

Working Paper, May 10, 2009, Comments welcome

**Race and IQ: A Theory-Based Review of the Research in Richard Nisbett's  
*Intelligence and How to Get It***

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Abstract

We provide a detailed review of data from psychology, genetics, and neuroscience in a point-counterpoint format to enable readers to identify the merits and demerits of each side of the debate over whether the *culture-only* (0% genetic-100% environmental) or *hereditarian* (50% genetic-50% environmental) model best explains observed mean ethnic group differences in intelligence test scores: Jewish (mean IQ = 113), East Asian (106), White (100), Hispanic (90), South Asian (87), African American (85), and sub-Saharan African (70). We juxtapose Richard Nisbett's position, expressed in his book *Intelligence and How to Get It*, with our own, to examine his thesis that cultural factors alone are sufficient to explain the differences and that the hereditarian model we have presented over the last 40 years is unnecessary. We review the evidence in 14 topics of contention: (1) data to be explained; (2) malleability of IQ test scores; (3) culture-loaded versus *g*-loaded tests; (4) stereotype threat, caste, and "X" factors; (5) reaction-time measures; (6) within-race heritability; (7) between-race heritability; (8) sub-Saharan African IQ scores; (9) race differences in brain size; (10) sex differences in brain size; (11) trans-racial adoption studies; (12) racial admixture studies; (13) regression to the mean effects; and (14) human origins research and life-history traits. We conclude that the preponderance of evidence demonstrates that in intelligence, brain size, and other life history traits, East Asians average higher than do Europeans who average higher do South Asians, African Americans, or sub-Saharan Africans. The group differences are between 50 and 80% heritable.

**Contents**

1	The Data to Be Explained	2
2	The Malleability of IQ Scores	7
	2.1. Is the African American Mean IQ actually 78, not 85	8
3	Culture-Loaded Versus <i>g</i> -Loaded Tests	8
	3.1. Spearman's Hypothesis and Jensen Effects	9
	3.2. The Method of Correlated Vectors	10
4	Stereotype Threat, Caste, and Other "X" Factors	11
5	Reaction Time Measures	13
6	Within-Race Heritability	15
7	Between-Race Heritability	17
	7.1. Inbreeding Depression Scores	18
8	Sub-Saharan African IQ Scores	20
	8.1. Mediated Learning	22
	8.2. Test Bias	22
	8.3. Mental Age	22
9	Race differences in Brain Size	23
	9.1. Within-Family Studies	24
	9.2. MRI, Autopsy, Skull Size, and External Head Size Studies	24
	9.3. Perinatal and Environmental Factors	25
	9.4. NASA, Einstein's Brain, and the Ecuadorean Sample	26
10	Sex Differences in Brain Size	27
	10.1. Sex Differences in Cognitive Ability	28
	10.2. Age x Sex x Race Interactions	29
11	Trans-Racial Adoption Studies	29
12	Racial Admixture Studies	32
	12.1. Skin Color Studies	33
	12.2. Eyferth's German Study	33
	12.3. Blood Groups and DNA	34
	12.4. The South African "Coloreds"	35
13	Regression to the Mean Effects	35
14	Human Origins Research and Life History Traits	36
15	General Discussion	38
	References	41

**1. The Data to be Explained**

Throughout the history of psychology, no question has been so persistent or so resistant to achieving consensus as that of the relative roles of nature and nurture in causing individual and group differences in cognitive ability [1,2]. The scientific debate goes back to the mid-19th century [3,4]. Starting with the widespread use of standardized mental tests in the U.S. during World War I (1917), average ethnic and racial group differences have been found. Especially

vexing has been the cause(s) of the 15- to 18-IQ point difference or 1.0 to 1.1 standard deviations (SD) between Blacks and Whites. This remains the main source of contention in the latest contribution to the debate, Nisbett's *Intelligence and How to Get It* [5]

The first major analysis of Black-White intelligence test scores began after World War I. The 23,596 Black draftees had an IQ of 83 (vs. 100 for Whites), with 13 percent of Blacks overlapping the White mean. In 1966, Shuey [6] reported these data and reviewed 380 additional studies published over a 50-year period and found the 15 point difference was consistent across student groups from preschool to college, as well as in members of the armed forces and specific groups such as delinquents, criminals, the gifted, and the developmentally challenged.

In *The Bell Curve*, Herrnstein and Murray [7] described an original analysis of 11,878 youths (including 3,022 Blacks) from the 12-year National Longitudinal Survey of Youth. It found that most 17-year-olds with high scores on the Armed Forces Qualification Test, regardless of ethnic background, went on to occupational success by their late 20s and early 30s, while those with low scores were more inclined to welfare dependency. The study also showed that the average IQ for Jewish-Americans was higher than for East Asian-, White-, Latino-, and African-Americans (113, 106, 103, 89, and 85, respectively, pp. 273-278).

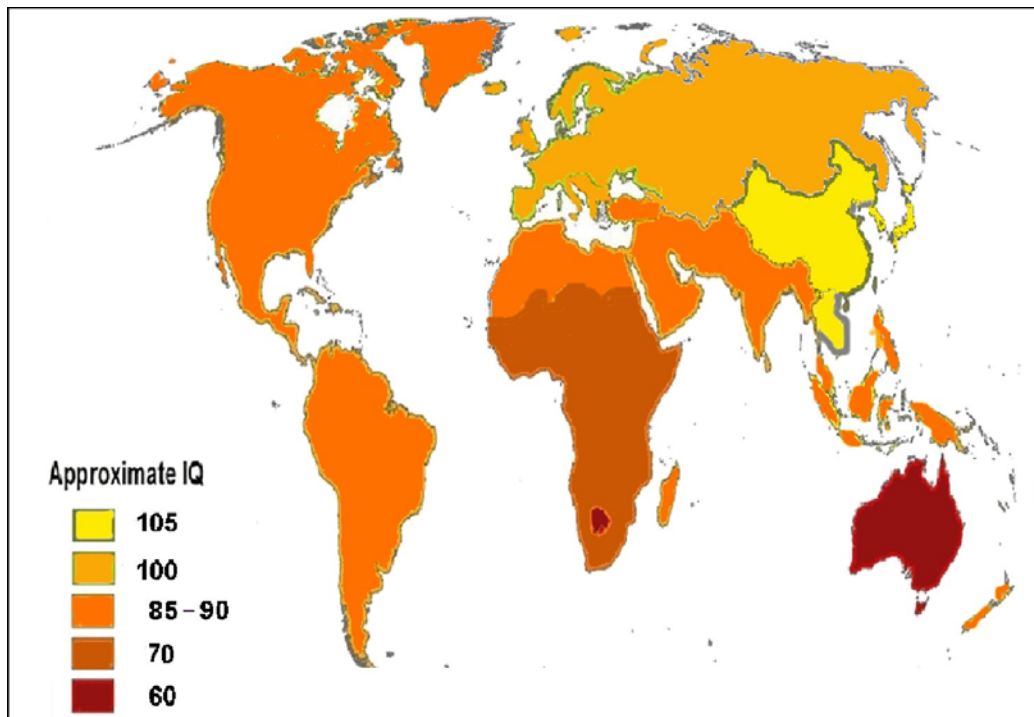
We described the rival hereditarian and culture-only explanations of mean group IQ differences in our 60-page review, "Thirty Years of Research on Race Differences in Cognitive Ability" in the 2005 *Psychology, Public Policy, and Law*, a journal of the American Psychological Association [8]. The defining difference between the two explanations—an approximately 50% genetic-50% environmental etiology for the hereditarian view versus an effectively 0% genetic-100% environmental etiology for culture-only theory—is whether any significant part of the mean group IQ differences is genetic. Intermediate positions (e.g., gene-environment interaction) can be operationally assigned to one or the other of the two positions depending on whether they accept any significant heritable component. For example, if gene-environment interactions make it impossible to disentangle causality and apportion variance, then for pragmatic purposes that view is indistinguishable from the 100% culture-only program because it denies a numerical weight to the genetic component proposed by hereditarians.

Currently, the magnitude of the U.S. Black-White IQ difference is not in itself a major cause of scientific dispute. A recent meta-analytic review by Roth et al. [9] yielded a 1.1 SD difference, with a range of from 0.38 to 1.46 for a total sample of 6,246,729 from corporate, military, and higher education samples. Further, that difference was consistent for college and university application tests such as the Scholastic Aptitude Test (SAT;  $N = 2.4$  million) and the Graduate Record Examination (GRE;  $N = 2.3$  million), as well as for tests of job applicants in corporate settings ( $N = 0.5$  million), and in the military ( $N = 0.4$  million).

The race-IQ debate was broadened considerably when research on East Asian Americans demonstrated they averaged a slightly *higher* IQ than White Americans [10]. The data base became truly international when Richard Lynn collated national IQ scores from 192 countries [11, 12, 13, 14]. Going beyond the traditional three macro-races of Africans, Europeans, and East Asians, Lynn organized the data according to the ten "genetic clusters" (population groups)

identified by Cavalli-Sforza et al. [15] in their 1994 *History and Geography of Human Genes*. Lynn tabulated 620 studies from the beginning of the twentieth century to the present ( $N = 813,778$ ) and found the world average IQ to be 90 (Figure 1). The East Asian cluster (Chinese, Japanese and Koreans) obtained the highest mean IQ at 105, followed by Europeans (100), Inuit-Eskimos (91), South East Asians (87), Native American Indians (87), Pacific Islanders (85), South Asians & North Africans (84), sub-Saharan Africans (67), Australian Aborigines (IQ 62), and Kalahari Bushmen & Congo Pygmies (IQ 54).

**Figure 1. World IQ Map of Indigenous Populations**



Some of the most convincing evidence that intelligence levels are environmentally influenced comes from James R. Flynn's report that in the developed world as a whole, scores increased markedly from 1947 to 2002—about 3 points a decade over the last 50 years [16,17,18]. The mean went up by 18 points in the US alone. The Flynn Effect, as the secular trend is often called, is generally agreed to be the result of social factors. If such factors can change the mean IQ for the population as a whole, it is reasonable to suppose they could also affect differences between subpopulations.

Building on this line of argument, Dickens and Flynn [19] presented analyses in 2006 to show that in the US, the 15-point IQ gap between Blacks and Whites narrowed by 5.5 points between 1972 and 2002. They documented a drop from 15 to 9.5 points on a combination of the Wechsler Intelligence Scale for Children (WISC), the Wechsler Adult Intelligence Scale (WAIS), the Stanford-Binet, and the Armed Forces Qualification Test (AFQT). It is hard to overestimate the

importance of a gap reduction of this magnitude. As Nisbett [5, p. 100] stated, it reduces the ratio of Whites to Blacks with an IQ of 130 (the level needed to be a highly successful professional) from of 18 to 1 to only 6 to 1.

**Table 1. Principal Components Analysis and Varimax Rotation for Pearson Correlations of Inbreeding Depression Scores, Black-White Differences, g Loadings, and Gains Over Time on the Wechsler Intelligence Scales for Children With Reliability Partialled Out**

Variables	Principal Components			
	Unrotated Loadings		Varimax Rotated Loadings	
	I	II	1	2
Inbreeding depression scores from Japan (WISC-R)	0.31	0.61	0.26	<b>0.63</b>
Black-White differences from the U.S. (WISC-R)	0.29	0.70	0.23	<b>0.72</b>
WISC-R g loadings from the U.S.	-0.33	0.90	-0.40	<b>0.87</b>
WISC-III g loadings from the U.S.	-0.61	0.64	-0.66	<b>0.59</b>
U.S. gains 1 (WISC to WISC-R)	0.73	-0.20	<b>0.75</b>	-0.13
U.S. gains 2 (WISC-R to WISC-III)	0.81	0.40	<b>0.77</b>	0.47
German gains (WISC to WISC-R)	0.91	0.03	<b>0.91</b>	0.11
Austria gains (WISC to WISC-R)	0.87	0.00	<b>0.86</b>	0.07
Scotland gains (WISC to WISC-R)	0.97	0.08	<b>0.96</b>	0.17
% of total variance explained	48.6	25.49	48.44	25.65

*Note.* From “Secular gains in IQ not related to the *g* factor and inbreeding depression—unlike Black-White differences: A reply to Flynn,” by J. P. Rushton, 1999, *Personality and Individual Differences*, 26, 381-389.

However, these optimistic claims have been challenged. In 1999, Rushton [20] showed that the Flynn Effect is not on the *g* factor, although that is the principal source of the Black-White difference (*g* is the general factor of mental ability, which is the “active ingredient” in IQ, see

Section 3). Table 1 shows the results of a principal components analysis of the secular gains in IQ from the U.S., Germany, Austria, and Scotland, along with Black-White IQ differences from the U.S., inbreeding depression scores calculated for cousin marriages in Japan, and *g* loadings from the standardization samples of the Wechsler Intelligence Scale for Children (WISC-R and WISC-III). The relevant findings are: (1) the IQ gains on the WISC-R and WISC-III form a cluster, showing that the secular trend in overall test scores is a reliable phenomenon; but (2) this cluster is *independent* of a second cluster formed by Black-White differences, *g* factor-loadings (a largely genetic effect), and inbreeding depression scores (a purely genetic effect).

Similarly, Rushton and Jensen [21] disputed Dickens and Flynn's [19] claim of a narrowing of the Black-White IQ difference by pointing out how selective they had been in choosing which tests to include in their analysis. For example, they excluded the Wonderlic Personnel Test, which showed a gain of only 2.4 points for Blacks between 1970 and 2001; the Kaufman Assessment Battery for Children (K-ABC), which showed a loss of 1 IQ point for Blacks between 1983 and 2004; the Woodcock-Johnson test, which showed a zero gain for Blacks; and the Differential Ability Scale, which showed a gain of only 1.83 points for Blacks between 1972 and 1986. We also pointed out that even the test data they did present did not directly support their conclusion. In order to report a gain of 5.5 points, Dickens and Flynn "projected" a trend line based on a small IQ rise per year *multiplied by more years than were in their data*. Simple arithmetic yielded a mean gain for Blacks of 3.4 points (23%), not the 5.5 claimed (37%). Including the aforementioned tests, reduced the gain to 2.1 points (14%).

Most recently, and partly in response to our critiques, culture-only theorists have updated their arguments in three important new books: Richard Nisbett's 2009 *Intelligence and How to Get It* [5], James Flynn's 2007 *What is Intelligence?* [17] as well as Flynn's 2008 *Where Have All the Liberals Gone?* [18]. Of the three, Nisbett's book is the most comprehensive and has garnered wide-spread media attention. In it, he renews his earlier critique of our hereditarian position [22], and summarizes and builds on the other two books. While Nisbett agrees with us that genes play a significant part in *within-group* IQ differences, unlike us, he contends they play no significant part in *between group* differences. In a technical Appendix, "The Case for a Purely Environmental Basis for Black/White Differences in IQ," Nisbett submits nine categories of empirical evidence which he asserts refute the hereditarian model we have presented over the last 40 years [8,23,24,25,26]. In doing so he also disputes many of the conclusions of *The Bell Curve* [7].

In this paper we provide a point-counterpoint response to the evidence and arguments Nisbett marshals to refute the hereditarian model. In so doing, we use a format that should enable readers to identify the merits and demerits of each side of the debate. Our 14-point response includes the 9 major research topics covered by Nisbett: (2) the malleability of IQ scores; (3) culture-loaded vs. *g*-loaded tests; (4) stereotype threat, caste, and other "X" factors; (5) reaction-time measures; (6) within-race heritability; (7) between-race heritability; (8) sub-Saharan African IQ scores; (9) race differences in brain size; (10) sex differences in brain size; (11) trans-racial adoption studies; (12) racial admixture studies; (13) regression to the mean effects; and (14) human origins research and life-history theory.

## 2. The Malleability of IQ Scores

**Nisbett:** Some of the most convincing evidence that the IQ gap has environmental causes comes from James Flynn's discovery that in the developed world as a whole, IQ scores have increased markedly. Flynn extrapolated these findings to suggest that the 15-point difference between Blacks and Whites will gradually disappear over time. Indeed, Black IQ is now superior to White IQ in 1950!

In line with Flynn's prediction, Dickens and Flynn [19] showed that the Black-White IQ gap narrowed by 5.5 points between 1972 and 2002. Even when the several additional tests that Rushton and Jensen [21] argued should be included in the analysis are taken into account, the median Black gain is still 4.5 IQ points, which is not very different from the 5.5 IQ point estimate initially given by Dickens and Flynn. Similarly, the Black-White difference shrank comparably on the National Assessment of Educational Progress (NAEP) Long-Term Trend tests. These have been given every few years since the early 1970s by the U.S. Department of Education to a random sample of 9-, 13-, and 17-year-olds. For children born as early as 1954, the Black-White difference in reading and math averaged a full 1.2 SDs. For the most recent cohorts the gap is between .60 and .90 SDs—a very large reduction. It is interesting to note that if we convert the NAEP gains to IQ-type scales, with the mean set to 100 and SD to 15, and average the gains in math and reading across all age groups, we obtain an estimate of a 5.4 point reduction in the Black-White education gap during the period for which Dickens and Flynn [19] found a 5.5 point reduction in the Black-White IQ gap.

**Rushton and Jensen:** In fact, there is very little evidence of any truly significant narrowing of the Black-White IQ gap. Nisbett does not explain how he arrived at an overall Black gain of 4.5 IQ points (30%) after including the four small (or negative) gain tests we described in Section 1. Simple arithmetic applied to all eight tests yielded a mean gain for Blacks of only 2.1 points (14%). Nisbett also exaggerated the NAEP gains. As Gottfredson [27] pointed out, the difference on school achievement tests only narrowed from 1.07 to 0.89 SDs from the 1970s to the 1990s, and even this 20% reduction (not the 35% claimed by Nisbett) had (a) occurred by the 1980s and no longer continued, and (b) does not contradict the hereditarian hypothesis. Nisbett appears to have ignored the Black-White difference on the NAEP Science test, which continued to show a 1.0 SD difference (although it is difficult to be sure because he was vague about how he made his calculations). The 2004-2008 NAEP results released in April 2009, just after Nisbett's book was published, also show no Black-White narrowing.

Other researchers have corroborated our conclusion that there has not been any significant narrowing of the Black-White difference over the 30-year-time period (from 1972 to 2002) covered by Dickens and Flynn. In 2001, when Roth et al. [9] confirmed the 1.1 SD difference in a sample of 6,246,729 corporate, military, and higher education testees, they also addressed the question of whether the difference was diminishing. They concluded that any reduction was "either small, potentially a function of sampling error...or nonexistent for highly g loaded instruments" [9, p. 323, our italics]. Similarly, in two subsequent studies, Murray [28,29] concluded there was "no narrowing." In the first, he found no narrowing in either verbal IQ or achievement test scores for children born to women in the 1979 sample of the National

Longitudinal Survey of Youth. In the second, he again found no narrowing for 6- to 65-year-olds in the Woodcock–Johnson standardizations of those born in the last half of the 1960s and early 1970s.

### **2.1. Is the African American mean IQ actually 78, not 85?**

When Murray [29] analyzed trends on the Woodcock-Johnson test, he found that a narrowing of 7.5 points had occurred for Black men born from 1925 to 1927 compared to those born in later years (after which the narrowing stopped). This was because Blacks born in the earliest group averaged 1.59 SDs below Whites rather than only 1 SD, thereby allowing a gain in later standardizations, but only from IQ 78 to the more typical IQ 85.

Murray's results raise the hypothesis that the magnitude of the US Black-White IQ gap is 22 points, not 15, a possibility supported by data from World War II military samples. The Black-White difference on the Army General Classification Test (AGCT) for 1944-1945 inductions was 1.52 SDs [2]. As Murray noted, the military testing during World War II was probably the most representative sampling of African American IQ ever undertaken. It was more inclusive than that conducted during World War I, which had excluded most of the 70% of African Americans who still lived in the rural South and were unschooled or very poorly schooled. This segment of the overall U.S. Black population, which had a lower mean IQ, was also underrepresented in the studies collated and analyzed by Shuey [6].

An IQ of 71 was found for the Black children in an entire school district from a rural county in Georgia in the U. S. Deep South; the White IQ in the same county was 101 [30]. Compatible with this finding are the results from Hills and Stanley [31] who gave the School and College Ability Test (SCAT), a deliberately easier test than the more usually administered Scholastic Aptitude Test (SAT), to all-Black college students in Georgia. They found that the scores were normally distributed and predicted college grades. However, the average for the Black college students on the SCAT was at about the 50th percentile on 8th grade national norms. Even today, test developers and educational researchers seldom get to examine the very lowest scoring segments of the Black population in inner cities.

### **3. Culture-Loaded Versus *g*-Loaded Tests**

**Nisbett:** Herrnstein and Murray [7] and Rushton and Jensen [8] argue that because Blacks and Whites differ more in their IQ test performance on those items with higher *g* loadings (correlations with the *g* factor), this constitutes evidence for the biological and genetic nature of the Black-White difference. However, many social scientists say that *g* is little more than a statistical necessity and of limited interest. My own view is that when it comes to race differences, the *g* factor is a red herring. Flynn [32] showed that the secular trends occur on *g* loaded tests. This produces an absurdity because the secular trends are without doubt almost entirely environmental in origin. Yet Flynn found that the IQ gains occur more on those subtests that Rushton and Jensen allege are *g* loaded and so more genetically influenced! Subsequently, Dickens and Flynn [19] showed that Blacks gained almost as much (5.13 points) on *g*-weighted tests as on non-*g*-weighted tests.

**Rushton & Jensen:** Nisbett’s “absurdity” is resolved when it is recognized that he (and Dickens and Flynn) are incorrect to claim that the secular rise in IQ is mainly on the  $g$  factor, the principal source of the Black-White differences. As shown in Table 1, Flynn Effect IQ gains on the WISC-R and WISC-III form a separate cluster from that formed by the Black-White IQ differences,  $g$  factor-loadings (a largely genetic effect), and inbreeding depression scores (a purely genetic effect).

Nisbett disputed the cluster analysis in Table 1 by referring to Flynn’s [32] subsequent analysis. In this, Flynn, with William Dickens doing the statistics: (a) discarded the Maze test Rushton had included, thereby reducing the number of WISC subtests from 11 to 10; (b) discarded the data Rushton included on the WISC-III on the grounds that most of the data was on the WISC; (c) averaged the five sets of gain scores on the grounds that five gain indicators were too many for Rushton’s factor analysis to be fair (never mind there was an equal number of  $g$  variables); and (d) calculated a new  $g$  for the Wechsler subtests by correlating them with the Raven’s Progressive Matrices test on the grounds that Rushton had measured “crystallized” rather than “fluid”  $g$  (never mind that Rushton used the standard method to extract  $g$  from the Wechsler tests). These manipulations succeeded in obscuring the straight-forward results shown in Table 1. One of the analyses even reversed the relation between  $g$  and the secular trend, thus constructing Nisbett’s “absurdity.” It is important to know that Flynn acknowledged in regard to his new analysis, “The data contained herein are not robust” (p. 212).

Independent researchers have corroborated Rushton’s (1999) finding that the Flynn Effect is not on  $g$ . Although one study in Spain [33] reported a positive correlation ( $r = .78$ ;  $P < .05$ ) between  $g$  and generational changes using the Spanish Differential Aptitude Test, 5 of the 10 samples showed an overall *decrement*, thereby rendering the study’s conclusion problematic. A study in Estonia [34] found a negative correlation ( $r = -.40$ ; *ns*) between  $g$  and the secular rise in IQ scores over a 60-year period in 12- to 14-year-olds on 12 subtests of the Estonian National Intelligence Test. Subsequently, Wicherts et al. [35] re-analyzed five independent data sets, including the Estonian data, and found clear evidence of rising IQ scores but also an absence of measurement invariance, indicating that the test scores had different meanings for the different cohorts. By contrast, when they examined the Black-White differences (e.g., from Dolan [36]), the measurement invariance indicated the test scores had the same meaning. They therefore concluded that IQ gaps between cohorts tell us nothing about IQ gaps between contemporary groups. Their results showed that the Flynn Effect is qualitatively different from the Black-White difference in regards to the  $g$  factor.

### 3.1. Spearman’s Hypothesis and Jensen Effects

Charles Spearman [37] introduced the term  $g$  to represent the general factor of intelligence, that is, the underlying process common to all mental tests. He then conjectured that Black-White IQ differences would be “most marked in just those [tests] which are known to be saturated with  $g$ ” (p. 379). Jensen [38] dubbed this “Spearman’s hypothesis” (p. 535) and carried out several studies to test it. Osborne [39] renamed it the “Spearman-Jensen hypothesis” because it was Jensen who brought Spearman’s hypothesis to widespread attention and did all the empirical work confirming it. Subsequently, Rushton [40] proposed that the term “Jensen Effect” be used

whenever a significant correlation occurred between  $g$ -factor loadings and any other variable. Jensen Effects are not omnipresent and their absence can be as informative as their presence. For example, as shown in Table 1, the Flynn Effect (the secular rise in IQ) is *not* a Jensen Effect because it does not occur on  $g$ .

Jensen [25] documented that  $g$  is the “active ingredient” of IQ scores, and is embedded to a greater or lesser extent in every question on an intelligence test. He showed that a test’s  $g$  loading is the best predictor, not just of that test’s correlation with scholastic and work-place performance, but of *biological* measures such as heritability coefficients determined from twin studies, inbreeding depression scores calculated in children of cousin-marriages, brain evoked potentials, brain pH levels, brain glucose metabolism, as well as nerve conduction velocity and reaction time measures. These correlations argue strongly for the heritable and biological, as opposed to the mere statistical reality of  $g$ .

### 3.2. The Method of Correlated Vectors

Since the Black-White IQ differences are more pronounced on those items and subtests with high  $g$  loadings than on those items and subtests with low  $g$  loadings, the differences are unlikely to be the result of any cultural peculiarities of this or that test or this or that time epoch. Jensen [25] developed the *method of correlated vectors* to determine whether there is an association between a column of quantified elements (such as a test’s  $g$  loadings) and any parallel column of independently derived scores (such as mean differences between groups). Jensen [25, pp. 369-379] summarized 17 independent data sets of nearly 45,000 Blacks and 245,000 Whites derived from 149 psychometric tests and found that the  $g$  loadings consistently predicted the magnitude of the Black-White differences ( $r = .62, P < .05$ ). This was borne out even among three-year-olds administered eight sub-tests of the Stanford-Binet; the rank correlation between  $g$  loadings and the Black-White differences was  $.71 (P < .05; [41])$ .

Jensen Effects have also been found for mean East Asian-White group differences in the US (favoring East Asians). Nagoshi et al. [42] examined the results of 15 cognitive tests administered to two generations of Americans of Japanese, Chinese, and European ancestry in Hawaii. They found that the more  $g$  loaded the test, the greater the East Asian-White differences, favoring East Asians.

Other studies have found Jensen Effects for other group differences such as those between Blacks, Coloreds (i.e., a Mixed Race group), South Asians, and Whites in South Africa, as well as between South Asians and Whites in Europe. For example, Rushton [43] re-analyzed data from 4,000 high-school students in South Africa on the Progressive Matrices (originally published by Owen [44] and found the four-way mean differences between Africans, Coloreds, South Asians, and Whites were all on  $g$ . When Rushton and Jensen [45] re-analyzed WISC-R data from 12- to 14-year-olds from Zimbabwe (originally published by Zindi [46]), they found that 77% of the difference between Africans and Whites was due to  $g$ . Similarly, in Serbia, Rushton et al. [47] found the differences between the Roma (Gypsies) of South Asian origin and the Whites were on the  $g$  factor. In two studies of engineering students, again in South Africa, Rushton et al. [48,49] found that the more the items from the Progressive Matrices loaded on  $g$ ,

the better they predicted the differences between Africans, South Asians, and Whites. Moreover, the  $g$  loadings showed cross-cultural generality, with those calculated on South Asians predicting the magnitude of the differences between Africans and Whites.

Surprisingly, although Nisbett favorably cited Flynn's [18] most recent book, he omitted to mention that Flynn has apparently changed his mind regarding the aforementioned "Jensen Effects" in explaining Black-White differences. He now agrees with Rushton and Jensen [8] and disagrees with Nisbett [5], as well as his former opinion [32] about the relation between  $g$  and the Black-White gains:

There are two messages. The first is familiar: You cannot dismiss black gains on whites just because they do not tally with the  $g$  loadings of subtests. But the second is new and unexpected. The brute fact that black gains on whites do not tally with  $g$  loadings tells us something about causes. The causes of the black gains are like hearing aids. They do cut the cognitive gap but they are not eliminating the root causes. And conversely, if the root causes are somehow eliminated, we can be confident that the IQ gap and the  $g$  gap will both disappear (p. 85).

#### 4. Stereotype Threat, Caste, and Other "X" Factors

**Nisbett:** While the Black-White IQ gap is not due to some obvious factor such as Blacks not being familiar with formal English, or being less motivated to perform on IQ tests, or having teachers or IQ testers who have low expectations for their performance, there is plenty of evidence that Blacks perform worse when their race is made salient because this engages a "stereotype threat." Blacks perform worse than they would in more relaxed settings where they need not fear they may be confirming a stereotype held by White testers. This was initially demonstrated by Steele and Aronson [50] and subsequently confirmed by countless studies. The underperformance is most likely when Blacks are tested in an integrated setting where intellectual ability is explicitly tested.

Another factor in the low IQ scores of Black Americans is what African anthropologist John Ogbu [51] has characterized as the effect of a "caste system" in America for Blacks. He refers to what he calls "involuntary minorities"—like the Africans who were brought to America by force. Ogbu argues that caste-like minorities often fail to take full advantage of the opportunities that are available to them because they lack conviction that their effort will be rewarded. Younger members of the minority may even invert the educational values of the society such as those among American Blacks who reject academic earnestness as "acting White." Ogbu points out that young Black students, even middle-class ones in middle-class schools, are more likely to come to class without having done their homework, and to be disruptive.

More generally, the problems that affect ability and achievement in lower-SES groups are often exacerbated for Blacks, who are overrepresented among the poor. These include poor prenatal care and nutrition, relative infrequency of breast-feeding, deficiency of vitamins and minerals,

lead poisoning, fetal alcohol poisoning, poorer health care, greater exposure to asthma-causing pollution, emotional trauma, poor schools, poor neighborhoods along with the less desirable peers who come along with the territory, and much moving and consequent disruption of education. Moreover, Black parenting differs very much from White parenting in encouraging abstraction and cognitive ability. For example, by the time the child of White professionals is three years old, she has heard 500,000 encouragements and 80,000 discouragements. By contrast, the three-year-old Black child whose mother is on welfare has heard about 75,000 encouragements and 200,000 reprimands.

**Rushton & Jensen:** Jensen [24, p. 137] dubbed as “X factors” critical variables such as those found in Nisbett’s list, to dramatize their plausible but mysterious or not-yet-demonstrated character. One way to test whether hypothesized X factors are operating is to compare the similarity of the correlations between background variables (such as the home environment or the peer group) and outcome measures (such as scholastic achievement or delinquency rates). If Black-specific X factors are truly having an effect, some of these correlations for Blacks should be offset (up or down).

A series of studies on large samples by David Rowe [52] found no evidence of X factors acting to lower the IQ scores of Blacks. For example, Rowe et al. [53] examined test scores for 8,528 Whites, 3,392 Blacks, 1,766 Hispanics, and 906 Asians and found the exact same relation between background variables and outcome measures in each race. There was no evidence that any special Black minority-specific process was affecting academic achievement or lowering IQ scores.

Another study examined longitudinal data on academic achievement (Rowe et al. [54]). Correlations were computed between academic achievement and family environment measures in 565 full-sibling pairs (White  $N = 296$  pairs; Black = 149; Hispanic = 120) from the National Longitudinal Survey of Youth tested at ages 6.6 and 9.0 years. Including age as a variable yielded three  $8 \times 8$  correlation matrices. Analysis showed the matrices were equivalent across the three groups with no evidence of any Factor X affecting academic achievement or developmental changes of any group.

Virtually identical statistical structure across racial groups has also been reported in military samples. For example, Ree and Carretta [55] examined a nationally representative sample of young Black, White, and Hispanic men and women who took the Armed Services Vocational Aptitude Battery (ASVAB;  $N = 9,173$ ), which consists of 10 separately scored subtests. They found the hierarchical factor structure of ASVAB subtest scores was the same across the three groups. Similarly, Carretta and Ree [56] examined the more specialized and diverse Air Force Officer Qualifying Test (AFOQT), a multiple-aptitude battery given to 269,968 applicants (212,238 Whites, 32,798 Blacks, 12,647 Hispanics, 9,460 Asian Americans, and 2,551 Native Americans). The same factor structure (the  $g$  factor; see Section 3) accounted for the greatest amount of variance in all groups and its loadings differed little by ethnicity. There was no race-specific “Factor X” effect detected.

## 5. Reaction Time Measures

**Nisbett:** Within race, those with higher scores on IQ tests tend to have quicker reaction times. In addition, the variability of the reaction times for higher-IQ people tends to be more uniform. Although the correlations are low (.20) and not always found, the best bet is that there are weak associations. And, although reaction times and the variability of reaction times are longer and greater, respectively, for Blacks than for Whites, it is important to note that between-group differences do not necessarily have the same cause as within-group differences. Because of the often conflicting nature of the results, it is best to assume that we know nothing of any clarity or value about the interrelations among reaction time, movement time, and race.

**Rushton & Jensen:** Nisbett greatly understates the importance of reaction time (RT) tasks for the race-IQ debate. These measures are on an absolute scale (i.e., one with a true zero) and they indicate the neurophysiological efficiency of the brain's capacity to process information accurately, which is the same ability measured by intelligence tests [57,58,59]. Reaction time is one of the simplest culture-free measures. Many RT tasks are so easy that 9- to 12-year-old children can perform them in less than one second. Yet even on these very simple tests, children with higher IQ scores perform faster than do children with lower scores. Since school children are not trained to perform well on reaction time tasks, as they are on certain paper-and-pencil tests, the advantage of those with higher IQ scores on these tasks is unlikely to arise from practice, familiarity, education, or training.

The magnitude of the correlation between speed of reaction time and intelligence is much greater than the .20 claimed by Nisbett. While it is true that for any one task, the correlations between reaction time and IQ normally lie between .20 and .40, when several measures are combined (as are items and subtests in IQ measures), they produce multiple correlations of .60 to .70 [57,58,59].

A consistent three-way race difference has been found on reaction time tasks in over 400 9- to 12-year-olds with East Asians faster than Whites, and Whites faster than Blacks. Moreover, the differences between Blacks, Whites, and East Asians in reaction time are largely on the *g* factor, with the correlations between the *g* loadings extracted from an IQ test (or the reaction time tasks) and the mean group differences in reaction time (or the IQ test) ranging from .70 to .81 [60,61]. The hypothesis that the group differences on these tests reflect a difference in motivation is disconfirmed by the fact that although the East Asians averaged faster *reaction* times (that is, quicker mental decision making) than the Whites or the Blacks, the Blacks averaged faster *movement* times (the actual motor response) than the Whites or East Asians.

Lynn and Vanhannen [13, pp. 66-67] observed the same pattern of reaction time scores internationally on over 1,000 9-year-old East Asian children in Japan and Hong Kong, White children in Britain and Ireland, and Black children in South Africa. The Progressive Matrices were given as a non-verbal test of intelligence, along with the "simple," "choice," and "odd-man-out" reaction time tasks. Table 2 shows the correlations between IQ and reaction times for the five countries. The East Asian children obtained the highest IQs, followed by the White children,

and then the Black children. The median speed for the three reaction time tasks followed the same order, as did their SDs, with the highest scoring group being the least variable.

**Table 2. Sample Size, Mean IQ score, and Reaction Time Measures (in milliseconds) from Five Countries**

	Hong Kong	Japan	Britain	Ireland	South Africa	SD	<i>r</i> *
Sample size	118	110	239	317	350	-	-
IQ scores	113	110	100	89	67	-	-
Simple reaction time	361	348	371	388	398	64	.94*
Choice reaction time	423	433	480	485	489	67	.89*
Odd-man-out reaction time	787	818	898	902	924	187	.96*
Variability of simple reaction time	99	103	90	121	139	32	.83*
Variability of choice reaction time	114	138	110	141	155	30	.73*
Variability of odd-man-out reaction time	269	298	282	328	332	95	.85*

*Note.* \**r* = reliability. Adapted from “*IQ and the Wealth of Nations*,” by R. Lynn and T. Vanhanen, 2002, p. 67, Table 6.2

## 6. Within-Race Heritability

**Nisbett:** Heritability measures the percentage of variation in a trait that can be attributed to the genes. The remaining percentage is due to all other factors such as prenatal and perinatal events as well as nutrition, education, and experience. Heritability is estimated by comparing the resemblance of family members, especially identical against fraternal twins, and adopted children against ordinary brothers and sisters. Identical twins share 100 percent of their genes, while fraternal twins only share 50 percent, just like ordinary brothers and sisters, while adopted children share no genes. The average correlations for individuals with varying degrees of relationship, reared together or apart are: identical twins together ( $r = .85$ ), identical twins apart (.74), fraternal twins together (.59), siblings together (.46), siblings apart (.46), mid-parent/child together (0.50), single parent/child together (.41), single parent/child apart (.24), adopting parent/child together (.20), adopted children together (.26).

Using correlations such as these, it is also possible to distinguish between two different types of environmental effects. The *shared environment* (also called *common* or *between-family* or *home environment*) includes all those variables that children reared in the same family have in common (e.g., parental socioeconomic status and child-rearing style); they make children growing up in the same family similar to one another. The *non-shared environment* (also called *within-family* or *specific environment*) includes all those variables that are unique to each child (e.g., an illness or chance friendship or outstanding teacher experienced by one sibling but not the other); they make children growing up in the same family different from one another.

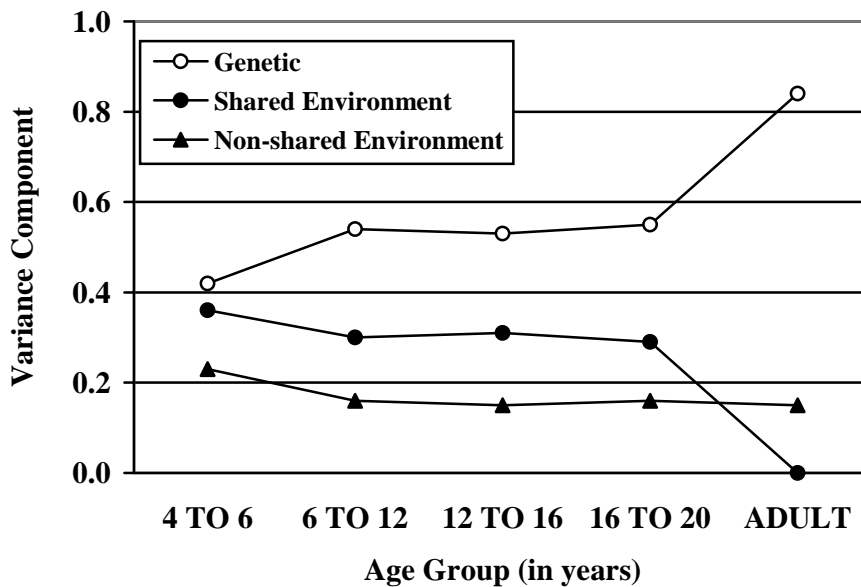
Many scientists today consider the heritability of IQ to be much lower than some previous estimates of 75 to 85 percent. I agree and suggest the heritability is lower than 50 percent. Previous estimates of genetic and common environmental influences have overestimated heritability and underestimated common environment effects by over-relying on twin studies, especially in adulthood, which are biased to having a disproportionately large number of people from social classes for which heritability is high. Even comparisons of identical twins reared apart over-estimate heritability because, although such twins grow up apart, they initially shared the same uterine environment, an observation which led Devlin et al. [62] to argue that heritability estimates based on twins should be reduced by 20 percent.

Adoption studies show that placing a child in an upper-middle-class environment rather than a lower-class environment results in an additional 12- to 18-points of IQ—a truly massive effect. Several adoption studies of this kind were carried out in France by Christiane Capron and Michel Duyme [63,64]. For example, Duyme et al. [64] found that abused children who had IQs of from 61 to 85 at age four, had gained 14 points after being adopted and retested at age 14. Moreover, the social class of the adopting family made a great difference. Children adopted into lower-SES families gained only 8 points; those adopted into middle-class families, 16 points; and those adopted into upper-middle-class families, almost 20 points.

In a review of many such adoption studies, van IJzendoorn et al. [65] found an 18-point IQ advantage for children adopted by a middle- or upper-middle-class family as opposed to staying

with the family of origin, which was generally of lower SES. By contrast, they estimated the genetic contributions to be at most about 12 points, derived by comparing the biological children against their adopted siblings. Earlier reviews, such as one by Herrnstein and Murray in *The Bell Curve* [7] greatly underestimated the magnitude of the average effect of adoption on IQ. They asserted it was 6 points, even though the review they relied on by Locurto [66] gave 12 points as the average effect of adoption.

**Rushton & Jensen:** Nisbett's conclusion is skewed by over-relying on data from young children. Evidence shows that heritability is lowest early in life and increases with age, until by adulthood the heritability of IQ is from 60 to 80% [67]. Figure 2 summarizes the changes with age due to genetic factors and shared and nonshared environments. It is based on an analysis of 6,370 identical and 7,212 fraternal twin pairs reared together [68]. As can be seen, the proportion of IQ variance associated with shared environmental factors is relatively constant at approximately 30% for ages up to 20 years but then drops to 0% in adulthood.



**Figure 2. Estimated proportions of the total IQ variance attributable to genetic and environmental (shared and nonshared) effects.** Note that only the nonshared (or within family) environmental variance remains relatively constant across the entire age range. From “Behavioral genetics of cognitive ability: A life-span perspective,” by M. McGue, T. J. Bouchard, Jr., W. G. Iacono, and D. T. Lykken, 1993, p. 64, in R. Plomin & G. E. McClearn (Eds.), *Nature, nurture, and psychology* (pp. 59-76). Copyright 1993 by the American Psychological Association.

Although Nisbett reported as an error Herrnstein and Murray's conclusion that the effect size for adoption studies was only 6 rather than 12 IQ points, he failed to mention that Herrnstein and Murray [7, p.747, n. 86] went on to detail how even a 20-point swing in IQ is consistent with a heritability of, say, 60 percent. This is because the remaining 40 percent of the observed variation remains for environmental influence. Given that 99% of variation under the normal curve falls between IQ 70 and IQ 130 (that is, 60 IQ points), a 20 point gain represents one-third of that range. Since the variance is equal to the SD squared, 40 percent of 152 ( $.4 \times 225 = 90$ ) can be due to environmental variation. This allows about a quarter of the environmental variation at younger ages to be attributable to variance among homes.

Jensen [25] too discussed the upper limit of IQ malleability, reporting that the maximum IQ gain from adoption studies was 10 to 12 points. He then showed how large gains were compatible with high heritability. He further noted that although adoption studies demonstrated IQ gains, they typically failed to examine the extent to which the gain was in *g*. When Jensen [69] re-analyzed two of the data sets from Capron and Duyme (cited by Nisbett), he found that being adopted into high socioeconomic status (SES) homes produced a gain only in non-*g* factors and in specificity of the various subtests. The adopted children's *g* factor scores mainly reflected the SES level of their *biological* parents. This implies that *g* is less amenable to environmental manipulation.

## 7. Between-Race Heritability

**Nisbett:** Heritability places no theoretical limit on the degree to which IQ can be affected by the environment. I will present my case vividly. Imagine tossing the seeds for corn plants into either rich soil or poor soil. The average height of the two groups of plants would differ greatly and do so entirely due to environmental factors even though they were genetically identical. The case can also be shown empirically by juxtaposing two facts: (a) the heritability of height is 85 to 90 percent, and (b) gains in height of a standard deviation or more have appeared in a generation or less in several countries of the world. For example, the average height of 13-year-old Korean boys increased by more than seven inches between 1965 and 2005, a difference of 2.40 SDs.

Most heritability studies have been carried out on White twins and these tend to overestimate the heritability of IQ for Blacks. Heritabilities estimated on poorer people and on Black populations are much lower. For example, Turkheimer et al. [70] carried out a study of 319 pairs of 7-year-old twins and showed that heritabilities radically depend on social class. On the Wechsler Intelligence Scale for Children (WISC), the heritability of IQ was about 70 percent for children whose parents were upper-middle-class but only about 10 percent for children whose parents were of lower social class (over half of them of African-American descent). Earlier studies (cited by Turkheimer) yielded similar results in terms of directionality, if not magnitude. The likely explanation is that lower-SES settings vary much more than middle-SES settings, including some that are pathological, thus causing the environmental effect to swamp heredity. By contrast, middle- to high-SES families do not differ much among themselves and provide sufficient conditions for the development of intelligence.

Dickens and Flynn [71] proposed a formal model that addressed the problem of gene-

environment interaction. They showed that two groups could be separated by an environmental factor of great potency that did not affect each member of the groups equally. It is easy to imagine a variety of environmental factors that are potent and separate Blacks and Whites. For example, different child-rearing practices, different youth cultures, and so forth could have a powerful effect on how much each group does “mental exercise” and on the cognitive problem-solving skills they each develop.

**Rushton & Jensen:** Most studies find IQ scores to be just as heritable in non-White samples as in White samples [72]. There is no indication of any extreme deprivation, or special cultural influence—such as being raised as a visible minority—at work in one group and not in others. If there was, Black heritabilities would be consistently lower than White heritabilities and we would indeed conclude that poverty, the legacy of slavery, or White racism had operated to suppress the level of intelligence in Blacks. However, Osborne [73] tested this hypothesis empirically by comparing several hundred pairs of Black and White twins aged 12- to 18-years on the Basic Test Battery, the Primary Mental Abilities test, and the Cattell Culture Fair Intelligence test, and found heritabilities of about 50% in each group. (The heritabilities in the Basic, Primary, and Cattell tests were, respectively: Whites—.61, .37, and .71; Blacks—.75, .42, and .19.)

The Turkheimer et al. [70] study that Nisbett cites is an outlier. In Britain, the exact *opposite* of Turkheimer’s result was found in over 2,000 pairs of 4-year-old twins ( $N = 4,446$  children), with greater heritability observed in high-risk environments [74]. A re-analysis of the Hawaii Family Study of Cognition also found contrary results to Turkheimer’s. Nagoshi and Johnson [75] found no reduction in the relationship between parental cognitive ability and offspring performance in families of lower as opposed to upper levels of socioeconomic status. In the 1,349 families they studied, the relationship remained the same across tests, ethnicity, and sex of offspring.

Finer grained analyses show the same within- and between-race heritabilities for Blacks and for Whites. Rowe and Cleveland [76] examined full- and half-siblings (106 pairs of Black half-sibs, 53 pairs of White half-sibs; 161 pairs of Black full-sibs, and 314 pairs of White full-sibs) from the National Longitudinal Survey of Youth on three Peabody Achievement Tests (Mathematics, Reading Comprehension, and Reading Recognition). The best fitting model was one where the sources of the differences between individuals within race and the differences between races were the same—50% genetic and 50% environmental. Similarly, Jensen [25, p. 465] tested four alternative models on IQ data from 123 Black and 304 White pairs of 12- to 18-year-old twins—only genetic factors, only environmental factors, neither genes nor environment, and genes plus environment. The model of both genetic and environmental factors best explained the observed Black-White IQ differences, while both the genetic-only and the environmental-only explanations were inadequate.

The Dickens and Flynn [71] gene x environment model that Nisbett cites cannot explain the Black-White IQ difference because it implies that Black groups, relative to White groups, become *increasingly* disadvantaged during the developmental period from early childhood to maturity. With increasing age there would be an accumulation of unfavorable effects on IQ for Black groups with respect to White groups. Yet almost all the data show that the size of the mean

Black-White group difference remains approximately constant at 1 SD, with no significant change after about three years of age. Their models have also been criticized on other points such as having too many free parameters, and ignoring the cross-cultural generalizability of Black-White differences on the *g* factor [8,77,78].

### 7.1. Inbreeding Depression Scores

**Nisbett:** Rushton and Jensen [8] claim that because the test items most affected by inbreeding depression (the lowering of an IQ score in offspring who receive the same harmful recessive genes from each of their closely related parents) are the ones that show the greatest difference between Blacks and Whites, this indicates evidence for the race differences being genetic. However, Flynn [32] found the correlation between inbreeding depression scores and the secular gains was as high as the correlation between inbreeding depression and the Black-White differences. Thus, we are confronted with another absurdity. If we are to believe that inbreeding depression is an indicator of the genetic nature of the Black-White IQ difference, we would also have to believe that the secular rise in IQ has a genetic cause.

**Rushton & Jensen:** The history of the false claim that inbreeding depression scores correlate as highly with the secular rise as they do with Black-White differences is worth recounting. The story begins with a 1989 study by Rushton [79], which used Jensen's [25] method of correlated vectors (Section 3.2) to find that inbreeding depression scores from 1,854 cousin marriages in Japan correlated  $r = .48$  ( $P < .05$ ) with Black-White differences in America on the same 11 tests. No-one has proposed a non-genetic explanation for inbreeding depression scores so the fact that they predict the mean Black-White differences clearly implies that the Black-White differences are genetic in origin. Nor do Rushton's results stand alone. Nichols [80] calculated heritabilities for 13 tests and found a .67 correlation between them and the magnitude of Black-White differences on the same tests. Jensen [24, pp. 103-119) calculated the *environmentality* of a test (defined as the degree to which sibling correlations departed from the pure genetic expectation of .50) and found it inversely related to the magnitude of Black-White differences ( $r = -.70$ ), i.e., the more environmentally-influenced a test, the less pronounced the Black-White difference.

Nisbett, however, claimed the inbreeding depression result was an "absurdity" because a study in 2000 by Flynn [32] had shown that the inbreeding depression scores correlated with the secular rise on the same tests, and these were obviously environmental in nature. The attempt to discount Rushton's inbreeding study actually began with an earlier study by Flynn in 1999 [81], not reported by Nisbett, which found correlations ranging from  $-.08$  to  $+.18$  (mean  $.08$ ) between inbreeding depression scores and five sets of secular gains across the 11 WISC subtests analyzed by Rushton [79]. Not content with this null result, Flynn [81] then correlated the inbreeding depression scores with the 6 Performance subtests, but these too showed a non-significant correlation (mean  $r = -.05$ ). Flynn then looked at the 5 Verbal subtests, where he found a correlation of  $.52$ , also not significant. However, its numerical value, and the fact that a correlation of  $.30$  or higher was found for the 5 Verbal scales in all five samples, allowed Flynn [81] to publish "Evidence against Rushton" (p. 373).

It was by replying to this 1999 criticism by Flynn that led Rushton [20] to put all the data together for the analysis shown in Table 1. Whereas the IQ gains over time on the WISC-R and WISC-III clustered together, suggesting the gains were a reliable phenomenon, they were independent of the cluster of Black-White differences, inbreeding depression scores, and *g* factor loadings. These results strongly support the heritability of the Black-White IQ difference and contradict Flynn's claim that the "massive IQ gains over time" found in several countries implied that the Black-White differences were environmental in origin.

To now counter the results in Table 1, Flynn [32] produced the 2000 result that Nisbett cites. To get this new result, Flynn teamed up with William Dickens who carried out the actual statistical analysis. As described in Section 3, they (a) discarded the WISC Maze subtest, (b) discarded the gain scores and Black-White differences on the WISC-III, and (c) averaged the remaining gains scores. Using this truncated set of variables Flynn was able to report a (non-significant) correlation of .28 between inbreeding depression and secular gains as well as a correlation (also non-significant) of .29 between inbreeding depression and Black-White differences. Flynn [32] himself admitted it was a weak result but hoped that it would serve as a "counterweight to Rushton's analysis" (p. 214). Nisbett omitted to report the magnitude of Rushton's [79] original correlation of .48 ( $P < .05$ ) based on all 11 WISC subtests, the actual magnitude of Flynn's correlation of .29, its lack of statistical significance, the process required to produce it, or Flynn's caveat regarding his findings.

Subsequently, other population group differences have also been found to be more pronounced on the more heritable components of IQ tests. For example, Rushton et al. [82] used data from 152 pairs of twins in the Minnesota Study of Twins Reared Apart to estimate the heritabilities of 58 diagrammatic puzzles from the Raven's Progressive Matrices. These item heritabilities correlated with the differences among 11 diverse samples including East Asian, White, South Asian, Colored, and Black high school and university students in South Africa (mean  $r = 0.40$ ;  $N = 58$ ;  $P < 0.05$ ). All the above results are highly informative because the hereditarian and culture-only models make clear and opposite predictions. Only the hereditarian model predicts race differences will be greater on more heritable items, culture-only theory predicts they will be greater on more culturally loaded items.

## 8. Sub-Saharan African IQ Scores

**Nisbett:** Rushton and Jensen [8] claim that Blacks from sub-Saharan Africa have an IQ of 70, which is even lower than that for African Americans. However, an IQ of 70 for sub-Saharan Africans is desperately wrong. By Western standards it would imply that more than half the African population suffers from mental retardation. Lynn's compilation of studies showing an IQ of 70 was critiqued by Wicherts et al. [83] who showed that Lynn had excluded several studies showing higher IQs for Africans. Wicherts also found that many of Lynn's studies were based on very small and haphazard samples and also that Lynn had used inappropriate norms.

In any case, the tests measuring African IQ, such as the Progressive Matrices, are highly environmentally responsive. For example, Skuy et al. [84] found gains of 14 points for Africans after training on task relevant behavior, and Daley et al. [85] found a gain of 26 points after 14

years of schooling. Results such as these simply do not fit a genetically “fixed” IQ of 70. IQ scores in Africa cannot possibly mean what they do elsewhere.

**Rushton & Jensen:** While it is true that Wicherts and colleagues [86,87,88] extensively critiqued Lynn’s conclusion of an average IQ of 70 for sub-Saharan Africa, it is noteworthy that their re-analyses only increased the mean IQ for Africa to 80. On the Progressive Matrices, they were able to raise the mean from 70 to 78; on other tests such as the Draw-A-Man test, the Kaufman Assessment Battery for Children, and the Wechsler scales, they raised the mean from 70 to 81. Even if it should turn out that the mean IQ for Africa is 80 rather than 70, the difference between Africans and Whites would still be 1.25 SDs.

Lynn and Mikk [89], however, have corroborated Lynn’s estimate of a sub-Saharan African IQ of only 70 by showing comparable differences on large-scale tests of educational attainment. For example, the Trends International Mathematics and Science Study (TIMSS) is standardized with a mean of 500 and SD of 100 on representative samples of 14-year-olds with  $Ns = 2,000$  to 10,000. First, the TIMSS scores correlated from .85 to .91 with the independently compiled national IQ scores [90,91]. Second, the African 14-year-olds score two SDs lower than their European counterparts [89]. On the 2003 TIMSS Science test, the results for England, Botswana, Ghana, and South Africa were 502, 369, 282, and 278, respectively; and on the Science test, 540, 366, 258, and 257. On the 2007 Math test, the results for England, Botswana, and Ghana were 513, 364 and 309, respectively; and on the Science test, 542, 355, and 303. Lynn and Mikk [89] calculated the Educational Quotient (or EQ) for all the available African data and found it was 68, commensurate with the IQ of 71 for these particular countries.

The average IQ of 70 for sub-Saharan Africans is highly consistent and not due to a “fluke” or to sampling error. Lynn’s [11,14] review covered over two dozen studies from West, Central, East, and Southern Africa, all of them corroborating an average IQ of 70. Some of these studies had quite large  $Ns$ . In Ghana, Glewwe and Jacoby [92] reported a World Bank study of 1,736 11- to 20-year-olds representative of the entire country. All had completed primary school; half were attending middle-school. Their mean IQ on the Progressive Matrices was less than 70. Nor should there be any doubt as to the impartiality of the investigators of African IQ as they include both Africans such as Fred Zindi in Zimbabwe [46] and non-hereditarians such as Robert Sternberg. For example, in Kenya, Sternberg and colleagues [93] administered the Progressive Matrices to 85 12- to 15-year-olds who scored an IQ equivalent of about 70. In Tanzania, Sternberg et al. [94] gave the Wisconsin Card Sorting Task to 358 11- to 13-year-olds who received a score equivalent to the 5th percentile on American norms (i.e., IQ = 75). After training on how to solve problems like those on the test, the children’s scores improved, but only to about the 9th percentile on American norms (IQ < 80).

Tests of university students confirm this pattern of results. One of us (JPR) traveled to South Africa to collect new IQ data from highly-select Black students at the prestigious University of the Witwatersrand in Johannesburg. Seven independent studies were published yielding a median IQ of 84 (range 77 to 103). Assuming that African university students score 1 SD (15 IQ points) above the mean of their population, as university students typically do, a median IQ of 84 is consistent with a general population mean of 70. Other studies of university students have found

a comparable IQ average of about 84 [95]. Studies conducted on the most select of all African university students, such as those in engineering schools, or on the basis of math and science competitions, find their average IQ is approximately 100 [96,97]. Assuming such students score two SDs above their group average, as they do at the best universities in the US, this value too indicates an IQ of 70 for the general population.

### 8.1. Mediated Learning

We agree that mediated learning interventions can increase African IQ scores. Indeed, one of us (JPR) co-authored the study by Skuy et al. [84] that Nisbett cites. Although that intervention did raise the mean IQ of first-year African psychology students from 83 to 97, that value is still low for students at a leading university. Further, a meta-analysis of the evidence shows that “coaching” or “teaching-to-the-test” has the effect of denuding the test of its *g* loading [98]. More generally, we take it as non-arguable that intervention strategies such as the elimination of tapeworms, improved nutrition, and provision of electricity, schools, and hospitals will raise test scores in Africa, as indeed they will anywhere that such deleterious conditions are found.

### 8.2. Test Bias

In regard to Nisbett’s suggestion that test scores have a different meaning in Africa than elsewhere, the existence of such a bias would be confirmed if the test failed to predict performance for Africans. However, a review by Kendall et al. [99] demonstrated that test scores predicted school grades and job performance equally well for Africans as they do for non-Africans (i.e., .20 to .50). Similarly, in the Sternberg et al. [93] study of Kenyan 12- to 15-year-olds, the IQ scores predicted school grades with a mean  $r = .40$ . In the Rushton et al. [49,100] studies of African and non-African university students, scores on one IQ test correlated with scores on another IQ test 3 months earlier (.60 for Africans; .70 for non-Africans) and with end-of-year-exam marks measured 3 months later (.34 for Africans; .28 for non-Africans). The only demonstrable, reliable example of bias is the rather obvious one of vocabulary for groups whose first language is not English. Even here, however, language accounts for only about 7 IQ points (out of the 30 point difference).

### 8.3. Mental Age

One way to give context to an African IQ of 70 is to compare it against the worldwide IQ average of 90 rather than the European average of 100. (Mean IQs of 100 are found only for European, East Asian, and Jewish groups.) Perhaps a better way to understand the mean African IQ of 70 is in terms of mental age—that is, the cognitive age equivalent of a person’s IQ score. Nowadays, the concept of a mental age has been replaced by the use of standard scores based on the normal distribution but mental age might provide a useful way to understand the low African IQ. If an average IQ of 100 for adult Whites is set at a mental age of 16, with a normal range of from less than 14 years to over 18 years, then an average IQ of 70 for adult Africans would be equivalent to a mental age of about 11 years. This would make the normal range of mental ages found in Africa to be from less than 9 to almost 14 years. Eleven-year-olds, of course, are not

retarded. They can drive cars, build houses, and work in factories if supervised properly, and can even become involved in warfare and organized crime.

## 9. Race Differences in Brain Size

**Nisbett:** Rushton and Jensen claim that cranial capacity and brain size are correlated with intelligence and that Whites average a greater cranial capacity than Blacks. It is true that the correlation between brain size and IQ may be as high as .40 and that according to a number of studies, Blacks have smaller brains than Whites. However, a Black-White difference in brain size is not always found, as shown in a compilation of data from the National Aeronautics and Space Administration [101].

Moreover, the brain-size/IQ correlation has not been shown to be causal. If bigger brains were smarter because of their size, we would expect to find a correlation within families. Siblings who get larger brains by luck of the genetic draw should also be the ones who have higher IQ scores. In fact, however, there is no such correlation. Schoenemann et al. [102] found that the sibling with the larger brain has no higher IQ on average than the sibling with the smaller brain.

When brain size differences between Blacks and Whites are found, they may have environmental causes. Pregnant Black women, compared to pregnant White women, are more likely to have any number of conditions that result in a smaller brain size for their offspring, ranging from poor nutrition to alcohol use. Perinatal factors are also more negative for Blacks than for Whites and prematurity is associated with smaller brain and body size in babies [103]. It is only when babies are premature that the brains of Black babies are smaller than those of White babies [104]. Postnatal conditions also favor Whites over Blacks, especially for nutrition.

There are several other anomalies for the race/brain-size/IQ hypothesis. For example, the direction of brain size over the last few thousand years of human evolution is down. Albert Einstein's brain was decidedly smaller, at 1,230 grams, than the overall average found for Blacks in the studies by Rushton. In Ecuador there exists a group of very short-stature individuals whose head size is several standard deviations below the mean [105]. These individuals have not merely normal intelligence but unusually high intelligence, with a majority being among the highest ranking in their school class.

**Rushton & Jensen:** Larger brains are more intelligent because they contain more neurons and therefore many more synapses (neural connections) and can thus process information more efficiently. Over two dozen studies used magnetic resonance imaging (MRI) and found brain size is related to IQ with a correlation of about .40, which is much higher than the .20 found using indirect head size measures, though that correlation is also reliable and significant [106]. Moreover brain size is highly heritable. For example, in an MRI study of 112 extended twin families, Posthuma et al. [107] found heritabilities of 82 percent for whole-brain gray matter volume, 87 percent for whole-brain white matter volume, and 86 percent for IQ. In an MRI study of 46 pairs of twins, Paul Thompson and colleagues [108] found a high heritability for many of the specific connections found within the brain, including myelin sheath, the fatty "insulation" that coats the axons and increases the speed of neural transmission (the thicker the myelin, the

faster the nerve impulses).

Dozens of studies from the 1840s to the present, using four different methods of measuring brain size—MRI, endocranial volume measured from empty skulls, wet brain weight at autopsy, and external head size measurements—all yield similar results regarding race differences in brain size. Moreover, East Asians are found to average a larger brain size (and higher IQ) than Europeans, who are found to average a larger brain size (and higher IQ) than Africans and African Americans. When Rushton [26] summarized the world literature on race differences in brain size for the three major methods (autopsies, endocranial volume, and head size measures), as well as head measurements corrected for body size, he found: East Asians = 1,364 in  $\text{cm}^3$ ; Whites = 1,347; and Blacks = 1,267. The overall mean for East Asians was  $17 \text{ cm}^3$  more than that for Whites and  $97 \text{ cm}^3$  more than for Blacks. Within-race differences due to differences in method of estimation averaged  $31 \text{ cm}^3$ . Since 1 cubic inch of brain matter contains millions of brain cells and hundreds of millions of synapses, race differences in average brain size likely explain their differences in average IQ. Indeed, if they did not relate to cognitive ability, it would be a mystery why such differences in number of neurons, which are metabolically very expensive, would ever have evolved.

### 9.1. Within-Family Studies

Nisbett referred only to Schoenemann et al.'s [102] paper to support his claim of no within-family correlation between brain size and IQ. This citation is highly selective. In fact, a total of five studies have now examined the within-family correlation between brain size and IQ [102,109,110,111,112]. Of these studies, *only* Schoenemann et al. failed to find any relationship, likely because it used a small sample ( $N = 20$  pairs of sisters) that had a very restricted range of IQ, thus making it statistically difficult to detect any difference. The largest within-family study measured head circumference at birth and IQ at age 18 at the time of conscription in the Swedish military [109]. The data were analyzed for 96,189 males who had at least 1 full brother similarly measured. These within-family comparisons are of special interest because they control for most of the sources of variance that distinguish families, such as social class, styles of child rearing, and general nutrition, that differ between families.

### 9.2. MRI, Autopsy, Skull Size, and External Head Size Studies

Using MRI, Harvey et al. [113] found that 41 Africans and West Indians in the United Kingdom had a smaller average brain volume than 67 Caucasians (although Harvey et al. provided no details on how, or if, the samples had been matched for age, sex, or body size). In another British study, Jones et al. [114] found a (non significant) trend for Whites to average a  $30 \text{ cm}^3$  larger intracranial volume and smaller ventricles than Afro-Caribbean's. (Ventricles are areas in the brain filled with cerebral spinal fluid.)

Measuring brain weight at autopsy, an early study by Paul Broca [115] reported that Whites averaged heavier brains than Blacks, but also had more complex convolutions and larger frontal lobes. These results were subsequently replicated by several studies which found a Black-White difference of about 100 grams [116,117,118,119]. Modern studies yield similar results. In a

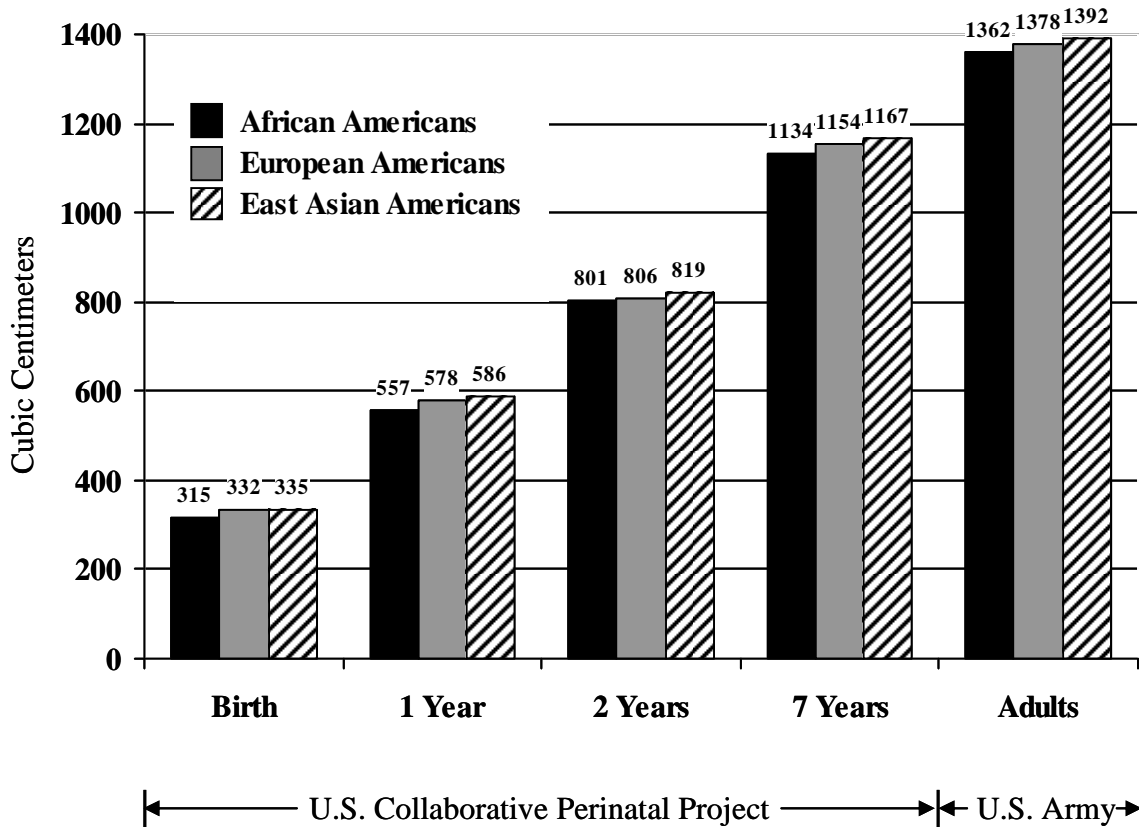
study of 1,261 American adults, Ho et al. [103] found that 811 White Americans averaged 1,323 grams and 450 Black Americans averaged 1,223 grams. Since the Blacks and the Whites were similar in body size, differences in body size cannot explain away the differences in brain weight. The largest autopsy study, as yet unpublished, is by anthropologist Ralph Holloway at Columbia University Medical School [120]. He found that 615 Blacks, 153 Hispanics, 1,391 Whites, and 5,731 East Asians, including both males and females aged 15 to 65 years, averaged brain weights of 1,222, 1,253, 1,285, and 1,290 grams, respectively. The groups were of similar body size, except for the East Asians who were shorter in stature and lighter in weight.

Filling over 1,000 skulls with packing material, the American anthropologist Samuel George Morton [121] found Blacks averaged about five cubic inches less cranial capacity than Whites. These results were later confirmed [122,123,124]. The largest study of race differences in endocranial volume was the recent one by Beals et al. [125] which measured approximately 20,000 skulls from around the world. It found that East Asians, Europeans, and Africans averaged cranial volumes of 1,415, 1,362, and 1,268 cm<sup>3</sup>, respectively. External head size measurements (length, width, height) have also been used to calculate cranial volume. Rushton [126] examined head size measures in 24 international military samples collated by the U.S. National Aeronautics and Space Administration (NASA) and found that after adjusting for the effects of body height, weight, and surface area, cranial capacity for East Asians was 1,460 cm<sup>3</sup> and for Europeans, 1,446 cm<sup>3</sup>. Subsequently Rushton [127] calculated average cranial capacities for East Asians, Whites, and Blacks from a stratified random sample of 6,325 U.S. Army personnel and found averages of 1,416, 1,380, and 1,359 cm<sup>3</sup>, respectively. This study also included precise adjustments for all kinds of body size measures. Yet none of these eliminated the differences in cranial capacity.

### 9.3. Perinatal and Environmental Factors

Nisbett attributed any brain size differences found between Blacks and Whites to perinatal factors and prematurity, as well as to poorer post-natal nutrition. But the evidence has never supported these long standing and reasonable hypotheses. For example, race differences in brain size can be observed *before birth*. In a study of fetuses, Schultz [128] found that from the 9th week of intrauterine life, 165 Black fetuses averaged a smaller brain case than did 455 White fetuses. The difference became more prominent over the course of fetal development.

Similarly, perinatal factors were ruled out as important for the development of IQ on the basis of a longitudinal study by the U. S. National Collaborative Perinatal Project of 40,000 children followed from birth to seven years [129,130]. It showed that at birth, 4 months, 1 year, and 7 years, East Asian children averaged larger cranial volumes (based on head circumference measures) than White children, who averaged larger cranial volumes than Black children (Figure 3). Within each group, the children with larger head sizes obtained higher IQ scores (mean  $r = .20$ ). Moreover, the differences in brain size were not mere correlates of body size, and unlikely to be due to nutrition, since the East Asian children were the shortest in stature and lightest in weight, while the Black children were the tallest in stature and heaviest in weight.



**Figure 3. Mean cranial capacity (cm<sup>3</sup>) for African Americans, European Americans, and East Asian Americans from birth through adulthood.** Data for birth through age 7 years from the U.S. Perinatal Project; data for adults from the U.S. Army data in Figure 4. (From Rushton, 1997, p. 15, Figure 2.

#### 9.4. NASA, Einstein’s Brain, and the Ecuadorean Sample

Nisbett’s citation of a compilation of data by NASA as evidence that Black populations do not always average a smaller brain size than Whites is highly selective. He did not mention that the compilation contained only a single Black sample (454 African mine laborers from South Africa) with mean head size measures but no variance and so could not be statistically included. Nor did Nisbett mention that the study which first brought the NASA data to research attention was by Rushton [126] which reported that four samples of East Asian military personnel (from Korea and Vietnam) averaged a larger cranial capacity (1,460 cm<sup>3</sup>) than 20 samples of White military personnel (1,446 cm<sup>3</sup>) from the US, Canada, and Europe.

If Einstein’s brain weighed 1,230 grams, that is indeed 10 grams below the mean of 1,240 grams for Blacks at autopsy [26]. However, Nisbett’s reliance on a single vivid anecdote is misleading. Einstein was 76 years old when he died and the Black samples averaged 50 years younger. The

aging process causes people to lose about 2 grams of brain tissue a year starting in the early twenties [103,106].

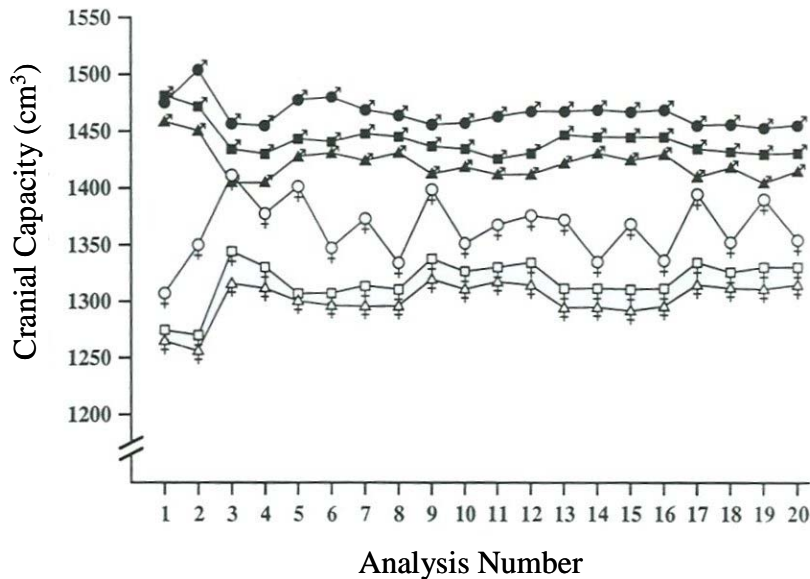
With regard to the Ecuadorean study, Nisbett is writing about a sample with Growth Hormone Receptor Deficiency (GHRD). However, he is mistaken as to their performance relative to the rest of the community. In fact, they perform either at the same level or slightly worse than the rest of the community, although at about the same level as their relatives [131].

## 10. Sex Differences in Brain Size

**Nisbett:** A brain size/IQ correlation found within the White population does not necessarily tell us about the reasons for the differences between Blacks and Whites. For example, Ankney [132] found that the male-female difference in cranial capacity is substantially larger than the Black-White difference. Yet, the genders have more or less the same IQ. So, why would any race difference in brain size really matter? In one sample of Blacks, Joiner [133] reported that the cranial capacity of Black females was the same as that of Whites, yet the IQ difference was the usual 1 SD.

**Rushton & Jensen:** Nisbett is correct that relationships identified in one population do not *necessarily* tell us the reasons for the relationship in other populations. The sex difference in brain size is a good example, and it presents a paradox. Ankney [132] did indeed find that adult males had heavier brains than adult females (by about 100 grams). He re-examined autopsy data on 1,261 American adults [103] and found that at any given body surface area or height, the brains of White men are heavier than those of White women, and the brains of Black men are heavier than those of Black women. For example, among Whites 168-cm (5' 7") tall (the approximate overall mean height for men and women combined), the brain mass of men averaged about 100 grams heavier than that of women, whereas the average difference in brain mass, uncorrected for body size, was 140 grams. Thus, only about 30% of the sex difference in brain size was due to differences in body size.

Ankney's [132] results were confirmed by Rushton [127] in a study of cranial capacity from a stratified random sample of 6,325 U.S. Army personnel described in section 9.2. After adjusting, by means of analysis of covariance for effects of age, stature, weight, military rank, and race, men averaged 1,442 cm<sup>3</sup> and women 1,332 cm<sup>3</sup>. This difference was found in all of the 20 or more separate analyses (shown in Figure 4) conducted to rule out any body size effect. Moreover, the difference was replicated across samples of East Asians, Whites, and Blacks, as well as across officers and enlisted personnel. Parenthetically, in the U.S. Army data, the East Asian women constituted the smallest sample ( $N = 132$ ), and it is probable this that caused the "instability" in estimates of their cranial size when some corrections were made for body size (Figure 3). The sex difference of 110 cm<sup>3</sup> found by Rushton, from analysis of external head measurements, is remarkably similar to that (100 grams) obtained by Ankney, from analysis of brain mass ( $1 \text{ cm}^3 = 1.036 \text{ grams}$ ).



**Figure 4. Cranial capacity for a stratified random sample of 6,325 U.S. Army personnel. The data, grouped into six sex-by-race categories, are collapsed across military rank.** (East Asian men, closed circles; white men, closed squares; black men, closed triangles; East Asian women, open circles; white women, open squares; black women, open triangles). They show that, across the 19 different analyses controlling for body size, men averaged larger cranial capacities than did women, and East Asians averaged larger than did whites or blacks. Analysis 1 presents the data unadjusted for body size showing no difference for East Asian and white men. (From Rushton, 1992, p. 408, Figure 1.)

### 10.1. Sex Differences in Cognitive Ability

Since brain tissue is energetically expensive, men of all races must be able to do something better, cognitively speaking, than women. According to Kimura [134], on average, women excel in verbal ability, perceptual speed, and motor coordination within personal space, while men do better on various spatial tests and on tests of mathematical reasoning. A review by Voyer et al. [135] showed that on the “purest” spatial measures, such as rotating an imaginary object or shooting at a moving rather than a stationary target, the mean sex difference approaches 1 SD. Ankney [132] therefore hypothesized that the sex difference in brain size relates to those intellectual abilities at which men excel, such as spatial and mathematical abilities, which then may require more “brain power.” Analogously to computers, whereas increasing word-processing power requires some extra capacity, increasing three-dimensional processing, as in graphics, requires a much more major increase.

However, the finding that women have proportionately smaller average brains than men but apparently the same overall IQ test scores, led Lynn [136, 137] to offer a resolution of what he termed “the Ankney-Rushton anomaly” [137, p. 1]. He tested the 19th century proposition that men average slightly higher in general intelligence than women [138]. Reviewing data from

Britain, Greece, China, Israel, the Netherlands, Norway, Sweden, Japan, India, and Indonesia, as well as the US, Lynn found that men averaged about 4 IQ points higher than women on a number of published tests. He suggested that age and development are critical because the male advantage in IQ does not emerge until the late adolescent growth spurt when brain size differences peak. Girls mature faster than boys, which give them an early advantage in language development and may mask later cognitive differences. Lynn argued this may have led generations of researchers, who relied on school samples, to miss the later emerging sex difference. Subsequently, in meta-analyses of general population samples on the Progressive Matrices, Lynn and Irwing [139,140,141] found no sex difference in IQ among children aged 6- to 14-years but a male advantage from 15-years through old age, with the male advantage by adulthood being equivalent to about 4.6 IQ points. Other researchers have corroborated Lynn's results [142,143].

## 10.2. Age x Sex x Race Interactions

Nisbett cited a study by Joiner [133] that found Black females had equal or larger crania than White females but a lower IQ score. Nisbett used this finding to cast doubt on the causal relationship between race, brain size, and IQ. He failed to mention that Joiner's sample was of 12- to 18-year-olds who had previously been analyzed by Rushton and Osborne [144] in a study of the heritability of cranial capacity in which an age x sex x race interaction found that girls matured earlier than boys and Blacks matured earlier than Whites, resulting in young Black girls being larger in body (and head) size than their White counterparts. However, by the end of the adolescent growth spurt, the typical race x sex pattern of differences clearly emerges (Figure 4). The disordinal age x sex x race interactions have been found for samples of 7- to 17-year-olds since 1899 [145].

## 11. Trans-Racial Adoption Studies

**Nisbett:** Rushton and Jensen [8] claimed that a study by Scarr and Weinberg [146] showed that the IQs of Black children adopted by mostly middle- and upper-middle-class White families averaged little different from those of the Black population at large, and the IQ of the Mixed-Race children averaged in between those of the Black and White adoptees. When the children were about 7-years-old, their IQs suggested a very slight genetic contribution to the gap. When they were adolescents, their IQs suggested a larger genetic contribution [147].

However, Scarr and Weinberg [146] identified several flaws in their study which they said made it non-supportive of a hereditarian position. To begin with there were no IQ measurements of the adopted children's biological parents making it impossible to know whether the children were assigned selectively, for example, by putting the Black adoptees into families that were of relatively lower social class. Moreover, the Black children were adopted at a later age than were the Mixed-Race children, and later age at adoption is associated with lower IQ. Also, the Black children had more prior placements in foster homes, which is also associated with lower IQ. By adolescence, the Black and Mixed-Race children had a high level of psychological disturbance having to do with identity issues. As a consequence of all these problems, the authors cautioned against any conclusion with respect to the role of heredity for the race differences.

Moreover, there are at least two other studies that work against the hereditarian perspective. In a British study, Tizard et al. [148] examined Black, Mixed-Race, and White children raised in an excellent residential nursery school and found that at 4- to 5-years, the White children averaged an IQ of 103; the Mixed-Race children, 106; and the Black children, 108. On their face, these results seem compatible with the assumption of a nontrivial genetic advantage for Blacks. In a U.S. study, Moore [149] compared Black and Mixed-Race children raised in either Black or White middle-class adoptive families. The children raised by the Black mothers were found to have lower IQ scores (104) than those adopted by the White mothers (117), which strongly implies that the gap is environmental in nature because under the genetic assumption, it should make little difference whether children are raised in Black or in White families.

**Rushton & Jensen:** Trans-racial adoption studies provide one of the most powerful methods for studying race differences. They are the human analog to the cross-fostering method commonly used in animal research. Human adoption is clearly a massive environmental intervention and Nisbett rightly emphasized its importance when he discussed within-race adoptions (Section 2).

We placed greatest weight on the Minnesota Trans-Racial Adoption Study because it is the largest and best-known of these studies and is the only one that included a longitudinal follow-up, with testing of the same children at ages 7 and 17 years [146,147]. It compared the IQ and academic achievement scores of Black, White, and Mixed-Race children who were adopted into upper-middle-class White families in Minnesota, whose parents had a mean IQ of 120 (much higher than the population mean of 100). The biological children of the adopting parents were also tested.

The first testing of 265 children was carried out in 1975 when they were 7-years-old and the second in 1986 when they were 17-years-old. Table 3 gives the results. The evidence for genetic influences became more evident as the children grew older. At age 17 adopted White children had an average IQ of about 106; Mixed-Race adoptees, 99; and adopted Blacks, 89. Although the Black mean of 89 was slightly above the national Black mean of 85, it was not above the Black mean for Minnesota. Further, school grades, class ranks, and aptitude tests also showed this same pattern. Growing up in a White middle-class home produced little or no lasting increase in the IQs of the adopted Black children.

**Table 3. Comparison of Cognitive Performance Measures at Ages 7 and 17 in Biological and Adopted (White, Mixed-Race, and Black) Children, all Reared in Middle-Class White Families.**

Children's background	Age 7 IQ	Age 17 IQ	Age 17 grade point average	Age 17 class rank (percentile)	Age 17 school aptitude (percentile) <sup>a</sup>
Biological parents	120	115	--	--	--
Nonadopted, with two White biological parents ( <i>N</i> at 7 = 143; <i>N</i> at 17 = 104)	116	109	3.0	64	69
Adopted, With two White biological parents ( <i>N</i> at 7 = 25; <i>N</i> at 17 = 16)	112	106	2.8	54	59
Adopted, with one White and one Black biological parent ( <i>N</i> at 7 = 68; <i>N</i> at 17 = 55)	109	99	2.2	40	53
Adopted, with two Black biological parents ( <i>N</i> at 7 = 29; <i>N</i> at 17 = 21)	97	89	2.1	36	42

*Note.* Based on national norms (weighted mean of four percentiles). Adapted from "The Minnesota Transracial Adoption Study: A follow-up of IQ test performance at adolescence," by R.A. Weinberg, S. Scarr, and I. D. Waldman, 1992, *Intelligence*, 16, 117-135.

The results cited by Nisbett of Tizard's [148] British study of 85 2- to 5-year-old Black, White, and Mixed-Race children, and Moore's [149] study of 46 7-year-old Black adopted children are accurate, but to be fully informative they need to be supplemented by follow-up testing past adolescence as in the Minnesota Study. As shown in Figure 2, behavior genetic studies demonstrate that as people age their genes exert ever more influence, whereas family socialization effects decrease.

Nisbett omitted to mention three adoption studies of severely malnourished, late adopted, East Asian children by White families, which support the hereditarian model of a *three-way racial gradient*. Winick et al. [150] studied 141 Korean children malnourished-in-infancy and then adopted as infants by American families. They found that by 10 years of age the children exceeded the national average in IQ and achievement scores: A severely-malnourished group obtained a mean IQ of 102; a moderately-nourished group obtained a mean IQ of 106; and an adequately-nourished group obtained a mean IQ of 112. Clark and Hanisee [151] studied 25 4-year-olds from Vietnam, Korea, Cambodia, and Thailand who were adopted into White

American homes before three years of age. Prior to placement, half the babies required hospitalization for malnutrition. When tested at age 4, their mean IQ score was 120 compared to the U.S. norm of 100. Frydman and Lynn [152] studied 19 Korean infants adopted by families in Belgium. At about 10 years of age, their mean IQ was 119, their verbal IQ was 111, and their performance IQ was 124. Even correcting the Belgian norms upward to 109 to account for any increase in IQ scores over time, the Korean children still had a statistically significant 10-point IQ advantage over indigenous Belgian children. Neither the social class of the adopting parents, nor the number of years the child spent in the adopted family, had any effect on the child's IQ.

## 12. Racial Admixture Studies

**Nisbett:** Rushton and Jensen [8] failed to deal fully enough with the most *direct* genetic evidence—the racial ancestry of a given individual. Since the genes in the U.S. Black population are about 20% European [153], the hereditarian model predicts that Blacks with more European genes should have higher IQs. However, the review of studies on skin color by Shuey [6] showed only a .10 to .15 correlation, not those of the .20 to .30 or higher that might have been expected under the hypothesis (assuming we ignore the social advantages that accrue to Blacks with lighter skin). Moreover, studies of blood groups, some of which are common in European populations and rare in African populations, and vice versa, show no relation with African American IQ scores [154,155].

Other studies have also examined the effects of racial ancestry and need to be taken into account. Eyferth [156], a German psychologist, studied the IQs of several hundred illegitimate children of German women fathered by Black American GIs during the post-World War II (1945) occupation, and compared them to those fathered by White GIs. The children fathered by the Black GIs had an average IQ of 96.5 and the children fathered by the White GIs had an average IQ of 97.

Another study identified 63 Black Chicago school children with IQs of 125 or above, and 28 children with IQs of 140 or above, asked them to report their racial inheritance [157,158]. These children reported slightly *less* European ancestry than the best estimate for the Black population as a whole. There is also a study of 4-year-old Mixed-Race children born to White versus Black mothers by Willerman et al. [159]. It found, contrary to the hereditarian prediction that children of mixed-parentage should have the same average IQ regardless of which parent is Black, that the children of White mothers and Black fathers had a 9-point IQ advantage over those of Black mothers and White fathers (mean IQs = 102, 93; *N*s = 101, 28). In another study, Moore [149] examined a small number of 7-year-olds adopted by middle-class White parents which found no difference in IQ between the 9 children with two Black biological parents and the 14 with one Black and one White biological parent (IQs = 109, 107, respectively).

Finally, it is worth noting that the reason Rushton and Jensen [8] give for the African American population having an average IQ of 85 rather than 70, is that “Black” Americans have about 20% European genetic admixture. Of course, following the simplest version of this logic, if the admixture of European genes in the Black population were 60% instead of 20%, then African Americans would have an average IQ of 115!

**Rushton & Jensen:** Nisbett's citations of what he terms "direct evidence" for the nil heritability of Black-White IQ differences are peculiarly old. The median year of publication being 1960 (range 1934 to 1986). Most are weak and non-decisive and have not been replicated even once. Some are so old and recycled that Jensen [24] and Loehlin [2] dealt with them 35 years ago! Nisbett's account ignored several more recent studies. Here we will consider the skin color studies, Eyferth's German study and the others of Mixed-Race children, blood groups and DNA, and the Mixed-Race population of South Africa.

### 12.1. Skin Color Studies

Rowe [52] updated Shuey's [6] review showing that lighter-skinned African Americans average higher IQs than their darker-skinned counterparts. For example, Lynn [160] examined the National Opinion Research Center (NORC) survey of a representative sample of the adult population. The 442 Blacks were asked whether they would describe themselves as "very dark," "dark brown," "medium brown," "light brown," or "very light." The correlation between these self-ratings and a 10-word vocabulary test score was .17 ( $P < .01$ ). Similarly, Rowe [161] examined the National Longitudinal Study of Adolescent Health and found the Black adolescents averaged a lower verbal IQ than the White adolescents, with the Mixed-Race group falling in between. Nor are the findings likely due to lighter-skinned African Americans being treated better through "expectancy effects" or "labeling theory," as Nisbett implies they might be. For example, in Scarr and Weinberg's [146] Minnesota Transracial Adoption Study, some children were misclassified, with their adoptive parents wrongly believing that the mixed-race children had two Black biological parents. Yet these children averaged the same IQs as those of other mixed-race children correctly believed by their adoptive parents to have had one Black and one White biological parent.

Early studies of brain weight data also fit the genetic admixture hypothesis. Bean [116] found, as did Pearl [118], that among Blacks the greater the amount of White admixture (judged independently from skin color), the higher the mean brain weight at autopsy. Subsequently, Rushton [130] examined 37 East-Asian-European hybrids from the U.S. National Collaborative Perinatal Project and found they fell intermediate in brain size and IQ to the non-mixed parental groups.

### 12.2. Eyferth's German Study

Three studies of racially mixed individuals at first appear to support culture-only theory against the genetic hypothesis. Eyferth [156] reported IQ data for out-of-wedlock children fathered by soldiers stationed in Germany after World War II and then reared by White German mothers. The mean IQs for 83 White children and for 98 Mixed-Race children were both about 97 (97.2 for the Whites, 96.5 for the Mixed-Race). However, as Loehlin et al. [2, pp. 126-128] noted, these results are ambiguous for three reasons. First, the children were still very young when tested. One-third of the children were between 5 and 10 years of age, and two-thirds between 10 and 13. As shown in Figure 2, behavior genetic studies show that while family socialization effects on IQ are often strong before puberty, after puberty they dwindle, sometimes to zero. Second, the Black GIs likely had higher than average IQ scores because there was rigorous

selection in the U.S. Army at the time, with a rejection rate for Blacks on the pre-induction Army General Classification Test of about 30%, compared to 3% for Whites. Third, 20 to 25% of the “Black” fathers were not in fact African Americans but French North Africans, that is, largely Caucasians.

Nisbett’s citation of Willerman et al.’s [159] report of a nine-point IQ advantage for the four-year-old offspring of couples with a White mother and a Black father compared to those from the offspring of a Black mother and a White father is at best, very weak evidence. Loehlin et al. [2, p. 126] noted that the White mothers may have had a higher IQ than did the Black mothers since they averaged almost a year more schooling. Also not mentioned by Nisbett is that the two sets of Mixed-Race children averaged an IQ of 98, intermediate to the White and Black children in the larger sample from whom they had been drawn (IQs = 105 and 91, respectively; [162, p. 43]. Similarly, with regard to Moore’s [149] study which found no difference between 7-year-old adopted children with only one versus two Black biological parents, a follow-up to adolescence would be informative.

### **12.3. Blood Groups and DNA**

As Nisbett correctly surmised, existing studies of blood groups have provided no support for the hereditarian perspective. Both Loehlin et al. [2] and Scarr et al. [146] found that blood groups that distinguish African from European ancestry did not predict IQ scores in Black samples. However, these studies provide genetic markers with too little variation in allele frequencies to make detection likely between Africans and Europeans [25, pp. 480, 524 n.64).

Molecular genetic technology was far less sophisticated in the 1970s. In future studies, individual admixture should be calculated through the use of DNA markers, as is already done in medicine. McKeigue [163] has shown how admixture mapping has greater statistical power than family-linkage studies. In comparison with association studies, admixture mapping requires far fewer markers to search the genome and is less affected by allelic heterogeneity. Statistical-analysis programs for admixture mapping are now available, and a genome-wide panel of markers has been assembled for populations of West African–European admixture.

Of course, there are still some who maintain that “races” do not exist at the genetic level. Tang et al.’s [164] study of 3,636 individuals who donated a DNA sample and identified themselves as being White, East Asian, African-American, or Hispanic argues strongly against this popular, though misinformed, contention. The study found that the self-identifications clustered almost perfectly according to 326 measured DNA markers. There were only five individuals with DNA that matched a racial/ethnic group other than the one they had checked to classify themselves. That is an error rate of only 0.14 percent. Tang et al. [164] concluded that, “ancient geographic ancestry, which is highly correlated with self-identified race/ethnicity—as opposed to current residence—is the major determinant of genetic structure in the U.S. population” (p. 268).

On the basis of existing surveys, an individual’s racial group can be determined by testing his or her DNA at 100 random sites along the genome, or at 30 specifically chosen ones [165]. Even different ethnic groups within a race can be distinguished using some 50 specifically chosen

sites. A genetic hypothesis predicts that for those Black individuals who possess more White genes, their physical, psychological test scores, and other characteristics will approach those of Whites. These procedures have become routine for evaluating admixture in genetic studies of disease risk and in criminology as well [165,166]. They are well suited to studies of race, genetics, and IQ.

#### 12.4. The South African “Coloreds”

As Nisbett noted, we suggested that Black Americans average a higher IQ than sub-Saharan Africans because of their 20 to 25% White admixture (Section 8). However, Nisbett failed to mention the support that comes for this hypothesis from the fact that in South Africa, the mixed-race population known as the “Coloreds” (their preferred term) also has an average IQ of 85, intermediate to the respective African and White means of 70 and 100 [96].

### 13. Regression to the Mean Effects

**Nisbett:** Rushton and Jensen [8] claim that because IQ is lower on average for Blacks than for Whites for genetic reasons, the Black children of high IQ parents should regress to a lower mean than should White children of similar parents. And it apparently is the case that Black children of high IQ parents average lower in IQ than White children of similar high IQ parents. However, this argument is quite weak because the same prediction can be derived from culture-only theory. If environmental factors such as parenting practices and sub-cultural pressures toward low intellectual performances are pushing the average Black IQ further down than the average White IQ, then we would expect more regression for Blacks—for reasons that have nothing to do with genetics.

**Rushton & Jensen:** Nisbett has misunderstood the theory of genetic regression, which predicts that the IQ of *all* offspring will move toward the mean of their parents’ group, including the offspring of *very low* IQ parents, who will *go up* in IQ. This is because parents pass on some, but not all, of their exceptional genes to their offspring. It is analogous to rolling a pair of dice and having them come up two 6’s or two 1’s. The odds are that on the next roll, you will get some value that is not quite as high (or as low).

Siblings provide an even better comparison than parent-offspring comparisons because siblings share very similar environments. Genetic theory predicts the precise magnitude of the regression effect. In one study, Jensen [24] tested the regression predictions using data from 900 White sibling pairs and 500 Black sibling pairs. When Black and White children were matched for IQs of 120, the siblings of Black children averaged close to 100, while the siblings of White children averaged close to 110. A converse effect was also found for children matched at the lower end of the IQ scale. When Black and White children were matched for IQs of 70, the siblings of the Black children averaged about 78, while the siblings of the White children averaged about 85. Throughout the range of IQs from 50 to 150 the results were exactly as predicted by genetic theory, not by culture-only theory.

Black children with parents of IQ 70 regress to their population average of 85, just as much as do Black children with parents of IQ 115. Similarly, White children with parents of IQ 70 regress to their population average of 100, just as much as do White children with parents of IQ 115. In the case of children's regression from high IQ parents to a lower average, this helps to explain why Black children born to well-educated, affluent, parents have test scores 2 to 4 points lower than do White children born to poorly-educated, impoverished, parents.

#### 14. Human Origins and Life History Traits

**Nisbett:** The direction of recent evolution over the last few thousand years is toward smaller brain sizes for humans.

**Rushton & Jensen:** According to recent research by Bailey and Geary [167], [also see 106], the human brain is three times larger than that of our australopithecine ancestors in terms of both absolute size and of brain size scaled to body size. Further increases in brain volume are evident with the emergence of *Homo erectus* and continuing to modern humans. The current consensus view of human origins, the "out-of-Africa" theory, posits that *Homo sapiens* arose in Africa about 150,000 years ago and then expanded northward beyond Africa about 100,000 years ago, with a European-East Asian split about 41,000 years ago. Evolutionary selection pressures were different in the hot savanna, where Africans lived than in the cold northern regions Europeans experienced, or the even colder Arctic regions where East Asians evolved.

According to Bailey and Geary [167], cranial capacity increases linearly with degree of latitudinal deviation north from the equator ( $r = .60$ ), with 87% of the latitudinal variation predicted by differences in mean annual temperatures. Migration results in ecological novelty such as new prey species [168]. Thus, the further the ancestral populations migrated out of Africa, the more they encountered the cognitively-demanding problems of dealing with ecological novelty, gathering and storing food, gaining shelter, making clothes, and raising children successfully during prolonged winters. As these populations evolved into present-day East Asians and Europeans, the pressures selected for larger brains along with the slower rates of maturation and the other life history characteristics associated with increased brain size.

On a suite of 60 life-history attributes, people of East Asian ancestry and those of African ancestry fall at the two ends of a continuum, with people of European ancestry falling intermediate [26]. In addition to brain size and IQ, this holds true for speed of maturation and longevity, personality and temperament, family stability and crime, and sexual behavior and fertility (see Table 4). One striking example is that around the world the rate of dizygotic (also termed two-egg, fraternal, or non-identical) twinning is: less than 4 per 1,000 births among East Asians; 8 among Whites; 16 or greater among Blacks. The tendency to produce dizygotic twins is heritable through the race of the mother and is mediated by sex hormones [26,169].

Another example: Black babies sit, crawl, walk, and put on their clothes earlier than do White or East Asian babies. The milestones for walking are: East Asians, 13 months; Whites, 12 months; Blacks, 11 months. Blacks also average an earlier age of sexual maturity than do Whites, who in turn have an earlier age than do East Asians, whether measured by age of first menstruation, first

sexual experience, or first pregnancy [26]. These racial-group differences are found to be heritable. For example, in rate of skeletal development, mixed Japanese-Black children develop faster than do mixed Japanese-White children, and especially than do children with two Japanese parents [170].

**Table 4. Life History Traits between East Asians, Europeans, and Africans**

<b>Trait</b>	<b>East Asians</b>	<b>Whites</b>	<b>Blacks</b>
Brain size (cm <sup>3</sup> )	1,364	1,347	1,267
Cortical neurons (billions)	13,767	13,665	13,185
<b>Intelligence</b>			
IQ scores	105	100	70-85
Decision times	Faster	Intermediate	Slower
Cultural achievements	Higher	Higher	Lower
<b>Maturation rate</b>			
Gestation time	Longer	Longer	Shorter
Skeletal development	Later	Intermediate	Earlier
Motor development	Later	Intermediate	Earlier
Dental development	Later	Intermediate	Earlier
Age of first intercourse	Later	Intermediate	Earlier
Age of first pregnancy	Later	Intermediate	Earlier
Life-span	Longest	Intermediate	Shortest
<b>Personality</b>			
Activity level	Lower	Intermediate	Higher
Aggressiveness	Lower	Intermediate	Higher
Cautiousness	Higher	Intermediate	Lower
Dominance	Lower	Intermediate	Higher
Impulsivity	Lower	Intermediate	Higher
Self-esteem	Lower	Intermediate	Higher
Sociability	Lower	Intermediate	Higher
<b>Social Organization</b>			
Marital stability	Higher	Intermediate	Lower
Law abidingness	Higher	Intermediate	Lower
Mental health	Higher	Intermediate	Lower
<b>Reproductive Effort</b>			
Two-egg twinning (per 1000 births)	4	8	16
Hormone levels	Lower	Intermediate	Higher
Size of genitalia	Smaller	Intermediate	Larger
Secondary sex characteristics	Smaller	Intermediate	Higher
Intercourse frequencies	Lower	Intermediate	Higher
Permissive attitudes	Lower	Intermediate	Higher
Sexually transmitted diseases	Lower	Intermediate	Higher

## 15. General Discussion

**Nisbett:** We can now shake off the yoke of hereditarianism in all of our thinking about intelligence. Believing that our intelligence is substantially under our control would not make us smart by itself. But it's a good start. Since schools make children smarter, there is no doubt that better schools can make us smarter still.

While it is true that intelligence is partially heritable, and that more intelligent people will be, on average, of a higher social class in virtue of their greater inherited intelligence, I believe the role of genetic inheritance in determining social class is fairly small. For the race differences in IQ, we can be confident that genes play no role whatsoever. Believing intelligence is under your control—and having parents who demand achievement—can do wonders. At any rate that has been true for East Asians and Jews. And, even though East Asians outperform Europeans in educational achievement, there is no reliable evidence of a genetic difference in IQ between East Asians and Europeans. For example, on the 1999 TIMMS assessments, U.S. eighth-graders scored .75 to 1.0 SD below Japan, Korea, China, Taiwan, Singapore, and Hong Kong in math and .33 to .50 below these countries in science. However, these differences are due to family upbringing, the educational system, and achievement motivation. For the remaining differences between Blacks and Whites, genes account for none of it; the evidence favors a completely environmental explanation.

**Rushton & Jensen:** The more we read *Intelligence and How to Get It*, the more we came to see it as a work not of scholarship, but of advocacy. Sadly, it is not the case that Nisbett simply sees the evidence differently than we do, or even favors his interpretation over ours when the evidence is mixed or ambiguous. Rather, he did his readers and the field a disservice by misrepresenting much of the available information.

Some of Nisbett's errors that are of commission might be due to seeing the data differently, as when he exaggerated the magnitude of the Black IQ score gains. He claimed they amounted to 4.5 out of 15 points (30%) even after the inclusion of the small and negative gains that Rushton and Jensen [21] argued Dickens and Flynn [19] had left out, rather than the 2.1 points (14%) calculated by Rushton and Jensen (Section 2). Similarly, on the educational achievement tests, he claimed a Black gain of 35% instead of the 20% reported by Gottfredson [27]—perhaps due to the fact that he excluded the NAEP Science test that Gottfredson included, which showed a full 1 SD Black-White difference.

Other errors were of omission. For example, when Nisbett discussed culture-loaded versus *g*-loaded tests, he failed to mention Flynn's [18] apparent change of heart over the importance of the *g* factor for Black-White differences (Section 3). Flynn stated that, "the black gains are like hearing aids. They do cut the cognitive gap but they are not eliminating the root causes....if the root causes are somehow eliminated, we can be confident that the IQ gap and the *g* gap will both disappear" (p. 85).

Perhaps Nisbett overlooked (or had forgotten) the large data sets we marshaled in a paper [8] on which he was a commentator [22], against the stereotype threat hypothesis, Ogbu's caste theory,

or the other “X factors” he described, for he never mentioned them (Section 4). Unfortunately Nisbett’s highly selective method appeared again and again. For example, in his discussion of reaction time tasks (in Section 5), he minimized the magnitude of the inter-task correlations (.20 instead of .60); in his discussion of the adoption and heritability studies of young children showing how malleable IQ can be, he neglected to inform his readers that these effects are known to dissipate by late adolescence (Section 6); in his suggestion that heritability is lower in Blacks due to oppressive social conditions, he neglected to cite the studies showing equal heritabilities (Section 7); and in his citation of Turkheimer’s [70] finding of a very low heritability for the poorest social class, he omitted to mention that other behavior genetic studies could not replicate it (also Section 7).

Most seriously, one has to consider Nisbett’s exclusion of so much of the data on East Asians, which provided evidence of a *three-way racial gradient* in IQ and brain size from East Asians to Whites to Blacks. A focus on three racial groups taken together obviously provides researchers with increased opportunity to test their hypotheses about group differences. In many cases, for example, malnutrition and later adopted children, diacritical comparisons of East Asians and Whites versus Blacks and Whites, allow the roles of genetics and environment to be unconfounded.

Since Nisbett [171] had previously written a book about East Asians, and now devoted a whole chapter to them, he was undoubtedly aware of the importance of such cross-cultural comparisons. Yet Nisbett first omitted to discuss Lynn and Vanhanen’s [14] most recent IQ data on East Asians on the grounds of Flynn’s much earlier claim [172] that Lynn had used small and unrepresentative samples and outmoded norms (Section 1). Then he described the work done on reaction time measures, but failed to acknowledge that East Asians have faster decision times, slower movement times, and more stable variability than Whites, who showed the exact same pattern in regard to Blacks (Section 5). He then neglected to mention that the East Asian advantage on reaction time measures occurs on the *g* factor extracted from both reaction time measures and IQ tests (also Section 5). Then, while judging inadequate a major trans-racial adoption study finding Black children continued to have a low mean IQ despite being raised by upper-middle class White parents, he failed to mention three independent studies of East Asian children adopted by White parents who grew to excel in both IQ and educational achievement, despite being malnourished at birth (Section 11).

In regard to the East Asian brain size advantage, Nisbett cited a data set from NASA in order to point to a single African sample while completely ignoring an analysis of the same NASA data set documenting the East Asian brain size advantage (Section 9). He also failed to mention any of the other brain size studies of East Asians, which found the East Asian advantage at birth, 1 year, 7 years, and adulthood. Reporting these data would have contradicted his hypothesis that the reason why Blacks “sometimes” averaged a smaller brain size than Whites is because of their lower birth weight and poorer subsequent nutrition. In fact, it was the East Asian samples, from birth to age 7, who were the smallest in stature and lightest in weight, while the Black samples were the tallest in stature and heaviest in weight (Section 9).

As we continued to read, we came across many other instances of willful avoidance of unwelcome evidence. For example, Nisbett selected the one and only study failing to find an absence of a within-family relationship between brain size and IQ, while neglecting to mention four other studies that found the relationship (Section 9). Similarly, in regard to racial admixture studies, he omitted all mention of the “Colored” population of South Africa having IQ scores of 85, intermediate to the parental populations of Africans and Whites, while relying instead on several outdated and heavily recycled studies, which had been responded to 35 years ago (Section 12).

We found similar examples of selective bias in Nisbett’s discussion of regression to the mean. Here, he provided an alternative account of how cultural factors might lead the children of very high IQ Black parents to regress further than the children of similarly high IQ White parents. But he neglected to mention the data regarding regression *at the other end of the distribution* (that is, regression *up* from very low IQ parents), which contradicted his argument (Section 13). Nisbett also neglected to mention that studies of siblings demonstrate precise fits to genetic predictions, as well as the evidence that Black siblings regress to a lower mean than do White siblings.

We found Nisbett’s errors of omission and of commission so major, so many, and so misleading, that they forced us to write a particularly long and negative review. Sadly, they soured us to the many points we found admirable and informative on first reading. These include his acknowledgement of the solid consensus among expert opinion: the existence of intelligence as a meaningful human trait; many of the population group differences in achievement now found internationally; the heritability of IQ within the White population and its relation to social class; the relation between IQ test scores and MRI-brain size relations; and the neurophysiological reaction time correlates of intelligence (measured in milliseconds).

We found it hard to disagree with Nisbett’s common sense view that to reform education it is necessary to carry out experiments in classrooms in order to identify the best methods of instruction. Nor could we disagree with Nisbett’s advice that to maintain IQ scores it is best to exercise, avoid smoking or abusing alcohol and drugs, do homework, read books, and seek out studious peers. We also found much that was useful in his cost-benefit survey of what has been done and what can be done to increase test scores and school performance. Sadly, the answer, as one of us (ARJ) pointed out in 1969, is still “not much” (see also [173]).

Contrary to many hopes and some claims, the narrowing of the gap in social conditions between Blacks and Whites has not led to any change in the magnitude of the Black-White IQ difference in over 100 years. Massive society-wide interventions such as ending segregation, the subsequent nationwide program of school busing to achieve racial balance, and the Head Start programs have failed to reduce this difference. Head Start programs did produce modest gains in school retention and graduation rates among Whites—but not Blacks [174]. Other large scale, often well-publicized, countywide amelioration projects have not reduced the Black-White achievement gap (despite desirably low student-teacher ratios and computers in every classroom) [8]. Adjusting for socioeconomic status only reduces the Black-White IQ difference by about one-third [8].

Racial group differences are now being observed on a global scale. Sub-Saharan Africans (IQ 70) lag the most, with the genetic cluster “South Asians/North Africans” (IQ = 85) becoming part of an increasing “Clash of Civilizations.” Lynn and Vanhanen [14] found that national IQ scores correlate .68 with per capita income and rate of economic development. They further document that national IQ differences explain a number of other social phenomena, such as adult literacy (.64), enrolment in tertiary education (.75), life expectancy (.77), and democratization (.57).

There is no value in denying reality. While improving opportunities and removing arbitrary barriers is a worthy ethical goal, we must realize that equal opportunity will result in equitable, though *unequal outcomes*. Expanding on the application of his “default hypothesis” that group differences are based on aggregated individual differences, themselves based on both genetic and environmental contributions, Jensen [59] proposed “two laws of individual differences”—(1) individual differences in learning and performance *increase* as task complexity increases, and (2) individual differences in performance *increase* with practice and experience (unless there is a low ceiling on proficiency). We must recognize that the more environmental barriers are ameliorated and everybody’s intellectual performance is improved, the greater will be the relative influence of genetic factors (because the environmental variance is being removed). This means that equal opportunity will result in unequal outcomes, *within-families*, *between-families*, and *between* population groups. The fact that we have learned to live with the first, and to a lesser degree the second, offers some hope we can learn to do so for the third.

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