



# Testing the genetic hypothesis of group mean IQ differences in South Africa: Racial admixture and cross-situational consistency

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## Abstract

Two predictions from the hereditarian model of group mean IQ differences are tested on a total sample of 1556 first-year university students in post-apartheid South Africa. The first prediction is that people of Mixed-Race average between the two parental populations. The second prediction is that the pattern of group means remains consistent over time and place. Data collated on South African university students given the Raven's Standard and Advanced Progressive Matrices confirm the predictions. Combining the results for both versions of the test showed the rank order of group IQ means is East Asians, Whites, South Asians, Coloreds, and Blacks (IQs = 116, 113, 106, 103, and 98, respectively;  $N$ s = 23, 398, 212, 36, and 887).

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## 1. Testing the genetic hypothesis of group mean IQ differences by examining racial admixture and cross-situational consistency in South Africa

As the trend to a global economy continues, the pattern of mean group IQ differences is likely to become more salient both within and between countries. Although some theorists have taken a

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world-wide perspective and posited a genetic contribution to the mean group differences, most analyses are carried out from an agnostic or culture-only perspective, with much focus on the malleability of test scores and factors such as poverty and racism (e.g., Dickens & Flynn, 2006; Rushton & Jensen, 2005, 2006).

A “strong inference” approach (Platt, 1964) to contrasting environmental and genetic models of race IQ differences has been advocated by Rowe (2005) and Rushton and Jensen (2005). For example, Rushton and Jensen (2005) examined 10 categories of technical research to conclude that the mean Black-White IQ difference in the US is 80% heritable. The evidence included: (1) the IQ distribution around the world is consistent across time and place; (2) the race-IQ difference is more pronounced on the more *g* loaded subtests (*g* being the general factor of mental ability); (3) the race-IQ difference is more pronounced on the more heritable subtests; (4) the race-IQ difference is paralleled by brain size differences; as well corroborating studies of (5) racial admixture; (6) trans-racial adoption; (7) regression to the mean; (8) 60 related life-history traits; (9) human origins research; and (10) the inadequacy of culture-only explanations.

The current paper extends the evidence by testing hereditarian hypotheses about group IQ differences in university students in post-apartheid South Africa. First, it examines whether the Mixed-Race population – the *Coloreds* (their preferred term) – score intermediate to the two main “non-mixed” parental populations, the Blacks and the Whites. Second, it examines whether the pattern of world-wide group IQ means – going from East Asians to Whites to South Asians to Blacks – is as consistent there as it is elsewhere.

### 1.1. Hypothesis 1: the mixed-race colored population of South Africa

With regard to the first hypothesis, that the Mixed-Race Colored population of South Africa should fall intermediate to its two main parental groups, Rowe (2005) provided an equation predicting trait scores for the offspring of Black and White parents:

$$M_{\text{offspring}} = h^2[1/2(M_{\text{BP}} - M_{\text{POPB}}) + 1/2(M_{\text{WP}} - M_{\text{POPW}})] + 1/2(M_{\text{POPB}} + M_{\text{POPW}}),$$

where  $M$  is the mean,  $h^2$  is the heritability of the trait, BP is the Black parent, WP is the White parent, POPB is the Black population, and POPW is the White population. This equation assumes, often unrealistically, that random mating has taken place between populations. Non-random mating would either lower or raise the child’s expected mean; information on the parent would be needed to estimate its effects. Hybrid vigor – the tendency of offspring of crossed strains to show greater health and robustness than offspring of a single strain – would also lead to an underestimate of an offspring’s trait score. Genetic admixture in the parental population would also render the equation less accurate.

Early research on admixture in the US was reviewed by Shuey (1966) who found that in 16 of 18 studies, Blacks with lighter skin color averaged higher scores than those with darker skin, although the magnitude of the association was quite low ( $r = 0.10$ ). What brain weight data are available also fits with the genetic hypothesis. Both Bean (1906) and Pearl (1934) found that the greater the amount of White admixture (judged independently from skin color), the higher the mean brain weight at autopsy in Black groups. Subsequently, Rushton (1997) examined 37 East-Asian-European hybrids from the US National Collaborative Perinatal Project and found they fell intermediate in brain size and IQ to the non-mixed parental groups.

The well-known Minnesota Transracial Adoption Study found that Mixed-Race (Black-White) adoptees averaged IQ scores between those of White and Black adoptees (Scarr & Weinberg, 1976; Weinberg, Scarr, & Waldman, 1992). All children were adopted into upper middle-class White families in Minnesota by parents whose mean IQ was more than 115. The study thus removed the most frequently proposed causal agents of racial IQ differences such as poverty, malnutrition, poor schools, and dysfunctional neighborhoods. The children ( $N = 265$ ) were first tested in 1975 when they were 7-years-old and the 196 remaining children were tested again in 1986 when they were 17-years-old. The 7-year-old White biological (i.e., non-adopted) children had an average IQ of 117, the adopted children with two White biological parents, 112; the Mixed-Race children, 109; and the adopted children with two Black biological parents, 97. At age 17, the non-adopted White children had an average IQ of 109 and a class rank at the 64th percentile; the adopted children with two White biological parents had an IQ of 106 and a class rank at the 54th percentile; the Mixed-Race children had an IQ of 99 and a class rank at the 40th percentile; and the adopted children with two Black biological parents had an IQ of 89 and a class rank at the 36th percentile. *Expectancy effects* were ruled out, at least at age 7, by the finding that the mean score for 12 children wrongly believed by their adoptive parents to have two Black biological parents was no different from that of 56 children correctly classified by their adoptive parents as having one Black and one White biological parent (Scarr & Weinberg, 1976).

Both Lynn (2002) and Rowe (2002) tested the racial hybridization hypothesis further. Lynn examined the 1982 US National Opinion Research Center survey 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 was  $r = 0.17$  ( $p < 0.01$ ). Rowe examined the 1994 National Longitudinal Study of Adolescent Health survey of adolescents (9830 Whites, 4017 Blacks, and 119 Mixed-Race). The Black adolescents averaged a lower birth weight, a lower verbal IQ, and a higher number of sexual partners than did the White adolescents. For each characteristic, the Mixed-Race mean fell between the other two. Rowe, too, cast doubt on the “discrimination based on skin tone” hypothesis since it was eliminated in his study by his deliberate selection of only those Mixed-Race adolescents judged by their interviewers to be Black, based on physical appearance.

Also consistent with the hybridization hypothesis is that African-Americans average an IQ of 85, which is 15 points higher than that of sub-Saharan Africans, with an average IQ of 70. African-Americans have approximately 20% White admixture (Parra et al., 1998) and in the Deep South, where White admixture is significantly lower, they too have IQs close to 70 (Rushton & Jensen, 2005, pp. 260–261). Lynn (2006) found Mixed-Race (Black-White) people in Brazil and South Africa also averaged scores intermediate to the “unmixed” groups. In South Africa, Lynn cited a study by Fick (1929) of Black, Colored, Indian, and White 10- to 12-year-olds on the American Army Beta test that Lynn calculated gave IQs of 65, 83, 77, and 100, respectively ( $Ns = 293, 6196, 762, \text{ and } 10,000$ ). He also cited a study by Owen (1992) of Black, Colored, Indian, and White 14- to 16-year-olds on the Raven Standard Progressive Matrices that he calculated gave IQs of 74, 80, 91, and 94, respectively ( $Ns = 1093, 778, 1063, \text{ and } 1056$ ).

### 1.2. Hypothesis 2: cross-situational consistency in South Africa

With regard to the second hypothesis, that group means should show cross-situational consistency, Lynn (2006) examined the world-wide literature on each of 10 “genetic clusters” or popu-

lation groups identified by Cavalli-Sforza, Menozzi, and Piazza (1994). To make the various results comparable, Lynn adopted an IQ of 100 (with a standard deviation of 15) for Europeans in Britain as a bench mark and adjusted the results for Flynn effects, which vary with different tests (e.g., 3 IQ points a decade on the Wechsler tests from the mid-1930s to the 1990s, and 2 IQ points per decade on the Raven's Standard Progressive Matrices from 1938 to 1979). Altogether, there were 620 studies in 113 countries from the beginning of the twentieth century to the present ( $N = 813,778$ ).

Lynn (2006) found the world average IQ was 90. The East Asians (Chinese, Japanese and Koreans) obtained the highest mean IQ at 105. The Europeans followed with a mean IQ of 100. The South Asians and North Africans came next with a mean IQ of 84. Finally, sub-Saharan Africans had a mean IQ of 67. The stability of the mean scores across countries and over decades is remarkable. Lynn first reviewed 73 studies of indigenous Europeans in 30 countries and found an IQ range of from 83 to 107 with a median of 99 (mean = 98). He also reviewed 23 studies of Europeans outside Europe and found an IQ range of from 93 to 103 with a median of 99 (mean = 99). In addition, 16 studies of European university students in Britain, the US, and elsewhere, showed an IQ range of from 100 to 113 with a median of 105 (mean = 105), 5 points higher than for the general population.

Lynn (2006) reviewed 59 studies of East Asians from China, Japan, Hong Kong, South Korea, Taiwan, and Singapore and found an IQ range of from 100 to 122 with a median of 105 (mean = 106). He reviewed 27 further studies of East Asians in the United States and found an IQ range of from 96 to 110 with a median of 101 (mean = 101), and 9 studies in Brazil, Britain, Canada, Malaysia, and the Netherlands with an IQ range of from 95 to 107 and a median of 102 (mean = 101). In addition, 6 samples of East Asian infants adopted by White families in the US and Western Europe showed an IQ range of from 102 to 115 with a median of 108 (mean = 109).

Lynn reviewed 37 studies of South Asians and North Africans from 16 countries such as India, Pakistan, Turkey, Iran, and Iraq and found an IQ range of from 77 to 96 with a median of 84. He reviewed 13 further studies of immigrants from those countries in the UK and Australia and found an IQ range of from 83 to 97 with a median of 89. He reviewed 18 further studies in Continental Europe, mainly in the Netherlands, and found an IQ range of from 75 to 94 with a median of 85, and 9 studies in Africa, Fiji, Malaysia, and Mauritius with a range of from 77 to 91 and a median of 86. In addition, 13 studies of select South Asian high school and university students showed an IQ range of from 85 to 106 with a median of 92, 8 points higher than for the general population.

Lynn reviewed 57 studies of sub-Saharan Africans in 17 countries gathered over an 80-year period from West, Central, East, and Southern Africa and found an IQ range of from 59 to 89 with a median of 67. He reviewed 14 studies of Africans in the Caribbean and Latin America and found an IQ range of from 60 to 80 with a median of 71. He also reviewed 32 of the most important of the hundreds of studies conducted in the US on African-Americans, also over an 80 year period, and found an IQ range of from 77 to 93 with a median of 85. He reviewed 22 further studies of Africans in Britain with a range of from 73 to 104 and a median of 86, and 7 studies in the Netherlands with a range of from 83 to 88 and a median of 85. In addition, 13 studies of select African university students in sub-Saharan Africa showed an IQ range of from 72 to 101 with a median of 82, 15 points higher than for the general population. Two studies of 14- to 16-year old Ethiopian Jews in Israel both gave IQs of 65.

### 1.3. *The present study*

Neither the data on Mixed-Race populations nor that on cross-situational consistency has gone undisputed as evidence for the genetic model (e.g., Dickens & Flynn, 2006; Nisbett, 2005). Some of these critiques have been responded to (e.g., Lynn & Vanhanen, 2006; Murray, 2007; Rushton & Jensen, 2006; Templer & Arikawa, 2006). More research is clearly called for.

The present study therefore examines two predictions from the hereditarian model with respect to five groups of first-year university students in post-apartheid South Africa – East Asians, Whites, South Asians, Coloreds, and Blacks. First, it examines whether the Mixed-Race population of South Africa, the *Coloreds*, score intermediate to the two main parental populations, Whites and Blacks. Second, it examines whether the more general pattern of mean IQs also remains consistent, both with those from earlier decades in South Africa (Fick, 1929; Owen, 1992), and with those from other continents.

### 1.4. *South African population groups*

South Africa provides a unique setting in which to contrast the hereditarian and culture-only models of group differences. The diverse population has a unique history with the largest White, South Asian, and racially mixed communities in sub-Saharan Africa. According to the 2001 census, Black Africans comprise 79% of the population; Whites comprise almost 10%; Coloreds almost 9%, and South Asians over 2%. The Whites (mainly Dutch) first began to arrive shortly after the Dutch East India Company founded a station at (what was to become) Cape Town in 1652 as a re-supply station for ships traveling between Europe and Asia. Later the English and other Europeans came. Early and later European interest followed from the strategic importance of the Cape Sea Route. The Coloreds began to appear in the 1600s from liaisons between White settlers and the Khoikhoi and San Bushmen who first inhabited the Cape. Others originated from relationships between the Khosian and Black Africans in Angola. Another early ingredient were *Malays* (as they often called themselves) who were brought in as slaves in the 1600s by the Dutch East India Company from what is now Indonesia. The Coloreds are concentrated mainly in the southwest of the country and are culturally distinct from the majority Black community. The South Asian population is similarly diverse. Some who today retain a “Malay” identity are Muslim. Another South Asian identity group is from India, most of who originated as indentured laborers brought in to work the Sugar Cane plantations in the mid 19th century, many of whom are also Muslim. Other Indians are Hindus who followed as merchants, mainly from Gujarat state. There is also a small Chinese community descended from migrant workers who came to work the gold mines around Johannesburg in the late 19th century.

Under the apartheid system (1913–1991), Coloreds worked mainly on White farms and their townships were associated with larger White cities. They tended to be better educated and earned more than Blacks. Since the transformation of South African society in the 1990s to majority rule, the Colored group’s average income remains higher than that of Blacks, but they are disadvantaged by the Equity Employment Act and Equality Act of 1998, which mandates that universities and companies mirror the demography of society. Their health and longevity remains intermediate to Whites and Blacks.

## 2. Method

The data were collected between 1998 and 2002 on first-year students mainly at the University of the Witwatersrand in Johannesburg, South Africa, and resulted in five publications described below by Rushton, Skuy, and colleagues. In some studies not all the data were reported at the time because the individual samples for some groups were too small for analysis. Also, whereas in one study the age range was from 17- to 29-years, in the others the cut-off was 23 years. Consequently, many additional individuals can be included by extending the age range to include anyone below 30 years and collating the small samples across the studies. The new and the old *N* from each published study are given below.

The Raven's Standard Progressive Matrices (SPM) or Advanced Progressive Matrices (APM) is used. Both versions consist of diagrammatic puzzles, each with a missing part which the test taker attempts to identify from eight options (Raven, Raven, & Court, 1998). In South Africa, retest reliabilities of 0.83–0.93 are found with an interval of approximately 1 year between administrations, and external validities range from 0.30 to 0.50 for Blacks, Coloreds, South Asians (Indians), and Whites (Kendall, Verster, & Von Mollendorf, 1988). The test was designed to measure *g*, the general factor of intelligence, or at least the non-verbal component thereof. In the present paper, the raw scores are converted to percentiles based on the 1993 US norms and hence to IQ score equivalents based on a mean of 100 and standard deviation of 15.

The first study (Rushton & Skuy, 2000) reported on 309 16- to 23-year-old psychology students given the untimed SPM. The 173 African students solved an average of 44 of the 60 problems, while the 136 White students solved 54. These scores placed the African students at the 14th percentile and White students at the 61st percentile, yielding IQ equivalents of 84 and 104, respectively. The current study includes an additional 10 Coloreds, 35 South Asians, and 3 East Asians.

The second study (Skuy et al., 2002) gave the SPM to 98 psychology students aged 17- to 29-years. The 70 "Africans" (including 1 Colored) and 1 40-year-old African averaged an IQ equivalent of 83, and the 28 "non-Africans" (including 20 Whites, 6 South Asians, and 2 Coloreds), 99. This was a training study and after receiving training on how to solve Matrices-type items, the African mean IQ rose to 96 and the non-African mean to 110. In the current study, the pre-training IQ scores are disaggregated to 68 Africans, 3 Coloreds, 6 South Asians, and 20 Whites.

The third study (Rushton, Skuy, & Fridjhon, 2002) gave the SPM to 342 17- to 23-year-old academically select engineering students (198 Africans, 58 South Asians, and 86 Whites). Out of 60 problems, the Africans solved an average of 50, the South Asians, 53, and the Whites, 56, yielding IQ equivalents of 97, 102, and 110, respectively. The current study includes an additional 3 Africans, 7 Coloreds, and 8 East Asians.

The fourth study (Rushton, Skuy, & Fridjhon, 2003) gave the APM to another 294 engineering students aged 17- to 23-years (187 Africans, 40 South Asians, and 67 Whites). Out of 36 problems, the Africans solved an average of 22, the Indians, 24; and the Whites, 29, yielding IQ equivalents of 103, 105, and 117, respectively, making this the now highest scoring African sample on record. The current study includes an additional 26 Africans, 7 Coloreds, 2 South Asians, 4 Whites, and 7 East Asians.

The fifth study (Rushton, Skuy, & Bons, 2004) gave the APM to another 306 17- to 23-year-old engineering students aged 17- to 23-years (177 Africans, 57 South Asians, and 72 Whites). Out of the 36 problems, the Africans solved an average of 23, the South Asians, 26; and the Whites, 29,

Table 1

Percentiles and IQ score by population group (Race) in academically select South African university students on the Raven's standard and advanced progressive matrices

Group	<i>N</i>	Mean percentiles	Mean IQ	SD IQ
East Asians	23	78 <sup>a</sup>	116 <sup>a</sup>	13
Whites	398	75 <sup>a</sup>	113 <sup>a</sup>	12
South Asians	212	60 <sup>b</sup>	106 <sup>b</sup>	12
Coloreds	36	55 <sup>b</sup>	103 <sup>b</sup>	13
Blacks	887	45 <sup>c</sup>	98 <sup>c</sup>	13

Note: *F*s (4, 1,551) = 97.99 and 102.21, respectively (*P*s < 0.001). Means with different superscripts differ significantly by *t*-test.

yielding IQ equivalents of 104, 109, and 117, respectively. The current study includes an additional 55 Africans, 9 Coloreds, 14 South Asians, 13 Whites, and 5 East Asians.

### 3. Results

Table 1 presents the results for the total sample of 1556 South African university students on both tests combined. The East Asians, Whites, South Asians, Coloreds, and Blacks average mean percentiles of 78, 75, 60, 55, and 45, respectively, with IQ score equivalents of 116, 113, 106, 103, and 98 (*N*s = 23, 398, 212, 36, and 887). The mean IQ for the Coloreds of 102 is intermediate to the mean for Whites of 113 and Blacks of 98. Similar but less smooth results occurred when the tests were analyzed separately. For the SPM, the IQs were 115, 109, 102, 97, and 92 respectively (*N*s = 11, 242, 99, 20, 442). For the APM, the IQs for the more academically select engineering students were 116, 117, 109, 109, and 103 (*N*s = 12, 156, 113, 16, and 445). A one-way Analysis of Variance for each of the two dependent variables showed highly significant sample differences with *F*s (4, 1,551) = 97.99 and 102.21, respectively (*P*s < 0.001). Subsequently, in Table 1, the means with different superscripts differed significantly by *t*-test.

### 4. Discussion

The main conclusion from this study is that among first-year university students in post-apartheid South Africa, the Mixed-Race Colored population averages intermediate to Whites and Blacks. Moreover, so do South Asians (Indians), as they do on other continents. East Asians, on the other hand, average a higher mean IQ than Whites, as they also do on other continents. The consistent pattern of these data, across very different sampling procedures, supports the hereditarian model that predicted it – although the pattern can also be explained *post hoc* by culture-only models. Strong inference, however, is the fast track for scientific advance (Platt, 1964; Rushton & Jensen, 2005).

Although the results reported here are consistent with a genetic hypothesis, they are not conclusive. It may be, for example, that lighter-skinned Coloreds have better nutrition and greater opportunities for learning. More sophisticated research is needed to settle the matter. Rowe

(2005) has suggested that studying interracial people would be a useful way forward, especially if capitalizing on biotechnology.

In the future, individual admixture might be calculated through the use of DNA markers, as occurs already in medicine. McKeigue (2005) has shown how admixture mapping extends to human populations the principles that underlie linkage analysis of an experimental cross. For detecting genes that contribute to ethnic variation in disease risk, for example, 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 for admixture mapping in populations formed by West African-European admixture has been assembled. Where admixed populations and panels of markers informative for ancestry are available, admixture mapping can be applied to localize genes that contribute to ethnic variation in any measurable trait.

Of course, some still maintain that “races” do not exist at the genetic level. One answer to this is Tang et al.’s (2005) study of 3636 individuals who donated a DNA sample and identified themselves as being White, East Asian, African-American, or Hispanic. The study found that the self-identifications clustered almost perfectly according to 326 measured DNA markers. Only five individuals had DNA that matched a racial/ethnic group different than the box they had checked to classify themselves. That is an error rate of only 0.14%. Tang et al. 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 US 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 (Collins-Schramm et al., 2002). 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, behavioral, and other characteristics will approach those of Whites. These procedures have become routine for evaluating admixture in genetic studies of disease (Risch, 2006; Tang et al., 2006). They can be recommended for studies of IQ.

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