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RACE DIFFERENCES IN BEHAVIOUR: A REVIEW AND EVOLUTIONARY ANALYSIS

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Summary—Racial differences exist on numerous heritable behaviour traits such that Caucasoids fall between Mongoloids and Negroids. Across samples, ages, and time periods, this pattern is observed on estimates made of brain size and intelligence (cranial capacity = 1448, 1408, 1334 cm^3; brain weight = 1351, 1336, 1286 g; IQ scores = 107, 100, 85); maturation rate (age to walk alone, age of puberty, age of death); personality and temperament (activity level, anxiety, sociability); sexual restraint (gamete production, intercourse frequency, size of genitalia); and social organization (marital stability, mental health, law abidingness). These observations may be explained in part in terms of gene-culture coevolutionarily based r/K reproductive strategies.

INTRODUCTION

Behavioural differentiation among human races follows a profoundly interesting pattern, offering an array of theoretical and empirical problems for analysis. Yet its study has been deemphasized in recent years. It has been argued that the use of racial terminology is poorly justified and that the phrase "ethnic group" be substituted, thereby shifting the emphasis away from a "question begging... biologistic bias" (Montagu, 1960, p. 697; see also Lewontin, Rose and Kamin, 1984, pp. 119–129). This position, however, obfuscates hierarchical order. For example, the rate of dizygotic twinning among Mongoloids is < 4 per thousand; among Caucasoids 8; and among Negroids > 16 (Bulmer, 1970). Similarly, in sexual restraint, on both genetically based variables (size of penis, vagina, clitoris, breasts and buttocks), and those more culturally influenceable (attitudes, intercourse frequencies), the Japanese are similar to the Chinese and Koreans, whether assessed in their home countries, Hawaii, or the U.S. mainland, but are different from Australians, Israelis and white Americans, who are similar to each other but are different from Kenyans, Nigerians, and black Americans (Rushton and Bogaert, 1987).

Paralleling differences in gamete production and sexual restraint are those in intelligence (cranial capacity, brain weight, test scores), maturation rate (age to hold head erect, age to walk alone, age of death), personality (activity level, anxiety, sociability), and social organization (marital stability, mental disorder, law abidingness), all of which show whites *between* Orientals and blacks. The efficient unit of analysis, therefore, is the higher order concept of race, within which cluster the different ethnic groups and, ultimately, individuals. Following common usage three main racial categories are considered: Mongoloid, Caucasoid and Negroid.

While most explanations of racial differences in behaviour tend to be proximate and particular it will be shown that they co-occur with morphological features such as brain size and gamete production. As such genetic and evolutionary explanations are especially likely. To anticipate and summarize, multifarious characteristics (see Table 1) will be reviewed and then discussed in the context of evolutionary based r/K reproductive strategies (MacArthur and Wilson, 1967; Rushton, 1985a; Wilson, 1975).

BRAIN SIZE AND INTELLIGENCE

A three-fold increase in the relative size of the hominid brain has occurred in the last 3 million years with the australophithecenes averaging about 500 cm^3 (the size of a chimpanzee); *Homo erectus* about 1000 cm^3; and *Homo sapiens*, about 1400 cm^3. If the encephalization quotient (EQ), the expected brain ratio given a certain body size, is plotted over the same evolutionary time frame,

Table 1. Rank ordering of populations on various traits

	Mongoloids	Caucasoids	Negroids
Intelligence			
Cranial capacity	1	2	3
Brain weight	1	2	3
Test Scores	1	2	3
Maturation rate			
Gestation time	?	2	1
Skeletal development	?	2	1
Age of walking	3	2	1
Age of first intercourse	3	2	1
Age of first pregnancy	3	2	1
Longevity	1	2	3
Personality and temperament			
Activity level	3	2	1
Aggressiveness	3	2	1
Anxiety	1	2	3
Dominance	3	2	1
Extraversion	3	2	1
Impulsivity	3	2	1
Sociability	3	2	1
Sexuality			
Multiple birthing	3	2	1
Size of genitalia	3	2	1
Secondary sex characteristics	3	2	1
Intercourse frequencies	3	2	1
Permissive attitudes	3	2	1
Social organization			
Marital stability	1	2	3
Mental health	1	2	3
Law abidingness	1	2	3

the increase is proportionately less, although still substantial: 3.04–6.90 (Jerison, 1973; Passingham, 1982).

It is reasonable to hypothesize that the bigger human brain evolved to increase intelligence. Passingham (1982) provided evidence using a visual discrimination task to measure the speed with which children and other mammals abstracted such rules as "pick the same object each time to get food". More intelligent children, assessed by standardized IQ (intelligence quotient) tests, learn these strategies faster than those less intelligent, and mammals with larger brains learn faster than those with smaller brains (i.e. chimp > rhesus monkey > spider monkey > squirrel monkey > marmoset > cat > gerbil > rat = squirrel).

Passingham (1982) also updated the evidence for a positive correlation between brain size and intelligence within human populations. Previously Van Valen (1974) had calculated a correlation of 0.30 between brain size and intelligence from several studies conducted over a 60 year period where brain size was estimated from outside the skull and intelligence inferred from occupational status. Passingham concurred with this result although noted that the effect disappeared when height was controlled. He carried out additional analyses to discover that intelligence, indexed by occupational status, was also related to brain *weight* measured at autopsy even allowing for differences in height. It seems reasonable, therefore, to assume a positive relation between brain size and intelligence.

The human races appear to differ both in average cranial capacity and in brain weight as well as on test scores and measures of economic success. Thus Coon (1982) calculated cranial capacity from observations recorded by Howells (1973) of 2000 skulls from 17 populations gathered on a tour of the world's museums and concluded that "Asiatic Mongols, Eskimoes, and Polynesians have the largest brains, European Caucasoids the next largest, Africans and Australoids still smaller, and the small or dwarfed peoples the smallest" (1982, p. 18). I averaged the figures provided in Coon and found: Mongoloids, 1401 cm^3; Caucasoids, 1381 cm^3; and Negroids, 1321 cm^3. I also calculated an average cranial capacity from a Table provided by Molnar (1983, p. 65) based on independent data by Montagu (1960) and others, and found: Mongoloids, 1494 cm^3; Caucasoids, 1435 cm^3; and Negroids, 1346 cm^3. Averaging all these figures results in a brain size for Mongoloids of 1448 cm^3, Caucasoids 1408 cm^3, and Negroids 1334 cm^3. These differences would be greater if adjustments were made for the brain–body allometric regression

(Jerison, 1973) because, at least in the United States, Mongoloids are smaller in body size, and Negroids larger than Caucasoids (Eveleth and Tanner, 1976). It is noteworthy that even the most critical of reviewers, such as Gould (1978), find the same rank ordering. In a paper attributing cranial capacity figures to "unconscious . . . finagling" (p. 503), Gould's own "corrected" estimates show that, in cubic inches, Mongoloids = 85.5, Caucasoids = 84.5, and Negroids = 83 (see his Table 6, p. 508), which convert to 1401, 1385 and 1360 cm^3, respectively.

Concomitant differences emerge when calculations are made of brain weight. In a critical review of this literature, Tobias (1970, p. 6) provided a summary which I averaged to find: Mongoloids, 1368 g; Caucasoids, 1378 g; and Negroids, 1316 g. A briefer, updating review was provided by Ho, Roessmann, Straumfjord and Monroe (1980a) from which I calculated: Mongoloids, 1334 g: Caucasoids, 1307 g; and Negroids, 1289 g. Ho *et al.* noted that in European samples brain weight begins to decrease around the mid-20s, whereas in Japanese samples the decrease apparently does not begin until the mid-30s. Ho *et al.* (1980a, 1980b) also provided original brain weight data for 1261 subjects aged 25–80 collated from autopsy records after excluding those brains obviously damaged and found significant mean differences between American whites and American blacks: 1323 g vs 1252 g, a difference which held when controlling for body weight, height, sex or surface area. In a study of newborns, Ho, Roessmann, Hause and Monroe (1981) collated brain weights from 782 autopsy records and found white infants had heavier brains than black infants. If a criterion of a gestational age of 38 weeks or more was imposed to define "full term" these differences disappeared although, as will be discussed in the next section, gestational time itself appears to distinguish the races. I am aware of no data on Monogoloid infants' brains. Averaging all the adult figures results in brain weight estimates for Mongoloids 1351 g, Caucasoids 1336 g, and Negroids 1286 g.

The most widespread way of assessing intelligence remains the use of standardized tests of IQ and educational attainment. Jensen (1969) is an often cited starting point. After documenting a 40 IQ point difference between unskilled and professional adults and considering the evidence that such differences were partly genetic in origin he pointed to the 15 point difference, established over several decades, between black and white Americans and conjectured whether this might also be partly inherited. Since that time, more data have come to light.

First, despite major environmental attempts to ameliorate the situation, the difference between black and white Americans in mean IQ remains as large today as it was at the time of the First World War (Jensen, 1985; Loehlin *et al.*, 1975). Second, the hypothesis that the difference is due to cultural bias in the tests has been weakened: when the scores of blacks and whites are compared on specific items, those judged to be least culturally biased, but loading most highly on *g* show the greatest differences (Eysenck, 1984; Jensen, 1980, 1985; Jensen and McGurk, 1987; *g* is the label given to the general factor of intelligence that emerges when factor analysis is carried out on numerous measures of complex mental ability). Moreover, Jensen (1985) showed that reaction time measures, which are positively related to intelligence test scores and which assess the speed with which individuals perform basic cognitive processes, likewise demonstrate the ethnic group difference. On a manifest level at least, these tests lack cultural bias. Finally, Lynn (1978) reviewed studies of racial differences from around the world finding the one standard deviation difference in Jamaica, Nigeria, Tanzania and Uganda. Other data from Africa (Baker, 1974; Buj, 1981) and the United Kingdom (Scarr, Caparulo, Ferdman, Tower and Caplan, 1983) are also in accord.

The literature on race and IQ has recently been extended to include Orientals. In one study, Lynn (1977) showed that when the WAIS (Wechsler Adult Intelligence Scale) was standardized in Japan in the early 1950s, the average Japanese IQ was 107, over 1/3 of a standard deviation higher than white Americans or Europeans. Subsequently, on a standardization of the revised version of the WAIS in 1975, the disparity in mean IQ had increased to 11 points, 2/3 of a standard deviation higher than Caucasians (Lynn, 1982). Additional evidence for greater Mongoloid intelligence has been documented by Misawa, Motegi, Fujita and Hattori (1984) and Vernon (1982). Vernon (1982), for example, examined the abilities and achievements of Chinese and Japanese immigrants throughout Canada and the United States and found that, despite discrimination and deprivation, they had reached higher average educational and occupational levels than Caucasions, and scored higher on tests of intelligence. While the initial Chinese immigrants came from poor and

uneducated peasant backgrounds, even the first generation children were making their way up the educational and socioeconomic ladder.

Most recently, Lynn (1987) has reviewed all the literature on the intelligence of the Mongoloids, including data from Hong Kong, Singapore and Taiwan, finding once again their tendency to achieve higher scores on tests of general intelligence than Caucasians. Lynn also noted that Mongoloids relative to Caucasoids are characterized by a psychometric profile of high visuospatial abilities and low verbal abilities as well as displaying a slow rate of intellectual growth in infancy and early childhood. Interestingly, and supportively, Steen (1987) reviewed data on mathematically precocious youth in the United States, finding that the proportion of Asian-American students who achieve high mathematics scores (above 650) on the Scholastic Aptitude Test is twice the national average, while the proportion of black students is less than 1/4 the national average, and internationally 5th and 12th grade level students in both China and Japan score higher than equivalent white Americans, whereas those from African countries do not.

MATURATION RATE

In the U.S.A., Negroids have a shorter gestation period than Caucasoids. By week 39, 51% of black children have been born, while the figure for whites is 33%; by week 40, the figures are 70 and 55% respectively (Niswander and Gordon, 1972). Similar results have been obtained in Paris. Collating data over several years, Papiernik, Cohen, Richard, de Oca and Feingold (1986) found that French women of European ancestry had longer pregnancies than those of mixed black–white ancestry from the French Antilles, or black African women with no European admixture. These differences persisted after adjustment for socio-economic differences. Other observations, made within equivalent gestational age-groups established by ultrasonography, find that black babies are physiologically more mature than whites as measured by pulmonary function (Fujikura and Froehlich, 1966; Farrel and Wood, 1976), amniotic fluid (Olowe and Akinkughe, 1978), foetal birthweight between 24 and 36 weeks of gestation (Hardy and Mellits, 1977), and weight-specific neonatal mortality (Morris, Udry and Chase, 1975; David and Siegel, 1983).

Black precocity continues throughout life. Revised forms of *Bayley's Scales of Mental and Motor Development*, administered in 12 metropolitan areas of the U.S.A. to 1409 representative infants aged 1–15 months, showed black babies scored consistently above whites on the Motor Scale (Bayley, 1965). This difference was not limited to any one class of behaviour but included: coordination (midline arm and hand); muscular strength and tonus (holds head steady, balances head when carried, sits alone steadily, and stands alone); and locomotion (turns from side to back, raises self to sitting, makes stepping movements, walks with help, and walks alone). Similar results have been found for children up to about age 3 elsewhere in the United States (Knobloch and Pasamanik, 1953; Williams and Scott, 1953; Freedman, 1974; Walters, 1967), in Jamaica (Curti, Marshall, Steggerda and Henderson, 1935), and in sub-Saharan Africa (Freedman, 1974; Warren, 1972). Thus, in a critical review, Warren (1972) found evidence for African motor precocity in 10 out of 12 studies. For example, Geber (1958) had examined 308 children in Uganda and reported an "all-round advance of development over European standards which was greater the younger the child" (p. 186). Subsequently, Freedman (1974, 1979) found similar results in studies of newborns in Nigeria using the *Cambridge Neonatal Scales* (Brazelton and Freedman, 1971).

In contrast, Mongoloid children appear to be motorically delayed relative to Caucasians. In a series of studies carried out on 2nd through 5th generation Chinese-Americans in San Francisco, on 3rd and 4th generation Japanese-Americans in Hawaii, and on Navajo Amerindians in New Mexico and Arizona, Freedman found consistent differences between these groups and 2nd to 4th generation European-Americans using the *Cambridge Neonatal Scales* (Freedman, 1974, 1979; Freedman and Freedman, 1969). One measure involved pressing the baby's nose with a cloth, forcing it to breathe with its mouth. Whereas the average Chinese baby fails to exhibit a coordinated "defense reaction", most Caucasian babies turn away or swipe at the cloth with the hands, a response reported in Western pediatric textbooks as the normal one to be expected. On other measures including "automatic walk", "head turning" and "walking alone", Mongoloid children are more delayed than Caucasians. Mongoloid samples, including the Navajos, typically

do not walk until 13 months, compared to the Caucasian 12 months and Negro 11 months (Freedman, 1979). In a standardization of the *Denver Developmental Screening Test* in Japan, Ueda (1978) found slower rates of motoric maturation in Japanese as compared with Caucasoid norms derived from the United States, with tests made from birth to 2 months in coordination and head lifting, from 3 to 5 months in muscular strength and rolling over, at 6 to 13 months in locomotion, and at 15 to 20 months in removing garments. These differences appear to be mediated by neuro-muscular mechanisms rather than skeletally, for on some measures of ossification development, Mongoloids appear to be as advanced as Negroids (Eveleth and Tanner, 1976).

Onset of other life-cycle traits including puberty and mortality also show differences. A French Army Surgeon (1898/1972), a 30 year specialist in genito-urinary diseases provided early observations that, in speed of sexual maturation, Mongoloids < Caucasoids < Negroids. Subsequent studies are confirmatory. In the U.S.A., blacks are more precocious than whites as indexed by age at menarche, first sexual experience, and first pregnancy (Malina, 1979; Rushton and Bogaert, 1987). A national probability sample of American youth found that by age 12, 19% of black girls had reached the highest stages of breast and pubic hair development, compared to 5% of white girls (Harlan, Harlan and Grillo, 1980), although the same survey found white and black boys to be similar (Harlan, Grillo, Coroni-Huntley and Leaverton, 1979). Subsequently, Westney, Jenkins, Butts and Williams (1984) found that 60% of 11 year old black boys had reached the stage of accelerated penis growth in contrast to the white norm of 50% of 12.5 year olds. This genital stage significantly predicted onset of sexual interest, with 2.2% of the black boys experiencing intercourse by age 11. While some surveys find that Oriental girls enter puberty as early as whites (Eveleth and Tanner, 1976), others suggest that in both physical development and onset of interest in sex, the Japanese, on the average, lag 1.5 to 2 years behind their American counterparts (Asayama, 1975).

At the other end of the life-span, results from the United States National Center for Health Statistics, a federal agency mandated to collect, analyze, and disseminate national epidemiologic data, reveal substantial population differences in mortality rates from infancy to old age (Fingerhut, Wilson and Feldman, 1980; Yu, 1986). For example, the 1980 average annual age-adjusted death rate per 1000 resident population was 3.5 for Chinese in contrast to 5.6 for white Americans, and substantially higher for black Americans. More specific studies bear this out. In a study of 2687 deaths among U.S. Navy personnel between 1974 and 1979, blacks had higher mortality rates than whites for numerous types of accidental and violent occurrences, improper use of medication, toxic effects, accidental drownings, and shootings (Palinkas, 1984).

PERSONALITY AND TEMPERAMENT

Across ages (24-hour-old infants, children, high school students, university students, and adults), across traits (activity level, aggressiveness, cautiousness, dominance, excitability, impulsiveness, and sociability), and across methods (archival statistics, naturalistic observation, ratings, and self-reports), much data support the hypothesis that, in terms of behavioural restraint, Orientals > whites > blacks (Freedman, 1979; Rushton, 1984; Vernon, 1982).

Freedman and Freedman (1969), for example, compared Chinese-American newborns with European-American newborns on 25 items of behaviour. Analysis indicated that the main differences came from items tapping *excitability/imperturbability*. Thus the European-American infants had a greater tendency to be changeable, moving back and forth between states of contentment and upset, as well as reaching the peak of excitement sooner, while the Chinese-American infants were calmer and more consolable when upset. In a study of Amerindian infants, Brazelton, Robey and Collier (1969) reported that Amerindian neonates exhibited almost none of the normally occurring spasmodic movements common in Caucasian newborns, and maintained smoother gross motor movements throughout the first year. By 3 and 4 years of age, Caucasoid children engage in more approach and interaction behaviour, whereas Mongoloid children spend more time on individual projects and generally demonstrate low noise levels, quiet serenity, and few aggressive or disruptive behaviours (Freedman, 1974, 1979). Eskimos, also of Mongoloid origin, are perceived by Europeans as behaviourally restrained (LeVine, 1975, p. 19) while to

Eskimos, Euro-Americans appear "emotionally volatile" (LeVine, 1975, p. 19), as they do also to Chinese-Americans (Freedman, 1979, p. 156).

Studies of adults show parallel differences. Many researchers have investigated the personality profiles of the Chinese and Japanese, both in their homelands and in North America, giving university students standardized tests such as Cattell's *Sixteen Personality Factor Questionnaire*, the *Eysenck Personality Questionnaire*, the *Edwards Personal Preference Schedule* and the *Minnesota Multiphasic Personality Inventory* (Vernon, 1982). The evidence consistently favored the hypothesis that, on average, Asians were both more introverted and more anxious than Euro-Americans and less dominant and aggressive. While fewer systematic studies have been carried out on Africans and black Americans, many imply greater aggressiveness, dominance, impulsivity, and displays of masculinity compared to whites (Dreger and Miller, 1960; Wilson and Herrnstein, 1985). For example, black men and women have higher mean frequencies than white men and women for sexual fantasies involving aggression (Price and Miller, 1984). Rushton (1985b) indexed behavioural restraint by low extraversion (sociability) and high neuroticism (anxiety) scores from the *Eysenck Personality Questionnaire* and, aggregating data from 25 countries, found that 8 Mongoloid samples ($N = 4044$) were less extraverted and more neurotic then 38 Caucasian samples ($N = 19{,}807$), who were less extraverted and more neurotic than 4 African samples ($N = 1906$). An apparent exception to this general trend occurs on the "thrill and adventure-seeking" components of the Sensation Seeking Scales, on which blacks are reported to score lower than whites (Zuckerman, 1984).

SEXUAL RESTRAINT

Racial differences are found in gamete production or rate of ovulation. While monozygotic twinning is nearly constant at about three and a half per thousand in all groups, dizygotic twinning varies widely. The rate per 1000 births among Mongoloids is approximately 3; among Caucasoids, 8; and among Negroids, > 16; with some African populations having twinning rates as high as 57 per 1000 (Bulmer, 1970; Nylander, 1975). The incidence of non-monozygotic triplets and quadruplets shows comparable rank orders.

Racial differences also exist in frequency of sexual intercourse. Examining Hofmann's (1984) review of the extent of premartial coitus among young people around the world, Rushton and Bogaert (1987) categorized the 27 countries by primary racial composition and averaged the figures. The results showed that African adolescents are more sexually active than Europeans who are more sexually active than Asians (see Table 2). While some variation occurred from country to country, consistency was found within groups. Thus Koreans and Japanese were similar to each other but different from Australians, Israelis, and Swedes who, in turn, were similar to each other but different from Kenyans, Nigerians, and black Americans. As is typical of such surveys, young men report a greater degree of sexual experience than young women (Symons, 1979). It is clear from Table 2, however, that the population differences are replicable across sex, with the men of the more restrained group having less experience than the women of the less restrained.

The rate of premarital intercourse is matched by that following marriage. Rushton and Bogaert (1987) inspected a section on cross-cultural intercourse frequency in a review by Ford and Beach (1951) and categorized the tribal peoples listed into three main groups. The Oceanic and Amerindian people tended to a lower per week average (1–4), than U.S. whites (2–4), than Africans (3–10). Recent surveys support the same conclusion. For married couples in their twenties,

Table 2. Proportion of population aged 11–21 experiencing premarital coitus (adapted from Hofmann, 1984)

Population	% Sexually experienced		
	Males	Females	Combined
Asians	12	5	9
Europeans	46	35	40
Africans	74	53	64

the average frequency per week of intercourse for the Japanese approximates 2 (Asayama, 1975), for American whites 4, and for American blacks 5 (Fisher, 1980). In addition blacks, compared to whites, experience a greater number of extramarital sexual partners, at an earlier stage in the marriage, and expect to have more of them in the future (Rushton and Bogaert, 1987).

Concomitant differences are found in sexual attitudes. In Ford and Beach's (1951) survey, the Asian groups were the most likely to endorse beliefs concerning the weakening effects of intercourse. A review by Vernon (1982) led him to conclude that both the Chinese and the Japanese were not only less experienced in premarital sex, but also less permissive, and less concerned with sexual display than Caucasians. For example, Connor (1975, 1976) found three generations of Japanese-Americans, as well as Japanese students in Japan, reported less interest in sex than Caucasian samples. Abramson and Imari-Marques (1982) observed that each of three generations of Japanese-Americans showed more sex guilt than matched Caucasian Americans. In studies carried out in Britain and Japan using a sex fantasy questionnaire, Iwawaki and Wilson (1983) found that British men reported twice as many fantasies as Japanese men, and British women admitted to four times as much sex fantasy as Japanese women.

In contrast, African descended people are more permissive than Caucasians. Reiss (1967) observed this with several hundred black and white university students in the United States on scales measuring premarital sexual attitudes (e.g. approving of or feeling guilt about petting and intercourse in casual and romantic relationships), results replicated with other samples and measuring instruments (Heltsley and Broderick, 1969; Sutker and Gilliard, 1970). Johnson (1978) also compared black and white premarital sexual attitudes and behaviour and included a Swedish sample who were expected to be (and were) more permissive than American whites. The black sample (particularly males) was found to have had intercourse earlier and with a greater number of casual partners, and with less feelings of distaste, than either white sample. In a study of sex fantasies, Price and Miller (1984) found that black men and women had higher mean frequencies than white men and women, and that whites more than blacks were prone to feel guilt for having them.

The ethnographic record (e.g. A French Army Surgeon, 1898/1972) makes reference to numerous anatomical distinctions, including the placement of female genitals (Orientals highest, blacks lowest); angle and texture of erection (Orientals parallel to body and stiff, blacks at right angles to body and flexible); size of genitalia (orientals smallest, blacks largest); salient muscularity, buttocks and breasts (Orientals least, blacks most). Many of these characteristics have been confirmed (Haeberle, 1978; Rushton and Bogaert, 1987). Thus Rushton and Bogaert (1987) averaged the ethnographic data on erect penis size and found them to approximate: Orientals, 4″ to 5.5″ in length and 1.25″ in diameter; Caucasians, 5.5″ to 6″ in length and 1.3″ to 1.6″ in diameter; blacks, 6.25″ to 8″ in length and 2″ in diameter. Women were proportionate to men, with Orientals having smaller vaginas and blacks larger ones, relative to Caucasians. Clitoral size differed in length: in European women, 1.2″; in African women, 2″. Variations were noted: In the French West Indies, the size of the penis and vagina covaried with amount of black admixture. Analyses of survey data gathered by the Kinsey Institute for Sex Research at Indiana University also show that black males have larger penises than white males (Rushton and Bogaert, 1987). Measures of the size of the testes, either taken from living subjects or from those at autopsy, show the difference is twofold lower in Asian men than Europeans (9 vs 21 g), too large a difference to be accounted for in terms of body size (Diamond, 1986; Short, 1984). Larger scrotal circumferences have been found in Nigerians than in Europeans (Ajmani, Jain and Saxena, 1985).

Finally, there is evidence that biologic changes differentially influence sexual behaviour across the races, the direction being Orientals < whites < blacks. Inspection of Figures 1 vs 2 and 3 in Udry and Morris (1968), for example, shows a higher periodicity, or midcycle/menses coital ratio, for blacks than for whites, a relation also observed in an analysis of independent data from the Institute for Sex Research by Rushton and Bogaert (1987). Others have noted that biologic maturation predicts the onset of sexual interest, dating, first intercourse, and first pregnancy for blacks more than for whites, and for whites more than for Orientals (Presser, 1978; Goodman, Grove and Gilbert, 1980; Westney *et al.*, 1984). Moreover, evidence suggests that black women have shorter menstrual cycles than white women, experience a greater number of orgasms per act of coitus, and have a greater incidence of pregnancy at a faster rate (Rushton and Bogaert, 1987).

SOCIAL ORGANIZATION

Stable social organization depends on individuals adhering to rules, a construct which can be indexed through marital functioning, mental durability, and law abidingness. Marital stability, for example, can be assessed by rate of divorce, out of wedlock birthing, child abuse, and delinquency. On each of these measures, the rank ordering within American populations is Asian > white > black (Bianchi and Farley, 1979; Garbarino and Ebata, 1985; Staples, 1985). For example, it has been noted that while there are approximately 1.5 million individuals of Mongoloid descent living in the U.S., they tend not to be an object of family research, partly because they are not perceived as a "problem" (Staples and Mirande, 1980) having significantly fewer divorces, out-of-wedlock births, or incidences of child abuse than whites, even when controlling for social class on which they are higher (Garbarino and Ebata, 1985). Black family structure, on the other hand, has been studied intensively.

Much research has emphasized the instability of black marriages and family ties, matrifocality, and the lack of authority of fathers (DuBois, 1908; Frazier, 1948). Subsequently, Moynihan (1965) wrote the report which is the most frequently cited discussion of black families in the United States. Moynihan observed high rates of marital dissolution, frequent heading of families by women, and numerous illegitimate births in black families, in contrast to white families. Some 20 years later the figures cited as evidence for the instability of the black family have doubled, almost tripled in some areas (Staples, 1985). While one out of two white marriages will end in divorce, two out of three black marriages will eventually dissolve. Out-of-wedlock births have increased among whites from 2% in 1960 to 8% 1982, whereas among blacks it increased from 22% in 1960 to 52% in 1982. Currently, 75% of births to black teenagers are out of wedlock compared with 25% of births to white teenagers, an age group constituting 50% of new mothers (U.S. Bureau of the Census, 1984). Moreover, in other parts of the world there is evidence that the impact of migration and technological development has detrimentally affected African social structures more than European, and European more than Oriental (Ajenifuja, 1982; Garbarino and Ebata, 1983; Zhanghling, 1983).

Indices of social breakdown are also to be gained from figures of those confined to mental institutions or who are otherwise behaviourally unstable. In 1970, 240 blacks per 100,000 population were confined to mental institutions, compared with 162 whites per 100,000 population (Staples, 1985). Blacks also use community mental health centers at a rate almost twice their proportion in the general population. The rate of drug and alcohol abuse is much greater among the black population—based on their over-representation among patients receiving treatment services (U.S. Department of Health, Education and Welfare, 1979). Moreover, it is estimated that as many as one-third of young black males in the inner city have serious drug problems. Kessler and Neighbors (1986) have demonstrated, using cross-validation on eight different surveys encompassing more than 20,000 respondents, that the effect of race on psychological disorders is independent of class. They observed an interaction between race and class such that the true effect of race was suppressed and the true effect of social class was magnified in models that failed to take the interaction into consideration. Again, in contrast, it appears that Orientals are underrepresented in the incidence of mental health problems (Vernon, 1982).

Finally, law-abidingness can be examined. Wilson and Herrnstein (1985) review much of the relevant literature. Afro-Americans currently account for about half of all arrests for assault and murder and two thirds of all arrests for robbery in the United States, even though they constitute less than one eighth of the population. Since about the same proportion of victims also say their assailant was black, the arrest statistics cannot be attributed to police prejudice. Blacks are also over-represented among persons arrested for most white collar offenses. For example, in 1980 blacks made up about one-third of those arrested for fraud, forgery, counterfeiting, and receiving stolen property, and about one-fourth of those arrested for embezzlement. Blacks are underrepresented only among those white-collar offenses that ordinarily require, for their commission, access to high status occupations (tax fraud, securities violations). The Chinese and Japanese in North America, however, have a lower incidence of crime than do Europeans (Vernon, 1982). Similar figures are found in Britain (Rushton, 1984): while comprising 13% of the population of London, African-descended people account for 50% of the crime (*Daily Telegraph*, 24 March, 1983). These findings also hold regardless of whether they are based on surveys of victims or on

official police records. Mongoloid immigrants to Britain are under-represented in crime. Cross cultural studies of developing countries suggest these findings may be generalizable (Wilson and Herrnstein, 1985).

DISCUSSION

Data have shown that, across ages, methods, samples, and time periods, Caucasoid populations fall between those of Mongoloids and Negroids with measures made of intelligence, maturation, personality, sexuality, and social organization. Many of the differences are not counterintuitive, despite repeated suggestions that such beliefs reflect only prejudice and faulty stereotyping. Of interest is the patterning of the racial differences with Caucasoids being consistently *between* Mongoloids and Negroids. A full explanation must take this into account. As far as I am aware, this review covers a more extensive array of research domains than any published previously. Irrespective of particular explanation, therefore, correlated behavioural phenomena have been identified which require further investigation.

Numerous sources of error variance may be pointed to in the data sets reviewed. For example, some of the estimates of brain size did not control for variables considered important such as nutritional state in early life, source of sample, and cause of death. Some of the measures made of penis size or intercourse frequency may have been influenced by unconscious biases in self or observer. Identification errors may have occurred in determining ethnicity as on death certificates when assessing mortality rates or in court records when assessing crime. Statistical corrections may further distort data, as when crime and health figures are adjusted for differences in age structure between comparison groups. Since diverse methodologies have provided multiple replications, however, explanations based on errors of measurement cannot account for so consistent a pattern as that observed.

A different critique concerns selective bias in what has been reported. While many studies finding an *absence* of differences have necessarily been omitted, I am unaware of any major study demonstrating results *opposite* to those reported here. The only exceptions I have found are that on some measures of physical growth Mongoloids are faster than Caucasoids (Eveleth and Tanner, 1976) and in personality, Negroids score lower in sensation-seeking than Caucasoids (Zuckerman, 1984). Some might argue that a focus on average differences is misleading and that a finer grain analysis might reveal subgroups not conforming to the pattern. Thus statistics on marital instability might reveal that the Japanese increasingly approximate the white American mean. No doubt the same result could be achieved by separating whites into subsets and finding one group higher than Orientals. There is, of course, much within-population variance on all the measures. On the other hand, by particularizing sufficiently, *any* general statement can be defeated. It is for this reason that aggregated measures are preferable (Rushton, Brainerd and Pressley, 1983). I have every reason to believe, therefore, that the data reported here reflect real differences.

At a theoretical level, many of the observations are typically explained in purely environmental terms. The greater achievements of the Chinese and Japanese, for example, as well as their more restrained sexual behaviour, can be attributed to family background where there are strong socialization pressures to conform and where restraint and tradition are valued (Vernon, 1982). In this account, success at learning would foster greater scores on IQ tests, higher socio-economic status, lowered levels of crime and higher standards of health. The opposite pattern of results may then be expected from blacks who typically come from less well integrated family systems and who are under-socialized for achievement. Data shows, for example, that black males learn early that assertive sexuality and sexual prowess are means of gaining status, as well as gratification (Johnson, 1978; Staples, 1978). Other observations, however, such as the smaller testes and larger brains of the Asians, and shorter menstrual cycles of the Africans as well as the data on gamete production (dizygotic twinning rate per thousand > 16 in blacks, 8 in whites, and < 4 in Orientals) imply the presence of genetic and evolutionary influences.

Many of the variables on which the races differ in central tendency are found to be substantially heritable within Caucasian samples. Genetic influences have been found for intelligence (Bouchard and McGue, 1981); maturation rate and mortality (Bouchard, 1984; Hrubec, Floderus-Myrhed, de Faire and Sarna, 1984); personality and temperament (Buss and Plomin, 1984; Rushton, Fulker,

Neale, Nias and Eysenck, 1986); sexual attitudes and behaviour (Eysenck, 1976; Martin, Eaves and Eysenck, 1977; Martin, Eaves, Heath, Jardine, Feingold and Eysenck, 1986); and components of social organization such as family structure and law abidingness (Bulmer, 1970; Mednick, Gabrielli and Hutchings, 1984; Rowe, 1986). Given that such heritabilities are often generalizable across cultural and racial groups (Rushton and Nicholson 1988), it is reasonable to assume that some of the between-group differences are genetic in origin.

Additional evidence implies a genetic basis to the population differences. It has become clear from both adoption and twin designs that the crucial environmental variables influencing behaviour are those which occur within-families, not between them (Plomin and Daniels, 1987; Rowe, 1986; Rushton, Littlefield and Lumsden, 1986). This is one of the most important discoveries yet made using behaviour genetic procedures and its full significance is yet to be realized. It implies that since the environmental variables usually proposed to explain the racial differences, such as social class, religious beliefs, cultural practices, father absence, and parenting styles account for so little (if any) variance within race, they are unlikely to between races. This conclusion results for both socially desirable and undesirable traits and implies that, within the constraints allowed by the total spectrum of cultural alternatives, people create environments maximally compatible with their genotypes (Rushton, Littlefield and Lumsden, 1986).

The heritability of racial differences has been suggested more directly for some traits. For example, with respect to IQ scores and educational attainment, black children adopted into white families have been found not to resemble the adoptive siblings with whom they were raised for 17 years (Scarr, Weinberg and Gargiulo, 1987). When the children were 7 years of age the results showed that black IQ was comparable to white IQ but a 10-year follow-up has indicated that black IQ and educational achievement significantly declined while social deviance and psychopathology increased. The heritability of racial differences in gamete production has been assessed by examining racially mixed marriages. The data shows that twinning rate is largely determined by the race of the mother independently of the race of the father, as observed in Mongoloid-Caucasoid crossings in Hawaii, and Caucasoid-Negroid crosses in Brazil (Bulmer, 1970).

r/K REPRODUCTIVE STRATEGIES

The ultimate aim of science is causally to explain the world around us, rather than only to describe it. A theory which orders much of the data reviewed, along with its patterning and its heritable nature stems from evolutionary biology, and directly links gamete production with brain size and both to a constellation of other life-history attributes (Rushton, 1985a, 1987a, 1987b; following Wilson, 1975). In this account, described under the rubric "differential K theory", the degree to which an individual had acquired a K rather than an r reproductive strategy was predicted to underlie diverse behaviours. The symbols r and K originate in the mathematics of population biology and refer to two ends of a continuum involving a trade-off between egg production and parental care. These range from r, involving maximum egg output and no parental care, to K, emphasizing elaborate parental care in which the birthrate is reduced to a minimum (MacArthur and Wilson, 1967; Wilson, 1975). As can be seen in Fig. 1, oysters producing 500 million eggs a year exemplify the r-strategy, while the great apes producing only one infant every 5 or 6 years, exemplify the K-strategy.

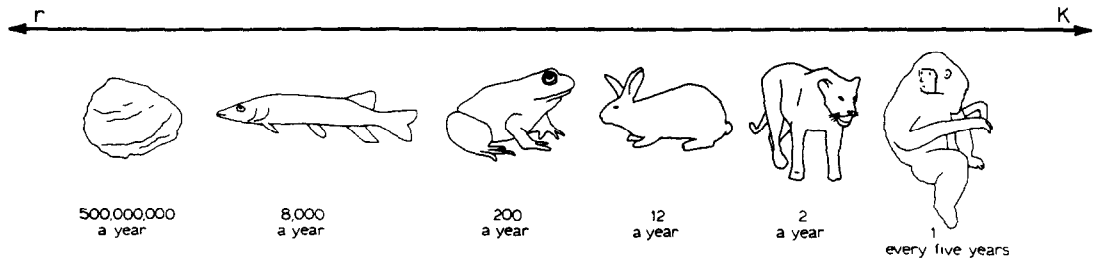

Fig. 1. The r/K continuum of reproductive strategies balancing egg output with parental care (after Johanson and Edey, 1981).

Comparative studies and selective breeding experiments, on species ranging from dandelions to fish to mice to men, indicate that these reproductive strategies are correlated with other life history attributes. Following Pianka (1970), Wilson (1975), Eisenberg (1981), and Barash (1982), these are summarized in Table 3. While each of the life-cycle traits might independently contribute to fitness, the important point is that they are expected to covary along a single axis both between and within species.

From Table 3, it can be seen that, in terms of *family characteristics*, r and K strategists differ in terms of litter size (number of offspring produced at one time), birth spacing, total number of offspring, rate of infant mortality and degree of parental care. In regard to *individual characteristics*, r and K strategists differ in rate of physical maturation, sexual precocity, life-span, body size, reproductive effort, energy use and intelligence. Finally, in terms of *population and social system characteristics*, they differ in their treatment of the environment, tendency to geographically disperse, population size stability, ability to compete under scarce resources, degree of social organization, and altruism.

Individuals and species are, of course, only relatively r and K. Thus rabbits are K-strategists compared to fish but r-strategists compared to humans. Primates are all relatively K-strategists and humans are the most K of all. Indeed, as depicted in Fig. 2, the order primates displays a natural scale going from lemur to macaque to gibbon to chimp to humans, in which there is a consistent trend toward K with progressive prolongation of gestation period and life phases (Lovejoy, 1981). Note the proportionality of the four indicated phases. The postreproductive phase is restricted to humans. With each step in the natural scale, populations devote a greater proportion of their reproductive energy to subadult care, with increased investment in the survival of offspring. As a species, humans are at the K end of the continuum, although it is postulated that some are more so than others (Rushton, 1985a).

Extrapolating the r/K framework to individual differences within *Homo sapiens*, several falsifiable predictions follow. Thus the more K the family the greater the spacing between births, the fewer the total number of offspring, the lower the rate of infant mortality, and the better developed the parental care. The more K a person, the longer the period of gestation, the higher the birthweight, the more delayed the onset of sexual activity, the older the age at first reproduction, the longer the life, the lower the sex drive, the higher the intelligence, the more efficient the use of energy, the lower the dispersal tendency, the more social rule following the behaviour, and the greater the altruism.

Several studies provide support for the application of r/K theory to humans. As a necessary preliminary, and as just discussed, many indices of K have been found to be heritable. Studies also

Table 3. Some life history, social behaviour, and physiological differences between r- and K-strategists (following Pianka, 1970)

r-Strategist	K-Strategist
Family characteristics	
Large litter size	Small litter size
Short spacing between births	Long spacing between births
Many offspring	Few offspring
High rate of infant mortality	Low rate of infant mortality
Low degree of parental care	High degree of parental care
Individual characteristics	
Rapid rate of maturation	Slow rate of maturation
Early sexual reproduction	Delayed sexual reproduction
Short life	Long life
High reproductive effort	Low reproductive effort
High energy utilization	Efficient energy utilization
Low intelligence	High intelligence
Population characteristics	
Opportunistic exploiters of environment	Consistent exploiters of environment
Dispersing colonizers	Stable occupiers of habitat
Variable population size	Stable population size
Competition variable, often lax	Competition keen
Social system characteristics	
Low degree of social organization	High degree of social organization
Low amounts of altruism	High amounts of altruism

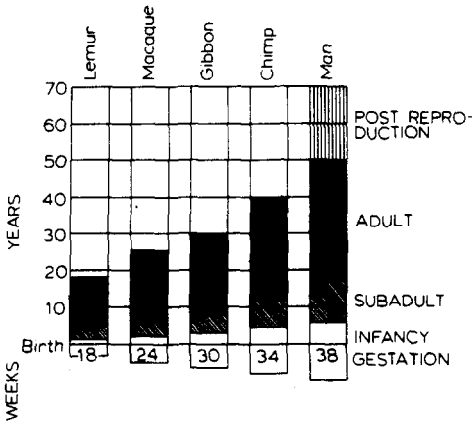

Fig. 2. Progressive prolongation of life phases and gestation in primates [From C. O. Lovejoy (1981) "The Origin of Man", *Science, N.Y.* **211**, 341–350. Copyright by the American Association for the Advancement of Science. Reprinted by permission].

find the predicted covariation among the attributes. Rushton (1987b) contrasted the characteristics of the mothers of dizygotic twins who, because they produce more than one egg at a time can be considered to represent the r-strategy, with the mothers of singletons representing the K-strategy. As predicted, the former were found to have a lower age of menarche, a shorter menstrual cycle, a higher number of marriages, a higher rate of coitus, more illegitimate children, a closer spacing of births, a greater fecundity, more wasted pregnancies, a larger family, an earlier menopause, and an earlier mortality. Ellis (1988) reviewed evidence that, compared with the general population, criminals have the following r-strategy traits: large numbers of siblings (or half siblings); families in which parents no longer live together; shorter gestation periods (more premature births); more rapid sexual maturation; greater copulatory frequency outside of bonded relationships and a preference for such; less stable bonding; lower parental investment in offspring (as evidenced by higher rates of child abandonment, neglect, and abuse); and a shorter life expectancy.

Because the races differ on many of the K characteristics (see Table 1 for review), it is hypothesized that Mongoloids are more K-selected than Caucasoids, who in turn are more K-selected than Negroids. This formulation may be viewed from the perspective of gene-culture coevolution which explains how cultural diversity varies with genetic differences (Lumsden and Wilson, 1981; Rushton *et al.*, 1986b). In this account, epigenetic rules guide development over the life span, biasing individuals to learn or produce patterns of culture maximally compatible with their genotypes. Via cognitive phenotypes and group action, for example, intellectual dispositions may be amplified into academies of learning, and sexual energies into appropriate artistry. Thus, in China and Japan, numerous monastic centers of enlightenment have existed historically and today universities and research institutes begin to outnumber those in the West whereas the same populations have often adopted clothing styles to flatten the breasts and buttocks in an explicit attempt to "deanimalize" (Freedman, 1979, p. 107). On the African continent dances have often been invented to emphasize undulating rhythms (A French Army Surgeon 1898/1972; Freedman, 1979), although there are fewer centers of educational excellence. Freud (1930) had also observed a positive correlation between restrained sexuality and the production of culture, a relationship he explained in terms of the psychodynamics of repression and sublimation. From an r/K perspective, the relationship is explained in terms of genetically correlated traits.

The analyses presented here may shed light on human origins. Behaviour is increasingly recognized to be an evolutionary pacemaker (Wilson, 1975) and the data reviewed support Lovejoy's (1981) theorizing that the hominid line diverged from other primates due to an interplay of reinforcing behaviour traits including a move to bipedality, pairbonding, increased parental care, and reduced male–male aggression with concomitant increments in social structure, altruism and intelligence. This review suggests that differences among extant human populations may show this process in sharp relief (see also Lynn, 1987; Smith, 1984; Tobias, 1985). The degree to which other morphological features such as dentition and facial structure, or sex hormones are associated with K behaviour in *Homo* (see Coon, 1962; Nyborg, 1987; Tobias, 1985) remains to be ascertained.

At the level of the individual, it must be recognized that almost all will have a mixture of r and K characters. For example, while Rushton (1987b) found average differences to accrue between the mothers of dizygotic twins and the mothers of singletons on such r/K attributes as number of marriages and number of children born out of wedlock, there is not a typology, and many mothers of dizygotic twins will be highly K in other respects. In a similar manner it is understood that racial group differences are generalizable to individuals in only imperfect ways. However, fearfulness about injustice resulting from the overgeneralization of differences in group means to particular individuals should not keep us from vigorous research. The exploration of genetic variance within the human species, and the analysis of the causes of this variance, are of crucial importance to understanding man.

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