psychology, can be interpreted to mean that mental ability tests measure something in common. Charles Spearman called this "something" the *general* factor, which he symbolized as *g* (see this book on pp. 33–36, 54–55, 138–39, 186–88). Whether called "Spearman's *g*," "psychometric *g*," or just plain *g*, this construct refers to the component of individual difference variance that is common to all tests of mental ability. The *g*-factor is the *sine qua non* of all "IQ" tests, no matter what other sources of variance such tests may measure.

Much new work has taken place on the underlying basis of intelligence. Foremost among this is research on "inspection time" (Deary & Stough, 1996). In this paradigm, subjects quickly inspect two lines that are displayed for fractions of a second and then decide which of the two lines is longer. More intelligent people, as measured by standard IQ tests, require a shorter stimulus duration to reach a given level of accuracy. Overall correlations between IQ tests and fast intake speed reach 0.50 and higher. The correlations with inspection time are highest with the *g*-factor.

Brain Size and Cognitive Ability

The published research on this topic has now been summarized by Rushton and Ankney (1996). The well-established relationship has been most clearly shown using Magnetic Resonance Imaging (MRI), which creates, *in vivo*, a three-dimensional image of the brain. An overall correlation of 0.44 was found between MRI-measured brain size and IQ in 8 separate studies with a total sample size of 381 nonclinical adults, which is roughly equivalent to the strength of the relationship between socioeconomic status of origin and IQ. From 7 MRI studies of clinical adults ($N = 312$) the overall correlation was 0.24; from 15 studies using external head measurements with adults ($N = 6,437$) the overall correlation was 0.15, and from 17 studies using external head measurements with children and adolescents ($N = 45,056$) the overall correlation was 0.21. The relation between brain size and IQ appears early in life, for head perimeter at birth correlates with IQ scores at age 7, as determined in the National Collaborative Perinatal Project study of thousands of white and black children (described on pp. 37–41).

A functional relation between brain size and cognitive ability is implied in two studies by Jensen showing the head size/IQ relation *within* as well as *among* families. A tendency for a sibling with a larger head to have a higher IQ than a sibling with a smaller head is of special interest because it controls for many of the sources of variance that distinguish families such as cultural background and socioeconomic status. Jensen (1994) examined 82 pairs of monozygotic and 61 pairs of dizygotic adolescent twins and extracted the

general factor, or psychometric g , from their IQ tests and found it correlated with head size across individuals ($r = 0.30$), within twin pairs ($r = 0.25$), and between twin pairs ($r = 0.32$). Jensen and Johnson (1994) examined the head size/IQ relation in several hundred pairs of siblings from the National Collaborative Perinatal Project and found that at 7 years of age (although not at 4 years) a significant correlation existed within families ($r = 0.11$) as well as between families ($r = 0.20$).

It is understandable that correlations between IQ and overall brain size will be modest. First, much of the brain is not involved in producing what we call intelligence; thus, variation in size/mass of that tissue will lower the magnitude of the correlation. Second, IQ, of course, is not a perfect measure of intelligence and, thus, variance in IQ scores is an imperfect measure of variation in intelligence. Although brain size accounts for only a small percentage of variation in cognitive ability, it is important to note, following Hunter and Schmidt (1990), that small correlations can have large effects. For example, although the MRI-established brain size/IQ correlation is only about 0.40, when squared it shows that 16 percent of the variance is explained, and it shows that, from regression predictions, for every 1 standard deviation increase in brain size, IQ will increase, on average, by 0.40 standard deviations.

Race Differences in Brain Size

Two corroborations have been made of black/white differences in brain size. Using magnetic resonance imaging to measure brain volume in a combined sample of 108 normal and clinical subjects in Britain, Harvey et al. (1994) found that 41 people of African and Caribbean background had a smaller brain volume than did 67 people of European background. However, Harvey et al. (1994) provided little information on ethnicity and no details on how, or if, the samples were matched for age, sex, or body size. Nonetheless, this MRI study would seem to be a harbinger of research to come.

In a study of cranial capacity in black and white adolescents, Rushton and Osborne (1995) examined data from 472 individuals aged 13 to 17 years comprising 222 whites and 250 blacks. Measures were taken of head length, head breadth, age, sex, race, height, weight, and cranial size estimated from head length and head breadth using standard equations. Age differences were found such that cranial size increased over the years 13 to 17 from 1,233 cm³ to 1,279 cm³. After adjusting for the effects of age and sex, but not for body size, white adolescents averaged a cranial size of 1,278 cm³ and black adolescents averaged 1,241 cm³, a difference of 36 cm³. But the white adolescents were taller and heavier than were the black adolescents, so adjustments were also made for body size (stature and weight). White adolescents then averaged a cranial capacity of 1,269 cm³ and black adolescents 1,251 cm³, a difference of 18 cm³.

TABLE A.1
Cranial Capacity (cm³) by Race (male only) in Home Continent and United States

	Home Continent								
	Asians	N	Year	Europeans	N	Year	Africans	N	Year
Autopsies (g × 1.036 = cm ³)	1,422	16 ¹	1918	1,440	13 ²	1922	1,273	4 ³	1895
Endocranial volume	1,491	1 ⁴	1984	1,441	1 ⁴	1984	1,338	1 ⁴	1984
Uncorrected head size	1,359	7 ⁵	1968	1,424	20 ⁶	1958	1,292	13 ⁷	1937
Corrected head size	1,416	2 ⁸	1975	1,378	1 ⁹	1975	1,337	1 ⁹	1975
Mean	1,422	26	1961	1,421	35	1960	1,310	19	1948
Mean of uncorrected and corrected head size	1,388	9	1972	1,401	21	1967	1,315	14	1956
	United States								
	Asians	N	Year	Europeans	N	Year	Africans	N	Year
Autopsies (g × 1.036 = cm ³)	—			1,430	5 ¹⁰	1935	1,341	4 ¹¹	1915
Endocranial volume	—			1,452	1 ¹²	1942	1,389	1 ¹²	1942
Uncorrected head size	1,465	1 ¹³	1992	1,483	14 ¹⁴	1962	1,436	2 ¹⁵	1959
Corrected head size	1,486	1 ¹³	1992	1,462	1 ¹³	1992	1,441	1 ¹³	1992
Mean	1,476	2	1992	1,457	21	1958	1,402	8	1967
Mean of uncorrected and corrected head size	1,476	2	1992	1,473	15	1977	1,439	3	1976
Increase in USA:									
(a) using all data		54 cm ³			36 cm ³			92 cm ³	
(b) using head size date		88 cm ³			72 cm ³			124 cm ³	
(c) head size % increase		6.3%			5.1%			9.5%	

Note: N = Number of studies. Year = Mean year data was published. ¹16 studies from Table 6.6. ²13 studies from Table 6.6. ³4 studies from Table 6.6. ⁴Beals et al. study from Table 6.6. ⁵4 samples from Table 6.3, plus 3 samples from Table 6.5. ⁶7 samples from Table 6.2, 6 samples from Table 6.3, 7 samples from Table 6.5. ⁷11 samples from Table 6.2, plus 2 samples from Table 6.5. ⁸Rushton (1991, 1994) studies from Table 6.6. ⁹Rushton (1994) study from Table 6.6. ¹⁰5 studies from Table 6.6. ¹¹4 studies from Table 6.6. ¹²Simmons (1942) study from page 110. ¹³Rushton (1992) study from Table 6.6. ¹⁴2 samples from Table 6.2, 10 samples from Table 6.3, 1 sample from Table 6.5, plus Rushton (1992) study from Table 6.6. ¹⁵1 sample from Table 6.2, plus Rushton (1992) study from Table 6.6.

To determine whether the international distribution of brain size matched the pattern of IQ scores with blacks scoring 15 points higher in the United States than in Africa but with Asians and Europeans scoring the same in the United States as in their home continents, I re-examined the brain size data reported in chapters 5 and 6. Set out in Table A.1 are the most complete (male only) results. All races averaged larger brain sizes in the United States than

in their home continents, but the gain was larger for Africans (92 cm^3) than for Asians (54 cm^3) or Europeans (36 cm^3). When comparisons are based only on the corrected and uncorrected head size data, where the cells are complete for all groups, once more the gain is larger for Africans (124 cm^3 or 9.5 percent) than it is for Asians (88 cm^3 or 6.3 percent) or for Europeans (72 cm^3 or 5.1 percent).

Table A.1 also gives the mean year of publication for each set of studies. These show a publication 20 years earlier for the home continent data. A secular trend in cranial capacity is also found across the 22 grouped data sets ($r = 0.48$, $p < 0.05$; with race statistically controlled, 0.39 , $p < 0.05$). This secular increase is in accord with Miller and Corsellis's (1977) study of autopsy records in England showing a brain weight increase in men of 0.66 g per year (0.68 cm^3) from a mean of $1,372 \text{ g}$ ($1,421 \text{ cm}^3$) for those born in 1860 to $1,424 \text{ g}$ ($1,475 \text{ cm}^3$) for those born in 1940—a total of 52 g (54 cm^3). Recall that mean IQs in all economically developed nations have also been increasing over time, by about 3 IQ points a decade (pp. 191, 245, 255). The simplest explanation for all these gains is better nutrition. In addition, in the United States, blacks gain a 25 percent Caucasian genetic admixture as they do also for IQ (see p. 136).

The disaggregated data in Table A.1 are generally in accord with the Asian-white-black gradient in brain size, but there is a paradox. The brain size increases in Asians and Europeans living in the United States is not matched by any known gain in IQ over their home continent counterparts. On some measures, Asians living in Asia averaged smaller crania than did Europeans or Africans living in the United States. More and better studies are obviously needed to allow appropriate control for the larger body size of Americans (impossible in these particular data) and the use of MRI to identify features of the brain that correlate more highly with IQ than does volume.

Heritability

Researchers continue to find evidence for within-race heritabilities. As discussed in chapter 3, both adoption studies and the comparison of identical and fraternal twins allow assessment of genetic and environmental contributions to be made. In the study just described (Rushton & Osborne, 1995) of cranial size differences in black and white adolescents, the sample was made up of 236 pairs of twins (111 white pairs, 125 black pairs). For the total sample, the genetic contribution ranged from 38 percent to 51 percent, depending on particular adjustments for age and body size. Environmental effects common to both twins (such as parental socioeconomic status) ranged from 6 percent to 20 percent and environmental effects unique to each twin (such as illness and trauma) ranged from 42 percent to 52 percent. The proportionate contributions did not vary systematically by sex or race.

The heritability of aggression and crime has been much studied, but little or no genetic evidence has existed for violence, *per se*. To fill this gap, Rushton (1996b) examined retrospective self-reports about such violent acts as the destruction of property, fighting, carrying and using a weapon, and struggling with a policeman. The sample consisted of 274 adult twin pairs raised together from the University of London Institute of Psychiatry Twin Register. Correlational and model fitting analyses were carried out. For men, genetic influences accounted for 55 percent of the variance, whereas for women, most of the variance was due to environmental factors.

At the molecular level, Robert Plomin predicts that four years from now, social scientists will routinely use DNA markers in their research. His focus is on quantitative trait loci (QTL) which assumes that complex dimensions like intelligence and aggression are due to a small number of genes with effects of varying size rather than to the "one-gene, one-disorder" or the polygenic "many-genes-of-infinitesimal-effect-size" alternatives. In the QTL approach, genes contribute cumulatively and interchangeably, much as risk factors contribute to vulnerability. QTL associations for intelligence, personality, and crime now regularly appear in technical journals (e.g., Plomin et al., 1995; Cloninger et al., 1996). Once replicable effects of a reasonable size are established, it will be only a short step to seeing if the races differ in the allele.

Black Heritabilities

The powerful analogy of how seeds given a normal environment grow plants of full height but those given a deprived environment grow plants of stunted height has been used many times in the debate over race to show indisputable environmental effects. Recently, Block (1995) used a version of the analogy to launch a full-scale attack on the use of heritability. But it is an *empirical* question whether heritabilities for blacks are the same as, or different from, those for whites. It is a truism among geneticists that as environments become less impeding and more equal, genetic contributions become larger. For example, over the last 50 years, as environmental barriers to health and educational attainment have fallen, the variance accounted for by genetic factors has increased (Scriver, 1984; Heath et al., 1985). In animal studies, low heritabilities for body size variables are typically interpreted as showing a suppressant effect of the environment on natural growth.

The relevant question thus becomes: "Are heritabilities for blacks lower than those for whites?" Evidence for his proposition comes from the already discussed study of cranial capacity in black and white twins (Rushton & Osborne, 1995). A somewhat higher range of heritabilities (depending on corrections for age and body size) was found for whites than for blacks (47 to 56 percent vs. 12 to 31 percent), and a somewhat lower range of environ-

mentalities was found for whites than for blacks (44 to 53 percent vs. 69 to 88 percent). Environmental factors could be having a more detrimental effect on brain development among blacks than among whites. These differences, however, did not achieve normal levels of statistical significance but they do point the way to how twin studies may inform about differentially harmful environments.

Support for generalizing within-group heritabilities to between-group differences comes from new work showing that the origins and structure of intellectual and social variables are virtually identical for blacks, whites, and Asians within the United States. Rowe, Vazsonyi, and Flannery (1994) used diverse but representative data sources to compare the similarity of correlation matrices for developmental and outcome variables for the various groups. The matrices were as similar to each other as were matrices computed from random halves within the same ethnic group. Ree and Carretta (1995) found a near identity of structure of intellect for ethnic groupings with the normative sample of the Armed Services Vocational Aptitude Battery (ASVAB) used to select applicants for all military enlistments in order to assign them to first jobs. Carretta and Ree (1995) found the same result with the more specialized Air Force Officer Qualifying Test (AFOQT), a multiple-aptitude battery given to applicants. Thus, average group differences result from different levels of the same processes, be they genetic or environmental. Rowe et al. (1994: 412) concluded:

Researchers should also be encouraged: Results they obtain for one ethnic group or in one U.S. geographic location will probably generalize to other groups and locations. Powerful generalization is the hallmark of a successful scientific enterprise; it bodes well for the future success of social science that developmental processes are alike in many subgroups of *homo sapiens*.

Genetic Similarity Theory

Chapters 4 and 5 described how race consciousness, and its frequent concomitant racism, occurs in cultures throughout history and the world over. Chapter 4 also reviewed evidence showing that individuals typically recognize, prefer, invest in, and grieve most for the members of their species with whom they share the most genes. In her positive review of this book, Gottfredson (1996) thought that one of the more interesting sections was the one showing an evolutionary basis for ethnocentrism. She wrote: "The data are startling for the uninitiated. For example, spouses and close friends tend to be most alike on the most heritable traits."

Genetic similarity theory left others unimpressed. Waqar Ahmad (1995), writing in the *New Scientist*, claimed I had "hijacked" Richard Dawkins's idea of the selfish gene. More regrettable was an exchange in the journal *Animal Behaviour* with Russell and Wells (1994, 1995) who had been initial coauthors on genetic similarity theory and on some of the early evidence in its

favor (chapter 4). Now they had moved to an “open verdict.” The main empirical reasons they gave for their change of position were that: (1) assortative mating cannot always be shown to occur; (2) assortative mating sometimes occurs for purely environmental reasons; and (3) cross-ethnic marriages are frequent. I (Rushton, 1995a) replied with the standard behavioral genetic logic that even when environmental factors can be shown to make phenomena complex, genetic factors are not thereby ruled out. To rule genetic factors out it would be necessary to measure both environmental and genetic factors in the same study. Unfortunately, while sociobiological research with nonhuman animals continues unabated on the relative importance of genetic and environmental factors underlying nepotistic discrimination (e.g., Arnold et al., 1996), the parallel work with humans lags well behind.

Crime

A novel study of *When Women Kill* examined 296 female-perpetrated homicide cases cleared by arrest in 1979 and 1983 in the cities of Atlanta, Baltimore, Chicago, Houston, Los Angeles, and New York City (Mann, 1996). Racial disproportions were similar to those found in male-perpetrated homicides. Of the arrests, 75 percent were African-American women, 13 percent were European-American women, and none were Asian-American women (the remainder were “Latina”). Typically, the offender was a single, thirty-one-year-old unemployed mother with less than a high school education who had been arrested in the past. The “socialization-only” reasons often given for black men fit more awkwardly for black women who are nominally precluded from expectations of violence. For example, there is no “expectation” for a macho image for females.

Although it may be little more than a cliché to point out that blacks commit proportionately more crimes of violence than do whites or Asians, the causes thereof remain moot. A government commission in Ontario (1996) reported that blacks were five times more likely to be in jail than were whites and ten times more likely than were Asians. The commission argued that the disproportion was due to systemic anti-black racism operating throughout the Ontario criminal justice system.

The commission’s report omitted consideration of the international data. As reported in chapter 7, analyses of INTERPOL Yearbooks for 1984 to 1986 showed a global racial pattern going well beyond Canadian, British, and U.S. particulars. Subsequently, Rushton (1995b) replicated these results using the 1989–90 INTERPOL Yearbook. The rate of violent crime (murder, rape, and serious assault) was three times higher in 23 African and Caribbean countries than it was in 12 Asian or Pacific Rim countries, with 41 European countries intermediate. Summing across crimes for Asian, European, and African countries gave rates per 100,000 population, respectively, of 32, 75, and 240.

Sexual Behavior and AIDS

Fueled in part by concern over the lethal epidemic of sexually transmitted disease, several major surveys of sexual behavior have confirmed the Asian/white/black pattern described in chapter 8. One study of 356 Asian and 346 non-Asian university students at the University of British Columbia in Canada found that Asian students were significantly more "restrained" than were non-Asian students on measures of interpersonal sexual behavior (e.g., petting, intercourse), intrapersonal sexual behavior (e.g., fantasy, masturbation), and sexual permissiveness (e.g., lifetime number of partners, number of "one-night stands"). The length of residency in Canada was typically unrelated to Asian behavior. Asian students born in Canada were as restrained as those who had only recently immigrated (Meston, Trapnell, & Gorzalka, 1996).

One prominent environmentalist theory of sociosexuality holds that Chinese people, relative to Europeans, inhabit a "collectivist" rather than an "individualist" culture, thereby leading to self-restraint. Meston et al. (1996) pointed to a problem with this theory, namely, Africans also embrace collectivist cultures but are *less* sexually restrained than are Europeans. Moreover, the authors noted, sexual restraint in China is apparent over a 1,000-year period of history covering several epochs so needs a more deeply rooted explanation. Meston et al. concluded that their results supported "[Rushton's] hypothesis of 'racial' (i.e., biological or genetic) differences among ethnic groups in sexual expressiveness and drive" (p. 64).

Results from the *A Youth At Risk Behavior Survey* featured in chapter 8 continue to be published by the Centers for Disease Control and Prevention. Large-scale surveys of sexual behavior in the United States (Laumann, Gagnon, Michael, & Michaels, 1994) and Britain (Johnson, Wadsworth, Wellings, Feld, & Bradshaw, 1994) have also appeared. All these tend to confirm that blacks are sexually more active at an earlier age than whites who are sexually more active at an earlier age than Asians.

In chapter 8, I drew out the implications of racial differences in sexual behavior for the worldwide distribution of sexually transmitted diseases such as AIDS. The rapid worldwide rate of increase in AIDS continues (currently 26 percent a year) and, in their latest report, the World Health Organization (1996) showed that over one and a quarter million adult cases had been reported from 193 countries as a result of the pandemic. Allowing for under-diagnosis, incomplete reporting, and reporting delay, the true figure is estimated to be about 6 million, and approximately 17 million people are estimated to have the human immunodeficiency virus (HIV) which causes the disease.

The World Health Organization (1996) extrapolated for each country the per capita prevalence of HIV. The results are truly stunning. Forty-seven countries were estimated to have 1 percent or more of their sexually active

population living with HIV. Thirty-seven of these countries were in sub-Saharan Africa and seven were in the Caribbean. A sampling: Botswana, Zimbabwe, Zambia, and Uganda have upwards of 20 percent or more of their population living with HIV; South Africa, Kenya, Mozambique, and Zaire have from 3 percent to 10 percent living with HIV; in the Caribbean, Haiti, Bahamas, Barbados, and Belize have 2 percent or more of their population infected; and Jamaica, Bermuda, and the Dominican Republic have more than 1 percent.

U.S. data show that African-Americans have rates similar to their counterparts in black Africa and the black Caribbean, with 3 percent of black men and 1 percent of black women living with HIV (Rosenberg, 1995). This survey, appearing in *Science*, drew correspondence to the effect that "race" was not causal to the incidence rates but was merely a marker for social factors such as poverty, which were the real causes (Males, 1996; McMillan, 1996). Rosenberg (1996) replied, noting that: (1) even with socioeconomic indicators controlled, sexually transmitted infections remained higher among African-Americans than among other groups; and (2) "cultural variations in behavior," distinct from socioeconomic status, were part of the complex web of causation. None of the correspondents pointed to the racial distribution elsewhere in the world nor to the fact that in Africa, it is *high* socioeconomic status that puts people at risk, mainly by increasing their access to sexual partners. Throughout the world, the virus must be considered endemic to black populations.

But Do Races Exist?

As this book shows, the construct validity of the three major races, Mongoloid, Caucasoid, and Negroid, has been established at the anatomical and behavioral level across both time and national boundaries. If race is simply arbitrary, consistent relationships of the type presented would not occur. Nonetheless, critics continue to call definitions arbitrary and subjective. The biologist Jared Diamond articulated this widespread viewpoint in the November 1994 issue of *Discover* magazine by surveying half a dozen geographically variable traits and forming very different "races" depending on which traits he picked. Classifying people using anti-malarial genes, lactose tolerance, fingerprint whorls, or skin color resulted in Swedes of Europe being placed in the same grouping as the Xhosa and Fulani of Africa, the Ainu of Japan, or the Italians of Europe.

Most of Diamond's classifications, however, make no sense, because they have little, if any, predictive value beyond the initial classification. More significantly, they confuse the scientific meaning of race, that is, a recognizable (or distinguishable) *geographic* population. In science, the validation of constructs such as race depends on a network of predictive relationships.

Testosterone

The possible role of testosterone in mediating crime, reproductive behavior, and other variables was discussed throughout the book. New work by Harris, Rushton, Hampson, and Jackson (1996) showed testosterone mediates aggression and nurturance. Salivary testosterone was examined in 306 university students and, in both men and women, it was found that those with high testosterone were more aggressive and less nurturant on self-report questionnaires than were those with low testosterone. Men also averaged five times the amount of testosterone in their saliva as did women and were more aggressive and less nurturant than were women.

Group characteristics arise from the nature of the people who belong to the groups. Among the qualities that affect people's behavior in groups is testosterone. Dabbs, Hargrove, and Heusel (1996) assessed testosterone levels from saliva samples in various fraternity groups in the United States and found that those fraternities whose members were high in testosterone tended more to be noisy, rude, and unruly whereas those fraternities whose members were low in testosterone tended to smile more and be academically successful and socially responsible.

r-K Reproductive Strategies

Chapter 10 described the work of the primatologist Adolf Schultz who held that as one "ascends" in the primate order from prosimians to monkeys to apes to humans, an increased absolute amount of time is devoted to each stage of development: gestation, infancy, childhood, and adulthood (Figure 10.3). Ecological theory suggests that this pattern of prolonged development reflects an increasingly *K*-selected strategy on the part of the primates including other such features as parental care, small litter size, large body size, and big brains. Generalizing from across primates to within humans, chapters 7 and 10 reported East Asians had the most prolonged development, Europeans the next most prolonged, and Africans the least prolonged.

A symposium was published in the 1996 issue of the *American Journal of Physical Anthropology* on comparative speed of tooth development among orangutans, chimpanzees, early hominids, and modern humans, some of it explicitly citing an *r-K* perspective, that confirmed trends reported in chapter 10. One study by Anemone, Mooney, and Siegel (1996) used dental x-rays and computerized tomography (CT) to find that the 3 million-year-old australopithecenes had a rapid, essentially "apelike" dental development and, by inference, apelike life history pattern, and that chimpanzees had a more rapid dental development than did humans. Among humans, sub-Saharan Africans had a more rapid dental development than did white French Canadians who had a more rapid rate than did Amerindians (Tompkins,

1996a). African populations also averaged larger jaws and bigger teeth than did Europeans.

Tompkins (1996b) went on to compare the relative development of permanent teeth in a sample of nearly one hundred 50,000-year-old Neanderthal/archaic *Homo* and Early Modern/Upper paleolithic hominids with the human samples. Both fossil hominid groups differed in having a more rapid dental development than did French Canadians, but they were matched by the southern Africans (except, possibly, the Neanderthal/archaic *Homo* group who were especially advanced). Tompkins (1996b) suggested "that the fossil hominids and southern Africans are characterized by similar potentials for more precocious skeletal maturation than in French Canadians (and other European/Euroamerican populations)" (p. 115).

Other researchers too have provided *r-K* related analyses of human variation. Cited in text were works by Ellis and Miller, both of whom have continued their research. Ellis (1994) reviewed literature suggesting genetic covariation between height, health, social status, brain size, and intelligence. Miller (1995) presented studies showing that black Americans spend more money on clothes than do white Americans and that blacks average greater skull thickness than do Asians or whites. Miller's interpretation was that blacks expend more effort than do whites on fighting and mating relative to parenting.

Out of Africa

Evidence mounts that the recent African model of human origins described in chapter 11 is correct. 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. Thus, all non-African human populations descend from an anatomically modern *H. sapiens* ancestor that evolved in Africa and then spread and diversified throughout the rest of the Earth, supplanting any *Homo* populations still present outside of Africa. Migration out of Africa may have occurred in a single or in multiple waves.

Among recent works confirming the Out of Africa model is Cavalli-Sforza, Menozzi, and Piazza's (1994) massive *History and Geography of Human Genes*, a compilation of data from 2,900 articles. African samples repeatedly showed the largest amount of genetic variation which is consistent with the view that Africans are the oldest population because this allowed more time for mutations to occur. Based on genetic similarities and differences, Africans also showed the greatest distance from other populations. The genetic distance between Africans and Europeans is twice that between Europeans and East Asians. Interestingly, the European/Amerindian distance is slightly less than the one between Europeans and East Asians. This last finding was

validated by work sequencing the Y chromosome showing an Amerindian/East Asian split about 30,000 years ago (Underhill, Lin, Zemans, Oefner, & Cavalli-Sforza, 1996).

Subsequent support for the Out of Africa model comes from Horai et al. (1995) at the National Institute of Genetics in Japan who sequenced all 16,500 bases in the mtDNA genome for three humans, one each from Africa, Europe, and Japan, and four apes (common and pygmy chimpanzees, a gorilla, and an orangutan). By comparing the differences in mtDNA sequences between the orangutan and the other apes, who are generally acknowledged to have split apart 13 million years ago, Horai was able to calculate the rate at which mtDNA mutations occur once populations split off from a common ancestor. Then, applying that rate to the three human lineages, Horai et al. inferred that they last shared a common ancestor 143,000 years ago, plus or minus 18,000 years. And, as the African lineage has the most diversity, Horai et al. concluded that last common ancestor lived in Africa.

Another corroboration of the recent out of Africa model comes from Tishkoff et al. (1996) who examined 1,600 individuals from 42 worldwide populations for a specific variation of the DNA sequence on human chromosome 12. As with other parts of the genome, extensive variety was found among groups in sub-Saharan Africa but few differences found among those in Asia, Europe, or the Americas. Of the 24 possible variations, 21 were found in sub-Saharan Africa, from Nigeria to Kenya and south. Tishkoff et al. (1996) concluded that all non-Africans evolved from a single common ancestral population which migrated out of northeast Africa. The migrant population could have been as few as 1,000 and the migration occurred no earlier than 100,000 years ago and could be as recent as 70,000.

Evolutionary selection pressures are different in the hot savanna, where Negroids evolved, than in the cold Arctic, where Mongoloids evolved. I proposed 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. Each population became adapted to the environment in which it evolved.

Progress in Evolution?

In their reviews, Lynn (1996a) and Peters (1995) both referred to my ranking of species on evolutionary scales. For Peters, this was a highly contentious idea but in Lynn's positive review, he described me as proposing that the

K-strategy was "evolutionarily more advanced" and that the Oriental race was "the most evolved." In fact, I did not use either of these phrases in the book, although I had alluded to similar ideas in previous writing. Regardless, the topic of evolutionary progress provides an intellectual challenge of the first order and needs to be addressed. Figure 10.2 (p. 202) does imply a move from simple *r*-type animals producing thousands of eggs but providing no parental care to more complex *K*-type animals producing very few offspring.

The question of progress in nature has fascinated since Aristotle. Aristotle suggested that organisms could be hierarchically graded along a *scala naturae* marked by minute continuous steps from the inanimate, through plants, to the animals. He offered overlapping criteria for ranking along this scale including "perfectibility" (closeness to a Platonic God), "soul" (capacity for rational discourse), and method of reproduction. For example, regarding reproduction, he wrote in the *History of Animals*:

Now some simply like plants accomplish their own reproduction according to the seasons; others take trouble as well to complete the nourishing of their young, but once accomplished they separate from them and have no further association; but those that have more understanding and possess some memory continue the association, and have a more social relationship with their offspring.

The Greek philosopher's biology is remarkably current. Based on detailed observation, Aristotle noted many of the principles that lie at the heart of the *r-K* analysis undertaken in this book including the inverse relations between seed output, parental care, and intelligence. The historian Arthur Lovejoy, in his 1936 book *The Great Chain of Being*, concluded that Aristotle's arrangement of all things in a single order of magnitude was one of the most important ideas in Western thought.

Darwin (1859) referred frequently to evolutionary progress in the *Origin of Species*. This was necessary not only to refute concepts of a steady-state world but also to counter a newly developed school that denied any difference in perfection between the simplest and the most complex organisms, which would be an implicit denial of improvement through natural selection. In his book *Sociobiology* (1975), E. O. Wilson also promoted the idea of biological progression, outlining four pinnacles in the history of life on Earth: first, the beginning of life itself in the form of primitive prokaryotes, with no nucleus; then the origin of eukaryotes, with nucleus and mitochondria; next the evolution of large, multicellular organisms, which could evolve complex organs such as eyes and brains; and finally the beginnings of the human mind.

John Bonner (1980), in his book *The Evolution of Culture in Animals*, showed that the later an animal emerged in earth history the larger was its brain and the greater was its culture. Pursuing the issue in a subsequent book, *The Evolution of Complexity* (1988), he asked "Why has there been an evolution from the primitive bacteria of billions of years ago to the large and com-

plex organisms of today?" Bonner held that it was quite permissible for paleontologists to refer to strata as upper and lower, for they are literally above and below each other and, because the fossils in the lower strata will, in general, be more primitive in structure as well as belong to a fauna or flora of earlier times, so "lower" and "higher" were acceptable terms. Bonner (1988: 6) noted that it was even acceptable to refer to lower and higher *plants*, slime molds versus angiosperms for example. It only became a "sin" when a worm was classified as a lower animal and a vertebrate a higher one, even though their fossils too will be found in lower and higher strata.

Paleontologist Dale Russell (1983, 1989) quantified increasing neurological complexity through 700 million years of Earth history in invertebrates and vertebrates alike. The trend was increasing encephalization among the dinosaurs that existed for 140 million years and vanished 65 million years ago. Russell (1989) proposed that if they had not gone extinct, dinosaurs would have progressed to a large-brained, bipedal descendent. For living mammals he set the mean encephalization, the ratio of brain size to body size, at 1.00, and calculated that 65 million years ago it was only about 0.30. Encephalization quotients for living molluscs vary between 0.043 and 0.31, and for living insects between 0.008 and 0.045 but in these groups the less encephalized living species resemble forms that appeared relatively early in the geologic record, and the more encephalized species resemble those that appeared later.

The hominid brain has nearly tripled in size over the last 4 million years. *Australopithecenes* averaged a brain size of about 500 cm³, the size of a chimpanzee. *Homo habilis* averaged about 800 cm³, *Homo erectus* about 1,000 cm³, and modern *Homo sapiens* about 1,350 cm³. In Figure 10.3 of this book (p. 205) *Homo sapiens* is to be found at the end of a *scala naturae* of characteristics. The once traditional view that man is the "most developed" of species, gains novel support from the perspective of an *r-K* dimension. As E. O. Wilson (1975) put it: "In general, higher forms of social evolution should be favored by *K* selection" (p. 101).

Conclusion

The main contribution envisaged for *Race, Evolution, and Behavior* was theoretical—to advance an *r-K* reproductive analysis of human diversity. This seemed a straightforward application of well-established ideas from population biology to the human species, anchoring humans and their social systems within the Darwinian paradigm. No environmental factor is able to explain the consistency of the international pattern of racial differences across so many variables. Evolutionary (and hence genetic) models are required.

As Linda Gottfredson observed in her review in *Politics and the Life Sciences*, much self-censorship operates among social scientists regarding mak-

ing public pronouncements about race differences. It is difficult to disagree with the conclusion arrived at by Murray (1996) following his review of the aftermath to *The Bell Curve*: on the topic of race, social science is corrupt. Yet, it is heartening to believe that it is also the vitality of social science research that shows up this sterility and points the way to a more encompassing worldview.

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