RACE DIFFERENCES IN INTELLIGENCE: A GLOBAL PERSPECTIVE

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The world literature on racial differences in intelligence is reviewed from three points of view. Firstly, studies using intelligence tests indicate that Caucasoids in North America, Europe and Australasia generally obtain mean IQs of around 100. Mongoloids typically obtain slightly higher means in the range of 100-106. African Negroids obtain mean IQs of around 70, while Negroid-Caucasoids in the United States and Britain obtain means of about 85. Amerindians and the South East Asian races typically obtain means in the range of 85-95.

A second source of evidence comes from studies of reaction times which provide measures of the neurological efficiency of the brain. These studies show that Mongoloids have the fastest reaction times, followed by Caucasoids and then by Negroids. Thirdly, the races can be assessed for their contributions to civilization. Here the Caucasoids and the Mongoloids have made the most significant advances both in the foundation of the early civilizations and in more recent developments.

The existence of racial differences in intelligence has been known since the time of the First World war when tests given to large numbers of military conscripts in the United States revealed that blacks had an average intelligence level about 15 IQ points below that of whites. In the following decades there has been debate over the question of whether these differences have a genetic basis. This debate has largely taken place in the context of the differences in intelligence found in different racial populations in the United States. Genetic theorists have pointed to the high heritability of intelligence and the difficulties of formulating credible environmentalist explanations to explain the difference (Jensen 1972, 1973, 1980; Eysenck, 1971). Environmentalists have pointed to a variety of factors which they consider capable of explaining the low Negroid IQ, of which the most important are bias in the tests, the adverse social and economic living conditions experienced by blacks,

discrimination and prejudice from white majorities and the historical legacy of slavery which has demoralized blacks and destroyed their family structure (Flynn, 1980; Jaynes and Williams, 1989; Mackintosh and Mascie-Taylor, 1985). Neither side has yet succeeded in convincing the other and the issue remains unresolved, although a recent poll has shown that the majority of experts now believe there is some genetic basis to the low black IQ (Snyderman and Rothman, 1988).

The purpose of the present paper is to consider the problem of racial differences in intelligence in a global perspective. Part one of the paper contains a review of the many studies which have been made of the intelligence of different races throughout the world. The principal question here is whether the world wide evidence supports the genetic or the environmental position.

In general terms the genetic theory requires that there should be a reasonably high degree of consistency of the intelligence levels shown by populations of different races in a variety of geographical locations. Thus, Negroids should universally have lower intelligence levels than Caucasoids and this difference should be found in Africa and the West Indies as well as in the United States and Britain. The reason for this is that the genes or alleles (alternative forms of genes) for low intelligence, if these exist, should be present in all Negroid populations and not merely in those whose ancestors were transported as slaves to the New World. Furthermore, Negroids in the United States and Britain are nearly all Negroid-Caucasoid hybrids (Reed, 1969). Their Caucasoid genes should, on the genetic hypothesis, raise their intelligence level as compared with the pure Negroids of Africa. Hence the genetic theory demands that African Negroids should have lower intelligence levels than the Negroid-Caucasoid hybrids of the United States and Britain. Whether or not this is the case can be regarded as a test of the genetic theory and any studies showing that pure African Negroids have higher IQs than American or British Negroid hybrids would falsify the genetic hypothesis.

A similar degree of consistency of intelligence levels should

be found for all races if the intelligence is largely genetically determined. The intelligence of Caucasoids should be approximately the same, whether they live in the United States, Britain, Europe, Australia or New Zealand. The same consistency should be present in the third major race of mankind, the Orientals or Mongoloids, who are present not only in their native habitat of north east Asia but also in the United States and Europe. Hence a world wide examination of the consistency of racial differences in intelligence would provide a perspective on the genetic and environmental theories which is lacking in the studies carried out in the local contexts of the United States and, more recently, in Britain.

Part two of the paper deals with the question of whether the racial differences in intelligence as measured by intelligence tests are also present in reaction times, i.e. the speed of response to simple stimuli. The interest of this question is that recent work has shown that reaction times are a measure of intelligence and appear to represent differences in the neurological efficiency of brain processes (Jensen, 1982; Eysenck, 1982). A positive finding of racial differences in reaction times would rule out many of the explanations for the intelligence differences advanced by environmentalists such as bias in the tests, the legacy of slavery and so forth, and would point to a genetically determined neurological basis for the differences. Whether or not there are racial differences in reaction times which run parallel with those in intelligence therefore provides a further test of the genetic and environmental theories.

Part three of the paper considers the racial differences in the foundation and advancement of civilization. The establishment of civilization required numerous discoveries such as the invention of writing and arithmetic and these must have been due to the work of highly intelligent individuals. This part of the paper considers whether the racial differences in the establishment of civilizations are the same as those found in the performance of intelligence tests.

Intelligence Test Performance

Intelligence tests were developed in the first two decades of the century and in the following seventy years numerous studies have been published of the intelligence of different peoples in many parts of the world. The principal studies have been collated and classified by the race and are summarized in Tables 1 through 6.

Intelligence was initially conceptualized as a single entity quantified by the intelligence quotient and many studies have reported racial differences in terms of a single IQ. The theoretical basis for representing intelligence in terms of a single IQ is Spearman's (1927) work identifying a general factor present in all cognitive tests and his conceptualization of this as general intelligence, now known as Spearman's g, and identified as a generalized problem solving ability which enters into the performance of all cognitive tasks.

This theory of intelligence was challenged in the nineteen thirties by Thurstone (1938) who proposed an alternative model which dispensed with the concept of Spearman's g and postulated six primary mental abilities designated reasoning, spatial, numerical, verbal, perceptual speed and fluency abilities. In the late nineteen-forties an integration of the Spearman and Thurstone models was proposed by Burt (1949). This consisted of a hierarchical model of intelligence in which Spearman's general factor was split into two correlated group factors now generally known as the verbal and visuospatial abilities. These can in turn be broken down further into narrower primary abilities, of which some twenty to thirty have been identified (Cattell, 1971). Burt's model is widely accepted in contemporary psychology and is adopted in this paper. Where possible means for different populations are given for general intelligence (Spearman's g) and for the verbal and visuospatial abilities.

Intelligence tests are normally calibrated with the mean IQ set at 100 and the standard deviation at 15. This metric has been adopted and the mean IQ of American Caucasoids set at 100 to serve as the standard in terms of which IQs of all other populations are expressed. Further details of the methods used

for the calculations of mean IQs for different populations are given in the appendix.

Caucasoids

Mean IQs for Caucasoid peoples in the United States, Britain, Continental Europe, Australia and New Zealand are set out in Table 1. In this and in subsequent tables summary results are given for the geographical location of the sample, the age of the subjects, the numbers, the tests used and mean IQs for general, verbal and visuospatial intelligence. General intelligence is conceptualized as Spearman's g, the general factor present in all cognitive tasks, and most effectively measured by tests of reasoning ability such as Raven's Progressive Matrices and Cattell's Culture Fair Test. It can also be measured by omnibus tests such as the Wechslers and the Stanford Binet. Results from all these tests are entered in the tables under general intelligence. Verbal IQs in the tables are derived from the verbal scales of the Wechslers and from verbal comprehension scales in such tests as the Differential Aptitude and the McCarthy. Visuospatial IQs are derived from the performance scales of the Wechslers and from visuospatial scales in the Differential Aptitude, the McCarthy and similar tests, and from figure copying tests such as the Draw-a-Man.

Inspection of the results set out in the table will show firstly that Caucasoids in the United States and Britain obtain virtually identical mean IQs. This was first demonstrated in the 1932 Scottish survey of 11 years olds who obtained a mean IQ of 99 on the American Stanford Binet. The subsequent studies shown in the table under Scotland and Britain confirm this result. The earlier standardization of tests in the United States were generally based on normative samples of Caucasoids only, such as the early Stanford Binet and Wechsler tests, but the later standardizations such as the WISC-R included Negroids. For this reason an adjustment has to be made to American means for later tests, because when the mean of the American total population is set at 100, the mean of American Caucasoids is 102.25, as derived from the standardization sample of the WISC-R (Jensen and Reynolds, 1982).

Table 1: Mean IQs of various Caucasoid populations

Caucasoids

Sample	Age	Number	Test	Intelligence			Source
				General	Verbal	Visuo-spatial	
United States	-	-	-	100	100	100	
Austria	adults	187	Culture Fair	101	-	-	Buj, 1981
Australia	9-13	35,000	Otis	95			McIntyre, 1938
Australia	6	600	Coloured PM	104			Reddington and Jackson, 1980
Australia	8-12	400	WISC	-	-	104	Radcliffe and Trainer, 1969
Belgium	adults	247	Culture Fair	98			Buj, 1981
Belgium	5-15	600	WISC	-	-	101	Berte, 1961
Belgium	10-16	920	Culture Fair	104			Goosens, 1962
Britain	13-15	10,000	Differential Aptitude	101	102	102	Lynn, Hampson and Iwawaki, 1987
Britain	adults	1,405	Culture Fair	100			Buj, 1981
Bulgaria	adults	215	Culture Fair	94			Buj, 1981
Czechoslovakia	adults	363	Culture Fair	98			Buj, 1981
Czechoslovakia	6	832	Coloured PM	104			Raven, 1986
Denmark	12	628	Progressive Matrices	100			Vejleskov, 1968
Denmark	adults	122	Culture Fair	99			Buj, 1981
Finland	adults	120	Culture Fair	96			Buj, 1981
France	adults	1,320	Culture Fair	94			Buj, 1981
France	6-9	618	Coloured PM	104			Bourdier, 1964
Germany, DR	7-11	454	Coloured PM	100			Kurth, 1969
Germany FR	6	3,607	Coloured PM	102			Schmidtke, Schaller & Becker, 1978
Germany FR	adults	1,572	Culture Fair	107			Buj, 1981

Greece	adults	220	Culture Fair	97			Buj, 1981
Hungary	adults	260	Culture Fair	99			Buj, 1981
Ireland	adults	75	Culture Fair	98			Buj, 1981
Italy	adults	1,380	Culture Fair	101			Buj, 1981
Italy	10-16	614	Progressive Matrices	100			Tesi and Young, 1962
Netherlands	adults	333	Culture Fair	107			Buj, 1981
New Zealand	9-15	26,000	Otis	99			Redmond and Davies, 1940
New Zealand	8-16	2,635	Progressive Matrices	102			Raven and Court, 1989
Norway	adults	100	Culture Fair	100			Buj, 1981
Poland	adults	835	Culture Fair	106			Buj, 1981
Poland	10	213	WISC	107			Firkowska et al 1978
Portugal	adults	242	Culture Fair	101			Buj, 1981
Romania	6	300	Coloured PM	95			Zahirnic et al 1974
Scotland	11	1,000	Stanford Binet	99			Scottish Council, 1933
Scotland	11	1,215	Terman Merrill	102			Scottish Council, 1949
Spain	18	113,749	Progressive Matrices	87			Nieto-Alegre et al 1967
Spain	adults	848	Culture Fair	98			Buj, 1981
Sweden	adults	205	Culture Fair	104			Buj, 1981
Sweden	6-15	1,106	WISC	-	-	104	Scandinaviska Test for laget, 1970
Switzerland	adults	163	Culture Fair	101			Buj, 1981
Yugoslavia	adults	525	Culture Fair	104			Buj, 1981
India	children	5,000	various	86			Sinha, 1986
British Indians	11	170	British Ability	96	89		Mackintosh and Mascie-Taylor, 1985
S. African Indians	16	1,063	Junior Aptitude	85			Owen, 1989

Further inspection of the results set out in Table 1 shows that the mean IQs from all these Caucasoid populations lies in the range of 94-107, with the single exception of a low value of 87 for Spain found by Nieto Alegre et al (1967). The variations between and within the countries are probably due principally to differences in sampling accuracy and procedures and to differences in living standards. Differences in sampling accuracy and procedures can occur because of the difficulty of obtaining representative samples and to differences in whether the mentally retarded are included. In the case of children, those in private schools may or may not be included in the samples. Sampling differences are probably largely responsible for a number of the discrepancies in the means obtained from the same country, e.g. the two studies of general intelligence in Australia give means of 95 and 104, and the three studies of France give means of 98, 104 and 94.

The largest discrepancy in the table is between the mean IQ of 87 for Spain obtained by Nieto Alegre et al and the mean of 98 obtained by Buj. This probably arises from a sampling difference between the two studies. Nieto Alegre et al obtained their sample from military conscripts drawn from the whole of Spain, whereas Buj drew his samples for Spain and other countries from the populations of the capital cities. While the sampling procedure adopted by Buj seems reasonable, it is probable that in less economically developed countries like Spain with a rather backward peasant population there are considerable differences between the mean IQs in the rural areas and in cities. In fact in the Nieto Alegre study there was a range of approximately 15 IQ points between the means of the conscripts from the poorest rural regions and the most prosperous and more urbanized centers. As countries have become more industrialized the numbers of their rural peasantry have declined and rural-urban differences in intelligence have largely disappeared. Thus Scotland was a largely urbanized country by the 1930s and at this time there was virtually no difference in mean IQ between urban and rural children (Scottish Council for Research in Education, 1939).

In addition to differences in sampling, some of the differences between these Caucasoid populations may also be ascribed to differences in living standards. There is a wide range of these among this set of nations. For instance, in Spain which produced the lowest mean IQ of 87 for military conscripts tested in 1965, the per capita income in that year was 770 US dollars as compared with $2,003 in Britain and $4,058 in the United States (United Nations, 1970). Low incomes have an adverse effect on intelligence because poor people have less to spend on nutritious foods and tend to have less leisure to give their children cognitive stimulation. Nevertheless, in spite of these considerable differences in living standards, the overall picture of the results summarized in Table 1 is one of fairly close similarity of mean IQs among these diverse Caucasoid populations.

The last entries in Table 1 are for the IQs of Indians derived from the Indian sub-continent, South Africa and Britain. The mean of 86 in India is derived from a review by Sinha (1968) of the results of 17 studies of children aged between 9 and 15 years and totalling in excess of 5,000. Mean IQs lie in the range of 81 to 94, with an overall mean of approximately 86. But ethic Indians in Britain obtain a mean of 96 which is within the range of other Caucasoid populations. Their verbal IQ of 89 is depressed, but this is probably because their families are recent immigrants and have not yet mastered the language. The British results suggest that when Indians is are reared in an economically developed environment their intelligence level is about the same as that of European Caucasoids.

Mongoloids

The Mongoloid peoples are those indigenous to north east Asia, north of the Himalayas and east of the Yenisey river. Their mean IQs are set out in Table 2. It will be seen that for general intelligence the Mongoloid peoples tend in the majority of studies to obtain somewhat higher means than Caucasoids. This is the case in the United States, Canada, Europe, Japan, Hong Kong, Taiwan, Singapore and The

Table 2: Mean IQs of various Mongoloid populations

Mongoloids

Sample	Age	Number	Test	Intelligence: General	Verbal	Visuo-spatial	Source
Japan	5-16	1,070	WISC	-	-	103	Lynn, 1977 a
Japan	6	240	Vocabulary-spatial	97	89	105	Stevenson, Stigler, Lee, Lucker, Kitamura and Hsu, 1985
Japan	11	240	Vocabulary-spatial	102	98	107	" " " "
Japan	2-8	550	McCarthy Scales	100	92	108	Lynn and Hampson, 1986 a
Japan	4-6	600	WPPSI	103	98	108	Lynn and Hampson, 1986 b
Japan	6-16	1,100	WISC-R	103	101	107	Lynn and Hampson, 1986 c
Japan	13-15	178	Differential Aptitude	104	-	114	Lynn, Hampson and Iwawaki, 1987
Japan	13-14	216	Kyoto NX	101	100	103	Lynn, Hampson and Bingham, 1987
Japan	3-9	347	Columbia MMS	110	-	-	Misawa, Motegei, Fujita and Hattori, 1984
Japan	9	444	Progressive Matrices	110	-	-	Shigehisa and Lynn, 1991
Hong Kong	6-15	4,500	Progressive Matrices	110	-	-	Lynn, Pagliari and Chan, 1988
Hong Kong	10	197	PM, Space Relations, Fluency	108	92	114	Lynn, Pagliari and Chan, 1988
Hong Kong	9	376	Cattell Culture Fair	113	-	-	Lynn, Hampson and Lee, 1988
Hong Kong	6	4,858	Coloured PM	116	-		Chan and Lynn, 1989

P R China	6-16	5,108	Progressive Matrices	101			Lynn, 1991
Taiwan	16	1,290	Culture Fair	105	-	-	Rodd, 1959
Singapore	13	147	Progressive Matrices	110	-	-	Lynn, 1977 b
Belgium-Koreans	6-14	19	WISC	110	102	115	Frydman and Lynn, 1989
United States	6-17	4,994	Various	100	97	-	Coleman et al, 1966; Flynn, 1991
United States	6-11	478	various	101	-	-	Jensen and Inouye, 1980
United States	6-10	2,000	Figure copying			105	Jensen, 1973
United States	6	80	Hunter Aptitude	106	97	106	Lesser, Fifer and Clark, 1965
United States - Koreans	6-14	112	various	107			Winick, Meyer and Harris, 1975
Canada-Calgary	15	122	Differential Aptitude	105	97	108	Vernon, 1982
Canada-Vancouver	6-8	38	WISC	100	94	107	Kline and Lee, 1972

People's Republic of China. The range is from 97 to 110, with a mean of around 106. The lowest figure is the mean of 97 obtained by Stevenson et al for Japanese 6 year olds. One explanation for this result is probably that Mongoloids tend to be late maturers. There is a good deal of evidence for this reviewed in Lynn (1987). It will be noted that the same investigators obtained a mean of 102 for Japanese 11 year olds. A further factor is that Stevenson obtained his American comparison sample from the city of Minneapolis in Minnesota and the mean Caucasoid IQ in Minnesota is 105 (Flynn, 1980, p. 107). This means that 5 IQ points should be added to all of Stevenson's Japanese means.

There is some dispute about the mean IQs of ethnic Mongoloids in the United States. Vernon (1982) reviewed the literature and concluded that the mean non-verbal IQ (general intelligence) was around 110 and the verbal IQ 97. These figures have been questioned by Flynn (1989) who maintains that the respective means are approximately 100 and 97. The best single study of American ethnic Mongoloids appears to be the Coleman et al (1966) report of five age groups spanning the years 6-16 from which Flynn's figures are derived. But there are problems with the Coleman study. One is that in this and other studies the category of Orientals may include Filipinos, whose mean IQ is about 85 (Flynn, 1991) and who therefore pull down the mean of ethnic Chinese and Japanese. Filipinos constitute about 20 per cent of American Orientals and if these are taken out of the Coleman sample the remainder who are largely ethnic Chinese and Japanese obtain a mean non-verbal IQ of 103 and a mean verbal IQ of 98.

A further problem in the Coleman data concerns the nature of the tests of "non verbal ability". Coleman himself is careful to state that the non verbal tests used in his study were not measures of intelligence. The tests were of math ability largely set out in verbal format and this will have given the tests a verbal bias and handicapped Orientals (Coleman 1990). Probably the Coleman non verbal ability tests should not be considered as good measures of general intelligence or Spearman's g. The weaknesses of the American studies of

Table 3: Mean IQs of various Negroid populations

Negroids				Intelligence			
Sample	Age	Number	Test	General	Verbal	Visuo-spatial	Source
Congo	adults	320	Progressive Matrices	65			Ombredane, Robaye and Robaye, 1952
Ghana	adults	225	Culture Fair	80			Buj, 1981
Nigeria	6-13	87	Colored Matrices, PMA	75	-	81	Fahrmeier, 1975
Nigeria	adults		Progressive Matrices	86			Weber, 1969
South Africa	8-16	1,220	Progressive Matrices	81			Notcutt, 1950
South Africa	adults	703	Progressive Matrices	75			Notcutt, 1950
South Africa	10-14	293	Army Beta	65			Fick, 1929
South Africa	9	350	Progressive Matrices	67			Lynn and Holmshaw, 1991
South Africa	16	1,093	Junior Aptitude	69	60	69	Owen, 1989
Uganda	12	50	Various	80			Vernon, 1969
Zambia	adults	1,011	Progressive Matrices	75			Pons, 1974; Crawford Nutt, 1976

ethnic Orientals is that hardly any of them provide a good measure of visuospatial abilities or of Spearman's g.

If Flynn should prove to be correct it would appear that the mean IQ of American ethnic Orientals is a little below that of Mongoloids in the countries of the Pacific rim. The explanation for this may be that the early Chinese and Japanese immigrants from whom the majority of ethnic Orientals are derived may have been below the average intelligence levels of their parent populations in Asia. The early immigrants came largely as laborers to build the railways and do other unskilled work developing the infrastructure of the west coast. This not particularly desirable work may have attracted those of less than average ability. If this is so, the high educational and occupational achievements of ethnic Orientals in the United States may be due to high work motivation rather than high intelligence levels.

A striking feature of the results for Mongoloids is that their verbal IQs are consistently lower than their visuospatial IQs. In most studies the differences are substantial amounting to between 10 to 15 IQ points. This pattern is present in Japan, Hong Kong, the United States and Canada. It has also been found among ethnic Japanese in Hawaii although these data are not presented in a form from which mean IQs can be calculated (Nagoshi and Johnson, 1987).

This difference is also picked up in the United States in performance on the Scholastic Aptitude Test (SAT), on which ethnic Orientals invariably do better than Caucasians on the mathematics test (largely a measure of general intelligence and visuospatial ability) but less well than Caucasians on the verbal test (Wainer, 1988). A further manifestation of the strong visuospatial and weak verbal abilities of ethnic Oriental Americans lies in their tendency to do well in professions like science, architecture and engineering which call for strong visuospatial abilities and poorly in law which calls for strong verbal abilities. This pattern of occupational achievement has been well documented by Weyl (1969, 1989) in his studies of the achievements of the major American ethnic populations. His method involves the analysis of the frequencies of ethnic

Table 4: Mean IQs of various Negroid-Caucasoid hybrid populations

Negroid-Caucasoid Hybrids

Sample	Age	Number	Test	Intelligence			Source
				General	Verbal	Visuo-spatial	
United States	-	-	362 Studies	85			Shuey, 1966
United States	4	4,550	Stanford Binet	87			Broman, Nichols and Kennedy, 1975
United States	2	46	Stanford Binet	86			Montie and Fagan, 1988
United States	6-11	4115	Verbal and non-verbal	84	89		Coleman et al, 1966
United States	6	111	WISC	81	86	80	Miele, 1979
United States	6-16	305	WISC-R	84	87	88	Jensen and Reynolds, 1982
United States	7-14	642	PMA	77	77	83	Baughman and Dahlstrom, 1968
United States	6-11	2,518	Various	84			Jensen and Inouye, 1980
S Africa coloureds	10-14	4,721	Army Beta	84			Fick, 1929
Barbados	9-15	108	WISC-R	82	84	84	Galler, Ramsey and Forde, 1986
Britain	11	113	NFER	86	87		Mackintosh and Mascie-Taylor, 1985
Britain	10	125	British Ability Scales	94	92		Mackintosh and Mascie-Taylor, 1985
Britain	8-12	205	NFER	87			Scarr, Caparulo, Bernardo, Tower and Caplan, 1983
Jamaica	10-11	50	various	75	82	90	Vernon, 1969
Jamaica	11	1,730	Moray House	72	72		Manley, 1963; Vernon, 1969
Jamaica	5-12	71	WISC	66	74	64	Hertzig, Birch, Richardson and Tizard, 1972

names among those who have achieved occupational distinction calculated in relation to their frequencies in the general population. Thus he finds that common Chinese names like Wong are greatly overrepresented in *American Men and Women of Science*, as compared with their frequency in the general population, but under represented in *Who's Who in American Law*. On the basis of this method he constructs a performance co-efficient for which average achievement is 100. A co-efficient of 200 means that an ethnic group appears twice as frequently in reference works of occupational distinction as would be expected from its numbers in the total population, while a co-efficient of 50 means that it appears half as often. In his first study he finds that ethnic Chinese obtained performance co-efficients of 506 in architecture, 303 in engineering and 438 in science but only 54 in law (Weyl, 1969). His second study on later data confirms this pattern for the 1980s, when ethnic Chinese obtained a performance co-efficient for science of 620, while for law their performance co-efficient was only 24.

It is easy to understand how this remarkable disparity arises. Adolescents typically discover that they tend to be good at some things and poor at others. There is a natural tendency for young people to concentrate on those activities they are good at, be they sciences, languages, arts, music, sport or whatever, and to make their careers in them. The reason that different people are good at different things depends partly on genetic and partly on environmental differences. The widespread appearance of the strong visuospatial – weak verbal ability pattern among Mongoloids in so many diverse geographical locations suggests that it has a genetic basis and that this is responsible for their striking over-achievement in the sciences and architecture and under-achievement in law.

Negroids

The mean IQs of Negroids have invariably been found to be substantially lower than those of Caucasoids. Many studies have been done in the United States and by the mid-1960's Shuey (1966) was able to present a summary of 362 investiga-

Table 5: Mean IQs of Amerindians

Amerindians

Sample	Age	Number	Test	Intelligence: General	Verbal	Visuo-spatial	Source
United States	6-17	4,994	verbal & non-verbal	94	89		Coleman et al, 1966
Navajo	5-8	44	WISC	79	65	93	Thurber, 1976
Navajo	4-5	27	WPPSI	75	64	91	Cundick, 1970
Navajo	6-7	26	WISC	78	66	96	Cundick, 1970
Navajo	16-17	100	WAIS	89	84	95	Howell, Evans & Downing, 1958
Navajo	-	44	WISC-R	78	64	95	Teeter, Moore & Peterson, 1982
Oneidas	7-14	82	WISC	91	86	97	Turner & Penford, 1952
Canadian Indians	-	236	WISC-R	97	90	105	Crawley in McShane & Plas, 1984
Ojibwa, Canada	-	35	WISC-R	97	91	104	McShane & Plas, 1984
Ojibwa & Crees, Canada	6-7	33	WISC	86	70	101	St John, Krichev & Bauman, 1976
"	9-10	31	WISC	90	81	100	" " "
"	14-15	36	WISC	89	78	101	" " "
"	16-20	60	WAIS	87	91	103	" " "
Dakota Indians	6-16	200	WISC-R	95	86	102	Browne, 1984
Papago	6-16	240	WISC-R	86	75	96	Reschly & Jipson, 1976

tions. The overall mean IQ of American Negroids was approximately 85. Subsequent studies in the United States such as those of Coleman (1966), Broman, Nichols and Kennedy (1975) and others have confirmed that this is about the right figure.

As a result of these studies it is sometimes assumed that the mean IQ of all Negroids is approximately 85 or 1 standard deviation below that of Caucasoids. However, it has to be noted that almost all American Negroids are Negroid-Caucasoid hybrids (Reed, 1989) and the same is probably true of most Negroids in the West Indies and Britain. To obtain mean IQs of pure Negroids it is necessary to take samples in Africa. For this reason mean IQs for pure African Negroids are listed separately in Table 3 from Negroid-Caucasoid hybrids in the United States, Britain, the West Indies and South Africa.

The first good study of the intelligence of pure African Negroids was carried out in South Africa by Fick (1929). He used the American Army Beta Test, a non verbal test devised in the United States in the First World War for testing recruits who could not speak English, and administered it to 10-14 year old Caucasoid, Negroid and Colored (Negroid-Caucasoid hybrids) school children. In relation to the Caucasoid mean of 100, based on more than 10,000 children, largely urban pure Negroid children obtained a mean IQ of 65, while urban Colored children obtained a mean IQ of 84. It is interesting to note that these South African Coloreds or Negroid-Caucasoid hybrids obtained a mean IQ virtually identical to that of American Caucasoid-Negroid hybrids.

The other studies of the IQs of pure Negroids summarized in Table 3 show means in the range 65-81. Vernon tested his small sample in Kampala with a number of tests and the overall mean was about 80, but this sample was drawn from an academic secondary school and the result suggests that the mean for the population would be around 70. The best single study of the Negroid intelligence is probably that of Owen (1989), who presents results for 1093 16 year olds in the eighth grade who had been in school for around 8 years and should have been well versed in paper and pencil tests. The test used

Table 6: Mean IQs of various south East Asian populations

South East Asians

Sample	Age	Number	Test	Intelligence			Source
				General	Verbal	Visuo-spatial	
Australia - Aborigines	5-13	83	Peabody Picture Vocabulary	-	80	-	Bruce, Hengeveld & Radford, 1971
Australia - Aborigines	3-4	22	Peabody Picture Vocabulary	-	67		Nurcombe and Moffit, 1970
Australia - Aborigines	9	1,000	Queensland	85	-	-	McElwain and Kearney, 1973
New Zealand - Maoris	13	131	Primary Mental Abilities	93	95	87	Walters, 1958
New Zealand - Maoris	8	151	Progressive Achievement/PM	92	91	-	Harker, 1978
New Zealand - Maoris	8-14	303	Queensland	90			St George, 1983
New Zealand - Polynesians	8-9	71	Progressive Achievement	-	87		Beck and St George, 1983
Carolines Micronesians	12-18	400	Culture Fair	88			Jordheim and Olsen, 1963
Singapore-Malays	**14**	**190**	**Progressive Matrices**	**96**			**Lynn, 1977b**

was the South African Junior Aptitude which is well constructed and standardized and provides measures of verbal and non verbal reasoning, spatial ability, verbal comprehension, perceptual speed and memory. The mean IQ of the sample in comparison with Caucasoid South African norms is 69. It is also around the median of the studies listed in Table 3. It is proposed therefore to round this figure up to 70 and take this as the approximate mean for pure Negroids.

Negroid-Caucasoid Hybrids

As noted, virtually all American Negroids are hybrids with some Caucasoid ancestry. The same is probably the case with West Indian and British Negroids. Although this has never been documented, West Indian Negroids lived as slaves on white owned plantations from the 17th to the 19th century in similar conditions to those of Negroids in the United States. There was undoubtedly a certain amount of interbreeding between white estate owners and Negroid slaves, which gave rise to a number of Negroid-Caucasoid hybrids whose existence as a considerable class was noted by Anthony Trollope in his *Tour of the West Indies*.

The results for Negroid-Caucasoid hybrids are shown in Table 4. For the United States, seven major post Shuey (1966) studies are listed because of their special interest by virtue of the large number of subjects, because they yield IQs for the verbal and visuospatial abilities, or because they are derived from young children. These show that the Negroid mean IQ of approximately 85 is present among children as young as 2-6 year olds.

In Britain the three major studies of Negroids obtained mean IQs of 86, 94 and 87, broadly similar to those in the United States. Figures are available for two of the Caribbean islands, namely Barbados (mean IQ = 82) and Jamaica (mean IQ = 66-75).

The Negroid-Caucasoid differences appear to be of about the same magnitude for general intelligence and the verbal and visuospatial abilities. Detailed studies by Jensen and his colleagues have shown that when samples are carefully

Table 7
Means for Progressive Matrices and 12 reaction time measures for 9 year old children from five countries (in milliseconds).

	Hong Kong	Japan	Britain	Ireland	South Africa	SD	r
Number	118	444	239	317	350		
Progressive Matrices IQ	113	110	100	89	67		
Decision time							
simple	361	348	371	388	400	64	-94**
complex	423	433	480	485	501	67	-89*
omo	787	818	898	902	991	187	-96**
Movement time							
simple	273	218	236	260	236	72	13
complex	267	227	261	280	236	66	13
omo	323	268	297	307	256	96	56
Decision time variabilities							
simple	99	103	90	121	129	32	-83*
complex	114	138	110	141	155	30	-73
omo	269	298	285	328	332	95	-85*
Movement time variabilities							
simple	68	63	52	73	69	30	-33
complex	65	66	56	80	70	25	-42
omo	136	127	110	129	119	49	40

One and two asterisks denote statistical significance at the 5 and 1 per cent level, respectively.

matched the Negroid-Caucasoid differences are greatest for general intelligence (Spearman's g) and for the visuospatial abilities and less for verbal ability (Jensen and Reynolds, 1982; Reynolds and Jensen, 1983; Naglieri and Jensen, 1987). Nevertheless, the broad picture, taking the results as a whole, is that the three abilities are of approximately equal magnitude. This also appears to be the case in South Africa according to the results of Owen.

Amerindians

The results of studies of the intelligence of Amerindians are summarized in Table 5. The mean general IQs have invariably been found to be somewhat below that of Caucasoids. The largest study is that of Coleman et al (1966) which obtained a mean of 94, but a number of studies have reported means in the 70-90 range. The median of the 15 studies listed is 89 which can be taken as a reasonable approximation, indicating that the Amerindian mean IQ falls someway between that of Caucasoids and Negroid-Caucasoid hybrids. The same intermediate position is occupied by Amerindians in performance on the Scholastic Aptitude Test (Wainer, 1988).

In addition, all the studies of Amerindians have found that they have higher visuospatial than verbal IQs. The studies listed are those where the Amerindians speak English as their first language, so this pattern of results is unlikely to be solely due to the difficulty of taking the verbal tests in an unfamiliar language. The verbal-visuospatial disparity is also picked up in the Scholastic Aptitude Test, where Amerindians invariably score higher on the mathematical test than on the verbal (Wainer, 1988).

The strong visuospatial-weak verbal pattern of abilities in the Amerindians resembles that of the Mongoloids, although in the Mongoloids the whole ability profile is shifted upwards by some 10-15 IQ points. This similarity is not altogether surprising in view of the close genetic relationship of the two races, Amerindians being an offshoot of the Mongoloids who crossed the Bering Straits from north east Siberia into Alaska at some time in prehistory. The similarity of the cognitive

profile of the two races suggests that this profile was present in the common stock from which both contemporary races are derived, and that some factor raised the intelligence levels in the Mongoloids following the geographical differentiation of the two races.

South East Asians

The South East Asian races comprise Polynesians, Micronesians, Melanesians, Maoris and Australian Aborigines. The results of intelligence test studies of these subraces are shown in Table 6. Apart from the low mean of 67 for a small sample of Australian Aborigine children, all the mean Iqs lie in the range of 80-95. The one study to include measures of general, verbal and visuospatial abilities for New Zealand Maoris shows that this group does not share the strong visuospatial-weak verbal ability profile of Mongoloids and Amerindians. Although the intelligence of this group of peoples has not been extensively researched there are sufficient studies to suggest a mean IQ of about 90.

Racial Differences in Reaction Times

It has often been argued that the racial differences in intelligence test performance may be due to the tests being biased or to a variety of environmental factors such as differences in education, experience of dealing with visual representations, motivation, attitudes towards test taking and nutrition. The alternative theory is that these differences have a genetic basis. In order to test for which of these different explanations is correct, a study has been carried out to determine whether the racial differences in intelligence are also present in reaction times. The rationale of the study is that reaction times provide a measure of the brain's neurological efficiency in dealing with very simple tasks and are unaffected by education, motivation and other environmental factors with the possible exception of extreme malnutrition.

It has been shown in a number of studies that reaction times are positively associated with intelligence, and the explanation widely accepted for this association is that reaction times

provide a measure of the neurological efficiency of the brain in analysis and decision making (Jensen, 1982; Eysenck, 1982). Hence if there are racial differences in reaction times of the same kind as those present in intelligence test performance, it can be inferred that these differences lie at the neurological level and probably reflect genetic differences.

Reaction times consist of the speed with which a subject reacts to simple stimuli. Normally a light comes on and the subject has to press a button to turn it off. Reaction time tasks can be varied to present different degrees of difficulty. In the present study three reaction time tasks were used of different degrees of difficulty. In the simplest task a single light comes on and the subject moves his hand to switch it off. This response normally takes around half a second. In more complex situations, one of several lights comes on and has to be switched off. These are known as choice reaction times and take a little longer. In a still more complex task, three lights come on of which two are close together and one stands apart. Here the subject has to judge which is the light that stands apart and switch it off. This is known as the odd man out task. It is more difficult than the simpler reaction time tasks and typically takes about twice as long.

All three reaction time tasks were used in the present study. In addition, the apparatus used in the investigation was designed to measure two separate processes in reaction time tasks known as movement times and decision times. In these tasks the subject has to make a decision about what to do (decision times) and then execute the decision by moving the finger to switch off the light (movement times). Both these times were recorded automatically on disks by a microcomputer.

The subjects used in the study consisted of 9 year old children representative of the three major races of Mongoloids, Caucasoids and Negroids. The Mongoloids were obtained from Hong Kong and Japan, the Caucasoids from Britain and Ireland and the Negroids from South Africa. All the children were drawn as socially representative samples from typical public primary schools in their respective countries with the

exception of the Irish children who came from rural areas and whose mean IQ was rather lower than would otherwise have been expected.

In all the five samples decision times, movement times and variabilities were negatively correlated with intelligence. Further details of the reaction time apparatus, testing procedures and analyses of the relationship between the reaction time measures and intelligence for the samples are given in Shigehisa and Lynn (1991), Chan, Eysenck and Lynn (1991) and Lynn and Holmshaw (1991).

Summary statistics for the five samples giving the numbers tested, mean IQs, means for the 12 reaction time measures and standard deviations for the entire sample are shown in Table 7. The last column of the table gives product moment correlations between the Progressive Matrices and the 12 reaction time measures. It will be seen that the Hong Kong and Japanese children obtained the highest mean IQs, fastest decision times and low decision time variabilities, the British and Irish children were intermediate, while the South African Negroids obtained the lowest means on the Progressive Matrices, slowest decision times and highest variabilities. All the correlations are high and five of the six are statistically significant.

The movement times of the five populations do not show any consistent overall relationship with Progressive Matrices scores. It is however interesting to note that the Negroid children tend to have fast movement times. In the complex and odd man out tasks their movement times are significantly faster than those of British, Irish and Chinese children.

It is known that the speed of reaction times is genetically determined to a significant extent. This has been shown by Vernon (1989) in a study of 50 identical and 52 non-identical twins, which produced a heritability coefficient of .51 for reaction times. Somewhat similar results have been reported by Ho, Baker and Decker (1988) for two other speed of information processing tasks which gave heritability coefficients of .47 and .24. These authors have also shown that the positive correlation between measures of speed of information process-

ing and intelligence arises from common genetic processes suggesting that common genetically controlled neurological mechanisms are involved in the performance of both types of task.

It is therefore considered that the most reasonable interpretation of the Mongoloid-Caucasoid-Negroid results is that these reflect genetic differences between the three racial groups. It is not considered likely that educational differences could be involved because of the extreme simplicity of the tasks. Motivational differences are improbable, because reaction times seem unaffected by motivation (Jensen, 1982). It might be thought that nutritional differences might be involved.

However, the fact that the Negroid children performed faster than the Caucasoid on movement times makes it unlikely that poor nutrition could have reduced neural conduction rates. We are therefore left with genetically determined differences in information processing capacities as the most probable explanation of the Mongoloid-Caucasoid-Negroid differences in decision times.

Contributions to Civilization

A third source of evidence on racial differences in intelligence lies in the degree to which the various races have made significant intellectual, scientific and technological discoveries and inventions. The argument is that these advances are likely to be made by a few outstanding and highly intelligent individuals. There will be more of these in a population where the average level of intelligence is high, and hence the intelligence levels of populations and whole races can be inferred from their intellectual achievements.

The first writer to advance this argument was Galton (1869) but he limited his analysis to the Greeks of the classical period, England and Scotland, the Negroids and the Australian Aborigines. His conclusion was that the Greeks produced the greatest number of intellectual advances and could therefore be considered the most intelligent population. He placed the Scots marginally above the English, and a long way below these he placed the Negroids and the Aborigines.

Galton's treatment of the problem was sketchy, but it provided the initial idea on which others were to build. The most extensive analysis of this kind was carried out by Baker (1974). He first set up twenty one criteria by which the achievements of early civilizations could be judged. These were as follows:

1. In the ordinary circumstances of life in public places, they cover the greater part of the trunk with clothes.
2. They keep the body clean and take care to dispose of its waste products.
3. They do not practice severe mutilation or deformation of the body, except for medical reasons.
4. They have knowledge of building in brick or stone, if the necessary materials are available in their territory.
5. Many of them live in towns or cities, which are linked by roads.
6. They cultivate food-plants.
7. They domesticate animals and use some of the larger ones for transport (or have in the past so used them), if suitable species are available.
8. They have knowledge of the use of metals, if these are available.
9. They use wheels.
10. They exchange property by the use of money.
11. They order their society by a system of laws, which are enforced in such a way that they ordinarily go about their various concerns in times of peace without danger of attack or arbitrary arrest.
12. They permit accused persons to defend themselves and to bring witnesses for their defence.
13. They do not use torture to extract information or for punishment.
14. They do not practice cannibalism.
15. Their religious systems include ethical elements and are not purely or grossly superstitious.
16. They use a script (not simply a succession of pictures) to communicate ideas.
17. There is some facility in the abstract use of numbers,

without consideration of actual objects (or in other words, at least a start has been made in mathematics).
18. A calendar is in use, accurate to within a few days in the year.
19. Arrangements are made for the instruction or the young in intellectual subjects.
20. There is some appreciation of the fine arts.
21. Knowledge and understanding are valued as ends in themselves.

Having set up these criteria, Baker proceeded to analyze the historical record of the races to ascertain which have originated civilizations. His conclusion was that the Caucasoid peoples developed all 21 components of civilization in four independent locations. These were the Sumerian in the valley of the Tigris and the Euphrates, the Cretian, the Indus Valley, and the ancient Egyptian. The Mongoloids also developed a full civilization in the Sinic civilization in China. The Amerindians achieved about half of the 21 components in the Maya society of Guatemala, a little less in the Inca and Aztec societies, but these peoples never invented a written script, the wheel (except possibly in children's toys), the principle of the arch in their architecture, metal working, or money for the exchange of goods. The Negroids and the Australian aborigines achieved virtually none of the criteria of civilization.

While Baker confined his analysis to the achievements of the races in originating civilizations, there can be little doubt that the same race differences appear in the historically later development of more advanced cultures. During the last 2,000 years the many discoveries that constitute developed peoples have been made only by the Caucasoid and Mongoloid peoples. For the first sixteen hundred or so years of this period a case can be made out that the Mongoloid civilization in China was marginally ahead. The Han period of around 200-100 BC saw the introduction of written examinations for candidates for the mandarin civil service, an idea which was considered an advance when it was introduced into Britain some 2,000 years later (Bowman, 1989). Printing was invented

in China by about 800, some 600 years before it was developed in Germany. When Marco Polo visited China about the year 1300 he was amazed at the quality of civilization in the numerous prosperous cities and particularly at the use of paper money, a concept not introduced into the general use in Europe until the nineteenth and twentieth centuries. The Chinese discovered gunpowder about the year 1050 and developed the technology for using it for guns and not only, as popularly supposed, for fireworks. They were the first to invent the principle of the magnetic compass. Their technology for the manufacture of high quality porcelain was well ahead of anything in Europe until the late eighteenth century. Details of these and many other Chinese scientific and technological achievements are given in Needham (1954).

During the last five centuries the Caucasoid peoples of Europe and latterly of North America have pulled ahead of the Mongoloids in science and technology. This is probably because China has been run as a single bureaucratic empire in which innovation has been discouraged first under the emperors and more recently under the communists while Japan was isolated from outside influences until relatively recently. Europe, in contrast, has been divided into numerous states, many of which afforded a high degree of personal freedom of thought, expression and technological innovation, and between which there was open communication. Nevertheless, although the Europeans have generally been ahead of the Mongoloids during the last five centuries, since 1950 the Japanese have provided a strong challenge and have surpassed the West in the production of a number of high quality technological goods.

A useful source for evaluating the contributions of the human races to scientific and technological achievements is available in Asimov's (1989) *Chronology of Science and Discovery*. This lists approximately 1,500 of the most important scientific and technological discoveries and inventions which have ever been made. The first three are bipedality, the manufacture of stone tools and the use of fire which antedate the evolution of the races. Thereafter every single invention and discovery was

made by the Caucasian or Mongoloid peoples. This compilation confirms the historical record. Who can doubt that the Caucasoids and the Mongoloids are the only two races that have made any significant contribution to civilization.

Conclusion

The studies of racial differences in intelligence test results, reaction times and scientific and technological discoveries show a high degree of consistency. All three sources of evidence indicate that the two races with the highest intelligence levels are the Mongoloids and the Caucasoids. These are followed by the Amerindians, while the south east Asian races and the Negroids are ranked lowest. The intelligence test results and the reaction times tend to indicate that average Mongoloid intelligence levels are a little higher than those of Caucasoids, but the difference is relatively small as compared with other racial differences.

The general consistency of the results from the three sources of evidence, and the consistency of the different intellectual achievements of the races over a long historical period, points to a substantial genetic determination for these differences. If genetic factors were not involved, there would have been much greater variation over time and place and the observed consistencies would not be present. Whatever criteria are adopted, the Caucasoids and the Mongoloids are the two most intelligent races and the historical record shows that this has been the case for approximately the last 5,000 years.

The environmentalist may argue that the Negroid peoples in Africa, the Caribbean, the United States and Britain, and the Amerindians, Maoris and Australian aborigines, all live in socially and economically impoverished conditions, as compared with Caucasoids and Mongoloids, and that these conditions are responsible for some or perhaps all of their low intelligence. This argument can be met by the concept of genotype-environment correlation, originally proposed by Plomin, De Fries and Loehlin (1977) and developed by Scarr and McCartney (1983).

There are two processes of genotype-environment correla-

tion which are relevant to the present problem. The first is "passive" and has the effect that children tend to be reared in environments which are correlated with their own genetic potentialities. The principle applies for any trait which has a heritability, and this is undoubtably true of intelligence, and in the case of intelligence means that intelligent parents transmit the characteristic genetically through their genes and environmentally through the advantageous environment which they provide for their children. The two modes of transmission have the effect that intelligent children tend to be reared in intelligence-enhancing environments. This brings the genotypes and the advantageous environments into positive correlation and implies that those reared in advantageous environments tend to have superior genotypes. This applies, for instance, to middle class children as compared with working class children, and can also, arguably, be applied to Caucasoid and Mongoloid children as contrasted with those of other races.

There is a second "active" type of genotype-environment correlation which states that people play an active role in creating their own environments. Genotypically intelligent peoples are able to create a socially and economically affluent environment to an extent which cannot be done by less intelligent peoples. Scarr and McCartney call this "niche building", and the two peoples who have been successful in building socially and economically developed niches in which to live and rear their children have been the Caucasoids and the Mongoloids.

The argument frequently advanced that poor social and economic conditions are responsible for the lower intelligence of the Negroids, Aborigines and Amerindians places the cart before the horse. It assumes that the impoverished environments of these peoples are simply the result of external circumstances over which these peoples themselves have no control. Such a claim does not stand up to examination. There are so many cases which it cannot explain, such as the achievements of Chinese, Japanese, Korean and Vietnamese immigrants in the United States and of Indians in Britain and

Africa. The only plausible explanation for why these peoples have succeeded where others, initially more advantageously placed, have failed is that they have the right genotypes for building socially and economically prosperous environments for themselves and their families.

Appendix: Notes on the Calculation of IQs

One of the principal problems in the calculation of the mean IQs for the various racial populations concerns the date at which the data were collected. Mean IQs in the economically advanced nations have been increasing during the last half century (Lynn and Hampson, 1986; Flynn, 1987). This poses the problem of whether an adjustment should be made for this increase in studies where a test standardized in the United States, Britain, Australia or New Zealand has been administered some years later to another population. The adjustment involves making an addition to the American, British or Australasian means to allow for the time interval between the two test administrations. The effect is generally to increase Caucasoid IQs in relation to those of other peoples. The increases are however quite small and do not remove the higher means obtained by Mongoloid populations, as shown in Lynn (1987).

For the present paper it was decided not to make such adjustments on two grounds. Firstly, the rates of secular increase of intelligence vary widely from about 1 to 6 IQ points per decade in studies of different age groups and different tests. It is therefore impossible to obtain any precise estimate of what adjustment would be appropriate for many of the tests. Secondly, the great majority of the studies employ tests initially standardized in the United States, Britain, Australia or New Zealand. These countries have high standards of living in relation to other populations and therefore enjoy some environmental advantage for the development of intelligence. This advantage is to some degree counterbalanced by the earlier administration of the tests. The decision was therefore made not to adjust the results for other populations

for the time differential between the two test administrations but to report the mean IQs as originally published. However, tests given to racial groups in the same country as the standardization samples have been reduced to allow for the secular increase in the mean IQ of the base population. This correction applies to the Kline and Lee (1972) Canadian Chinese sample, whose mean IQs are reduced by 7 IQ points to allow for the secular increase of intelligence 1947-1970; and to the Belgian Korean sample whose IQs are reduced by 10 points to allow for a secular increase of intelligence in Belgium 1954-1983.

Figures for general intelligence are derived either from non-verbal reasoning tests such as the Progressive Matrices and the Culture Fair, or from full scale Wechsler IQs. In some studies only verbal and performance Wechsler IQs are reported and where this is the case these have been averaged to give an approximate figure for the full scale IQ. Where means for Wechsler subtests are reported, the verbal IQs are calculated from Vocabulary, Information, Comprehension, Similarities and Arithmetic, and Visuospatial IQs from Block Design, Object Assembly, Picture Arrangement, Picture Completion and Mazes. The reason for this is that factor analysis has shown that these are the best measures of the two abilities (Jensen and Reynolds, 1982). In the case of non- American standardizations of the Wechslers, IQs are calculated from the WISC tests by reading the means off the standardization tables and converting to American IQs. Buj's IQs are given in relation to a British mean of 100.

REFERENCES

Asimov, I.
1989 *Chronology of Science and Discovery* London: Grafton Books
Baker, J.R.
1974 *Race* Oxford: Oxford University Press.
Baughman, E.E. and Dahlstrom, W.G.
1988 *Negro and White Children* New York, Academic Press.
Beck, L.R. and St. George, R.
1983 The alleged cultural bias of the PAT: Reading Comprehension and Reading Vocabulary Tests. *New Zealand Journal of Educational*

Studies, 18, 32-47.

Berte, R.
1961 *Essai d'adaptation de l'echelle d'intelligence pour enfants de D. Wechsler à des écoliers belges d'expression française*, Brussels, Centre Nationale de Researches de Psychotechnique Scolaire.

Borjas, G. J.
1986 The self-employment experience of immigrants. *Journal of Human Resources*. 21, 485-506.

Bourdier, G.
1964 Utilisation et nouvel etallonage du P.M. 47 *Bulletin de Psychologie*, 235, 39-41.

Bowman, M.L.
1989 Testing individual differences in ancient China. *American Psychologist*. 44, 576-578.

Brandt, I.
1978 Growth dynamics of low birth weight infants with emphasis on the perinatal period. In: *Human Growth* vol. 2 ed. F. Falkner and J.M. Tanner, pp. 557-617. New York: Plenum Press.

Broman, S.H., Nichols, P.L. and Kennedy W. A
1975 Preschool IQ. New York: J. Wiley.

Broman, S, Nichols, P.L. Shaughnessy, P. and Kennedy W.
1987 *Retardation in Young Children*. Hillsdale, New Jersey: Lawrence Erlbaum.

Bruce, D.W., Hengeveld, M. and Radford, W.C.
1971 *Some cognitive skills in Aboriginal children in Victorian primary schools*. Victoria, Australian Council for Educational Research.

Burt, C.
1949 The structure of the mind: a review of the results of factor analysis. *British Journal of Educational Psychology*. 19, 110-111.

Buj, V.
1981 Average IQ values in various European countries. *Personality and Individual Differences*, 2, 168-169.

Cattell, R. B.
1971 *Abilities*. Boston: Houghton Mifflin.

Centre de Psychologie Appliquée
1957 *Manual of the Wechsler Intelligence Scale for children*. Paris, Centre de Psychologie Appliquée

Coleman, J.S.
1990 Personal communication

Coleman, J.S. et al
1966 *Equality of Educational Opportunity* Washington, D.C., U.S. Office of Education.

Cundick, B.P.
1970 Measures of intelligence of southwest Indian students. *Journal of Social Psychology* 81, 151-156.

Du Chateau, P.
1967 Ten point gap in Maori aptitudes. *National Education*. 49, 157-158.
Eysenck, H.J.
1971 *Race, intelligence and education*. London: Temple Smith.
Eysenck, H.J.
1982 *A Model for Intelligence*. Bolin: Springer-Verlag.
Fahrmeier, E.D.
1975 The effect of school attendance on intellectual development in Northern Nigeria. *Child Development*, 46, 281-285.
Fick, M.L.
1929 Intelligence test results of poor white, native (Zulu), colored and Indian school children and the educational and social implications *South African Journal of Science*. 26, 904-920.
Firkowska, A., Ostrowska, A., Sokolowska, M., Stein, Z.,
Susser, M. and Wald, I.
1978 Cognitive development and social policy *Science*. 200, 1357-1362.
Fitzgerald, J.A. and Ludeman, W.W.
1926 The intelligence of Indian children. *Journal of Comparative Psychology*, 6, 319-328.
Flynn, J.R.
1980 *Race IQ and Jensen*. London: Routledge and Kegan Paul.
1987 Massive IQ gains in 14 nations: what IQ tests really measure. *Psychological Bulletin*. 101, 271-293.
1989 Rushton, evolution and race: an essay on intelligence and virtue. *The Psychologist*, 2, 363-366.
Frydman, M. and Lynn, R.
1989 The intelligence of Korean children adopted in Belgium. *Personality and individual Differences*, 10, 1323-1326.
Galler, J.R., Ramsey, F. and Forde, V.
1986 A follow up study in the influence of early malnutrition on subsequent development. *Nutrition and Behavior*. 3, 211-222.
Galton, F.
1869 *Hereditary Genius*. London: Macmillan.
Goodenough, F.L.
1926 Racial differences in the intelligence of school children. *Journal of Experimental Psychology*. 9, 388-397.
Goosens, G.
1952 Une application du test d'intelligence de R.B. Cattell. *Revue Belge de Psychologie et de Pédagogie*. 19, 115-124.
Gould, S.J.
1981 *The Mismeasure of Man*. New York, Norton.
Harker, R.K.
1978 Achievement and ethnicity: environmental deprivation or cultural difference. *New Zealand Journal of Educational Studies*, 13, 107-124.

Hertzig, M.E., Birch, H.G., Richardson, S.A. and Tizard, J.
1972 Intellectual levels of school children severely malnourished during the first two years of life. *Pediatrics*, 49, 814-824.

Hodgkiss, J.
1979 *British Manual for the Differential Attitude Tests Windsor*. Windsor. National Foundation for Educational Research.

Ho, H-Z, Baker, L.A. and Decker, S.N.
1988 Covariation between intelligence and speed of cognitive processing: genetic and environmental influences. *Behavior Genetics*. 18, 247-261.

Howell, R.J., Evans, L. and Downing, L.N.
1958 A comparison of test scores from the 16-17 year age group of Navajo Indians with standardisation norms from the WAIS. *Journal of Social Psychology*. 47, 355-359.

Jaynes, G.D. and Williams, R.M.
1989 *A Common Destiny: Blacks and American Society* Washington DC. National Research Council.

Jensen, A.R.
1972 *Genetics and Education*. London. Methuen.
1973 *Educability and Group Differences* London. Methuen.
1982 Reaction time and psychometric g. In H.J. Eysenck (ed). *A Model for Intelligence* Berlin: Springer-Verlag.

Jensen, A. R. and Inouye, A.R.
1980 Level 1 and Level II abilities in Asian, white and black children. *Intelligence*. 4, 41-49.

Jensen, A.R. and Reynolds, C.R.
1982 Race, social class and ability patterns on the WISC-R. *Personality and Individual Differences*, 3, 423-438.

Jordheim, G.D. and Olsen, I.A.
1963 The use of a non-verbal test of intelligence in the trust territory of the Pacific. *American Anthropologist*, 65, 1122-1125.

Kline, C.L. and Lee, N.
1972 A transcultural study of dyslexia: analysis of language disabilities in 277 Chinese children simultaneously learning to read and write in English and in Chinese. *Journal of Social Education*, 6, 9-26.

Kurth, von E.
1969 Erhohung der Leistungsnormen bei den farbigen progressiven matrizen. *Zeitschrift fur Psychologie* 177, 85-90.

Lesser, G.S., Fifer, F. and Clark, H.
1965 Mental abilities of children from different social class and cultural groups. *Monographs of the Society for Research in Child Development*. 30.

Linn, M C. and Petersen, A.C.
1986 A meta analysis of gender differences in spatial ability: implications for mathematics and science achievement. In J.S. Hyde and

M.C. Linn (eds) *The Psychology of Gender*. Baltimore: Johns Hopkins University Press.

Lynn, R.

1977a The intelligence of the Japanese. *Bulletin of the British Psychological Society*,30, 69-72.

1977b The intelligence of the Chinese and Malays in Singapore. *The Mankind Quarterly*. 18, 125-128.

1987 The intelligence of the Mongoloids: a psychometric, evolutionary and neurological theory. *Personality and Individual Differences*. 8, 813-844.

1990 The role of nutrition in secular increases in intelligence. *Personality and Individual* Differences. 11, 273-285.

1991 Intelligence in China. *Social Behavior and Personality*, to appear.

Lynn, R., Chan, J. and Eysenck, H.J.

1991 Reaction times and intelligence in Chinese and British children. *Perceptual and Motor Skills*.

Lynn, R. and Hampson, S.

1986a Intellectual abilities of Japanese children: an assessment of 2 1/2-8 1/2 year olds derived from the McCarthy Scales of Children's Abilities *Intelligence*. 10, 41-58.

Lynn, R. and Hampson, S.

1986b Further evidence on the cognitive abilities of the Japanese: data from the WPPSI. *International Journal of Behavioral Development* 10, 23-36.

1986c The structure of Japanese abilities: an analysis in terms of the hierarchical model of intelligence *Current Psychological Research and Reviews*, 4, 309-322.

1986d The rise of national intelligence: evidence from Britain, Japan and the United States. *Personality and Individual Differences*, 7, 23-32.

Lynn, R., Hampson, S. and Bingham, R.

1987 Japanese, British and American adolescents compared for Spearman's g and for the verbal, numerical and visio-spatial abilities. *Psychologia*. 30, 137-144.

Lynn, R., Hampson, S.L. and Iwawaki, S.

1987 Abstract reasoning and spatial abilities among American, British and Japanese adolescents. *The Mankind Quarterly*. 27, 397-434.

Lynn, R. and Holmshaw, M.

1991 Black-white Differences in reaction times and intelligence. *Social Behavior and Personality*. (to appear)

Lynn, R., Pagliari, C. and Chan, J.

1988 Intelligence in Hong Kong measured for Spearman's g and the visuospatial and verbal primaries *Intelligence*. 12, 423-433.

Lynn, R. and Shigehisa, T.

1991 Reaction times and intelligence in British and Japanese children.

Journal of Biosocial Science. (to appear)

McIntyre, G. A.
1938 *The Standardization of Intelligence Tests in Australia*. Melbourne, University Press.

Mackintosh, N.J. and Mascie-Taylor, C.G.N.
1985 The IQ question. In *Education For All* (The Swann Report) Cmnd paper 4453. London: HMSO.

McShane, D.A. and Plas, J.M.
1984 The cognitive functioning of American Indian children: moving from the WISC to the WISC-R. *School Psychology Review*. 17, 39-51.

Manley, D.R.
1963 Mental ability in Jamaica. *Social and Economic Studies*, 12, 51-77.

Maqsud, M.
1980 Extraversion, neuroticism, intelligence and academic achievement in Northern Nigeria. *British Journal of Educational Psychology*. 50., 71-73.

Mercer, J.R.
1984 What is a racially and culturally discriminating test? In C.R. Reynolds and R.T. Brown (eds) *Perspectives on bias in mental testing* New York, Plenum.

Miele, F.
1979 Cultural bias in the WISC. *Intelligence*, 3, 149-164.

Montie, J.E. and Fagan, J.F.
1988 Racial differences in IQ: item analysis of the Stanford-Binet at 3 years. *Intelligence*, 12, 315-332.

Murdock, J. and Sullivan, L.R.
1923 A contribution to the study of mental and physical measurements in normal school children. *American Physical Education Review*, 28, 209-330.

Naglieri, J. and Jensen, A.R.
1987 Comparison of black-white differences on the WISC-R and the K-ABC: Spearman's hypothesis. *Intelligence*. 11, 21-43.

Nagoshi, C.T. and Johnson, R.C.
1987 Cognitive abilities profiles of Caucasian vs Japanese subjects in the Hawaii family study of cognition. *Personality and Individual Differences* 8, 581-583.

Needham, J.
1954 *Science and Civilisation in China*. Cambridge: Cambridge University Press.

Nieto-Alegre, S., Navarro, L., Santa Cruz, G. and Dominguez, A.
1987 Diferencices regionales en la medida de la inteligencia con el test M.P. *Revista de Psicologia General y Aplicado*, 22, 699-707.

Notcutt, B.
1950 The measurement of Zulu intelligence. *Journal of Social Research*. 1, 195-206.

Nurcombe, B. and Moffit, P.
1970 Cultural deprivation and language deficit. *Australian Psychologist*, 5, 249-259.
Ombredane, A., Robaye, F. and Robaye, E.
1952 Analyse des résultats d'une application experimentale du matrix 38 à 485 noirs Baluba. *Bulletin contre d'études et reserches psychotechniques*, 7, 235-255.
Owen, K.
1989 *Test and item bias: the suitability of the Junior Aptitude Test as a common test battery for white, Indian and black pupils in Standard 7*. Pretoria: Human Sciences Research Council.
Pons, A. L.
1974 Administration of tests outside the cultures of their origin. *26th Congress South African Psychological Association*.
Radcliffe, J.A. and Turner, F.E.
1969 *Manual for the Australian version of the WISC*. Hawthorn, Victoria: Australian Council for Educational Research.
Raven, J.
1981 *Manual for Raven's Progressive Matrices and Mill Hill Vocabulary Scales*. London, H.K. Lewis.
1986 *Manual for Raven's Progressive Matrices and Vocabulary Scales*. Research Supplement 3. London, H.K. Lewis.
Raven, J. and Court, J.H.
1989 *Manual for Raven's Progressive Matrices and Vocabulary Scales - Research Supplement No. 4*. London, H.K. Lewis.
Reddington, M.J., and Jackson, K.
1981 Raven's colored progressive matrices: a Queensland standardisation. *ACER Bulletin*. 30, 20-28.
Redmond, M. and Davies, F.R.J.
1940 *The Standardisation of Two Intelligence Tests*. Wellington, New Zealand Council for Educational Research.
Reed, T. E.
1969 Caucasian genes in American Negroes. *Science*. 165, 762-8.
Reschly, D.J. and Jipson, F.J.
1976 Ethnicity, geographical locale, age, sex and urban-rural residence as variables in the prevalence of mild retardation. *American Journal of Mental Deficiency*, 81, 154-161.
Reuning, H.
1988 Testing Bushmen in the Central Kalahari. In S.H. Irvine and J.W. Berry (eds) *Human Abilities in Cultural Context*. Cambridge, Cambridge University Press.
Reynolds, C.R. and Jensen, A.R.
1983 WISC-R subscale patterns of abilities of blacks and whites matched on full scale IQ. *Journal of Educational Psychology*. 75, 207-214.

Rodd, W.G.
1959 A cross cultural study of Taiwan's Schools. *Journal of Social Psychology*. 50, 3-36.
St. George, R.
1983 Some psychometric properties of the Queensland Test of Cognitive Abilities with New Zealand, European and Maori children. *New Zealand Journal of Psychology*. 12, 57-68.
St. John, J. Krichev, A. and Bauman, E.
1976 North Western Ontario Indian children and the WISC. *Psychology in the Schools*. 13, 407-411.
Scarr, S., Caparulo, B.K. Ferdman, B.M., Tower, R.B. and Caplan, J.
1983 Developmental status and school achievements of minority and non-minority children from birth to 18 years in a British Midlands town. *British Journal of Developmental Psychology*. 1, 31-48.
Scarr, S. and McCartney, K.
1983 How people make their own environments: a theory of genotype-environment effects. *Child Development* 54, 424-435.
Schmidtke, A., Schaller, S. and Becker, P.
1978 *Raven-Matrizen Test Manual Deutsche Bearbeilung Weinheim* Beltz Test Gesellschaft, Berlin.
Schreider, E.
1968 Quelques corrélations somatiques des tests mentaux. *Homo*. 19, 38-43.
Scottish Council for Research in Education
1933 *The Intelligence of Scottish Children*. London: London University Press.
1939 *The Intelligence of a Representative Group of Scottish children*. London: University of London Press.
1949 *The Trend of Scottish Intelligence*. London: University of London Press.
Shigehisa, T. and Lynn, R.
1991 Reaction times and intelligence in Japanese children. *International Journal of Psychology*, 00, 000-000.
Shuey, A.M.
1966 *The Testing of Negro Intelligence*. New York, Social Science Press.
Sinha, U.
1968 The use of Raven's Progressive Matrices in India. *Indian Educational Review*, 3, 75-88.
Skandinaviska Testforlaget
1970 *Manual of the Swedish WISC*. Stockholm: Skandinaviska Testforlaget.
Snyderman, M. and Rothman, S.
1988 *The IQ Controversy, the Media and Public Policy*. New Brunswick, Transection Books.

Spearman, C.
1927 *The abilities of man.* New York: Macmillan.
Stevenson, H.W., Stigler, J.W., Lee, S., Lucker, G.W., Kitanawa, S. and Hsu, C.
1985 Cognitive performance and academic achievement of Japanese, Chinese and American children. *Child Development.* 56, 718-734.
Susanne, C. and Sporoq, J.
1973 Etude de correlations existant entre des tests psychotechniques et des mensurations cephaliques. *Bulletin Societé Royal Belge Anthropologie et Prehistorie,* 84, 59-63.
Teeter, A., Moore, C. and Petersen, J.
1982 WISC-R verbal and performance abilities of Native American students referred for school learning problems. *Psychology in the schools.* 19, 39-44.
Tesi, G. and Young, H.B.
1962 A standardisation of Raven's Progressive Matrices 1938. *Archivio Psicologia Neuologica & Psichiatra.* 5, 455-464.
Thurber, S.
1976 Changes in Navajo responses to the draw-a-man test. *Journal of Social Psychology,* 99, 139-140.
Thurstone, L. L.
1983 *Primary Mental Abilities.* Chicago, Chicago University Press.
Turner, G.H. and Penfold, D.J.
1952 The scholastic aptitude the Indian children of the Caradoc reserve. *Canadian Journal of Psychology.* 6, 31-44.
United Nations
1970 *National Accounts Statistics.* New York, United Nations.
Vejleskov, H.
1968 An analysis of Raven Matrix responses in fifth grade children. *Scandinavian Journal of Psychology* 9, 177-186.
Vernon, P.A.,
1989 The heritability of measures of speed of information-processing. *Personality and Individual Differences.* 10, 573-576.
Vernon, P.E.
1969 *Intelligence and Cultural Environment.* London, Methuen.
1982 *The Abilities and Achievements of Orientals in North America.* New York: Academic Press.
Wainer, H.
1988 How accurately can we assess changes in minority performance on the SAT? *American Psychologist,* 43, 774-778.
Weinberg, W.A., Dietz, S.G., Penick, E.C. and McAlister, W.H.
1974 Intelligence, reading achievement, physical size and social class. *Journal of Pediatrics,* 85, 482-489.
Weyl, N.
1969 Some comparative performance indexes of American ethnic

minorities. *The Mankind Quarterly*. 9, 106-128.

1989 *The Geography of American Achievement*. Washington, D.C.: Scott-Townsend.

Winick, M., Meyer, K.K. and Harris, R.C.

1975 Malnutrition and environmental enrichment by early adoption. *Science*. 190, 1173-1175.

Wober, M.

1969 The meaning and stability of Raven's Matrices Test among Africans. *International Journal of Psychology*, 4, 229-235.

Zahirnic, C., Girboveanu, M., Onofrei, A., Turcu, A., Voicu, G., Voicu, M. and Visan, O.M.

1974 Etalonarea matriceolur progressive colorate Raven pe copii de 6-10 ani in Municipal Bucuresti. *Revue Psihologi*,. 20, 313-321.

PHYSICAL CHARACTERISTICS AND MENTAL ABILITY

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To demonstrate the strong genetic determination of certain physical characteristics, Sir Cyril Burt included physical measurements in many of his studies of twins. However, nowhere in his over 600 books, papers and articles did he attempt to directly relate intelligence to physical characteristics, although in his much maligned 1955 paper he says "Mr. Moore and I correlated assessments for intellectual performance with assessments for physical, temperamental, and moral qualities. This time most of the cross-correlations were certainly positive though never very large". (Burt, 1955). With the database from the Georgia Twin Study it is now possible to relate a total of five physical measurements to mental ability.

The idea that human anthropometric characteristics are related to mental ability is not new. As early as 1902, perhaps even before, no less authority than Karl Pearson attempted to correlate intelligence and head measurements. (Pearson, 1902). There were at least two additional published papers by Pearson (1906, 1925) and one by Pearl (1906) examining the relationship between physical measurements and mental ability. The correlations for these early studies were positive but small. Clark, Vandenberg and Proctor (1961) reported significant correlations between head size and mental ability. They concluded that "tests which correlate highly with these physical measurements may be better measures of innate capacity than those which do not."

Recently Richard Lynn published additional new evidence on the relationship of brain size and intelligence. (Lynn, 1990 a). In three studies of eight-and nine-year-old children in Northern Ireland and England Lynn found correlation coefficients of +.18 to +.26 between head size and intelligence.

Now that Burt is vindicated (Joynson, 1989) at least two papers by Sir Cyril Burt should be added to the above list: