
Race Differences and *r/K* Theory

A Reply to Silverman

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To allow an adequate evaluation of *r/K* theory in light of Silverman's critique, data are tabulated showing that, on average, Mongoloids > Caucasoids > Negroids in brain size and intelligence, maturational delay, sexual restraint, quiescent temperament, and social organization. The sequence of this suite of life-history characters may parallel the order of emergence of the populations in earth history. The phased linearity is ordered by a theory of *r/K* reproductive strategies in which Mongoloids are more *K* selected than Caucasoids and especially more than Negroids. It is suggested that behavioral differences among human races arose because the more predictable environment faced by later emerging populations selected for increased brainsize, fewer and slower maturing offspring, greater parental care per each offspring, stronger pair bonds, and increased social organization.

KEY WORDS: Intelligence; Life-history analysis; Reproductive strategy; Sexuality.

Silverman raised several topics needing discussion: a) intelligence, b) rule following, c) sexual restraint, d) the concept of *scala naturae*, and e) the question of values, each of which will be considered in turn. First, it is necessary to examine the broader context, for only by enlarging the network of evidence is it possible to make an adequate evaluation of the validity of *r/K* theory in the context of human race differences.

Behavioral, physiological, and anatomical differences among the races follow a remarkable pattern, a summary of which is presented in Table 1. The observation that on over 60 different variables including brain size and intelligence, rate of maturation, sexuality, personality, and social organization, Caucasoids average consistently *between* Mongoloids and Negroids, offers an array of theoretical and empirical problems for analysis; it has also engendered much scholarly debate (Lynn 1989a, b; Rushton 1985, 1988a, b;

Received August 27, 1989; revised October 19, 1989.

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Table 1. Relative Ranking of Races on Life History Variables

	Mongoloids	Caucasoids	Negroids
Brain weight and intelligence			
Cranial capacity	1,448 cc	1,408 cc	1,334 cc
Brain weight at autopsy	1,351 g	1,336 g	1,286 g
Millions of "excess neurons"	8,900	8,650	8,550
IQ test scores	107	100	85
Maturation rate			
Gestation time	?	Medium	Early
Skeletal development	?	Medium	Early
Age of walking	Late	Medium	Early
Age of first intercourse	Late	Medium	Early
Age of first pregnancy	Late	Medium	Early
Brain weight decline begins	Age 35	Age 25	?
Lifespan	Long	Medium	Short
Personality and temperament			
Activity level	Low	Medium	High
Aggressiveness	Low	Medium	High
Cautiousness	High	Medium	Low
Dominance	Low	Medium	High
Impulsivity	Low	Medium	High
Sociability	Low	Medium	High
Reproductive effort			
Multiple birthing rate	Low	Medium	High
Size of genitalia	Small	Medium	Large
Secondary sex characteristics	Small	Medium	Large
Intercourse frequencies	Low	Medium	High
Permissive attitudes	Low	Medium	High
Sexually transmitted diseases	Low	Medium	High
Androgen levels	Low	Medium	High
Social organization			
Law abidingness	High	Medium	Low
Marital stability	High	Medium	Low
Mental health	High	Medium	Low

1989a, b; Rushton and Bogaert 1987, 1988, 1989; Zuckerman and Brody 1988).

***r/K* REPRODUCTIVE STRATEGIES**

The symbols *r* and *K* can be used to designate two ends of a continuum involving trade-offs between offspring production and parental care. To illustrate on a macro-scale, oysters, producing 500 million eggs a years but providing no care, exemplify the *r* strategy, while the great apes, producing one infant every 5 or 6 years and providing lavish care, exemplify a *K* one.

Reproductive characters correlate with and select for other features of the life history (Wilson 1975). As Table 2 shows, these can be categorized into *family characteristics*, *individual characteristics*, and *population and social system characteristics*. If one generalizes from the literature on other animals to a micro-scale of human differences, the more *K* the family, the greater is the spacing between births, the fewer the offspring, the lower the rate of infant mortality, the more stable the family system, and the greater

Table 2. Life History Differences Between *r* and *K* Strategists

<i>r</i> Strategist	<i>K</i> Strategist
<i>Family characteristics</i>	
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
<i>Individual characteristics</i>	
Rapid rate of maturation	Slow rate of maturation
Early sexual reproduction	Delayed sexual reproduction
Short life	Long life
Small body size	Large body size
High reproductive effort	Low reproductive effort
High energy utilization	Efficient energy utilization
Low encephalization	High encephalization
<i>Population characteristics</i>	
Opportunistic exploiters of the environment	Consistent exploiters of the environment
Dispersing colonizers	Stable occupation of habitat
Variable population size	Stable population size
Competition variable, often lax	Competition keen
<i>Social system characteristics</i>	
Low degree of social organization	High degree of social organization
Low amounts of altruism	High amounts of altruism

the parental care. The more *K* the 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 larger the final body size, the more physiologically efficient the use of energy, the higher the intelligence, the more social-rule-following the behavior, and the greater the altruism. Thus, a single axis may underlie a variegated complex of characteristics both among and within species.

In studies of dandelions, fish, flies, milkweed bugs, and field mice, many *r/K* traits covary *within* species and are genetic in origin. Studies find this covariation also within Caucasian populations. For example, a comparison of mothers of dizygotic twins who, because they ovulate more than one egg at a time represent a more *r* strategy, with mothers of singletons who represent a more *K* strategy, showed that the former mothers had, on average, a lower age of menarche, a shorter menstrual cycle, a higher number of marriages, a higher rate of coitus, a greater fecundity, more miscarriages, an earlier menopause, and a higher mortality rate (Rushton 1987).

Brain size correlates negatively with gamete production across human races, and both covary with a suite of other attributes. For example, in rate of dizygotic twinning per 1,000 births, Mongoloids 4, Caucasoids 8, and Negroids 16 (Bulmer 1970). This suggests that there have been historical differences in *r/K* selection that have produced racial differences in mating effort and parental care. The data summarized in Table 1, when evaluated against the attributes of Table 2, suggest that, on average, Mongoloids are more *K* selected than are Caucasoids, who in turn are, on average, more *K* selected than are Negroids.

INTELLIGENCE

If the threefold increase in hominid brain size over the last 3 million years did not confer fitness benefits, it would not have occurred, for the brain is a metabolically expensive organ using 20% of the body's supply of energy while representing 2% of body mass. Brain size appears to have evolved as part of a package of life-history characteristics, requiring a more stable environment, a longer gestation, a higher offspring survival, a lower reproductive output, and a longer life (Eisenberg 1981; Pagel and Harvey 1988).

Several sources of evidence support the view that big brains add fitness by increasing the efficiency with which information can be processed. For example, a positive relation has been found between brain size and intelligence in man. Most of these studies estimated brain size externally from head size using a tape (Van Valen 1974), but one also recently used magnetic resonance imaging to scan the brain directly (Willerman et al. 1989). Then, IQ scores predict more than "classroom specializations"; they are the single-best predictor of job performance in a wide range of occupations ranging from menial tasks to managers, with predictive validities matching those to be found in the educational system (Hunter 1986). IQ scores also predict social mobility and earning power at age 50, as well as delinquency and longevity (Jensen 1980); studies of within-family social mobility show that children with lower IQ scores than their fathers go down in social class as adults, while those with higher IQs go up. Perhaps most decisively, IQ scores have been shown to be a Darwinian fitness character as indicated by dominance effects obtained on studies of twins and other kinships. For example, Jensen (1983) reported a well-controlled study of 1,854 cousin marriages in Japan showing clear inbreeding depression on various subtests, and Nagoshi and Johnson (1986) found "hybrid vigor" in offspring of Caucasoid-Mongoloid matings in Hawaii.

One set of nonobvious predictions that follows from this essentially genetic analysis is that the racial group differences in IQ will be most pronounced on the more heritable of homogeneous traits. This is a *differential* prediction: A positive correlation is expected only if the racial-group differences are due to the genes; if the differences are due to environmental factors, the correlation would be negative. In support of the genetic prediction, Rushton (1989c) found that the Japanese inbreeding depression scores on IQ subtests reported by Jensen (1983) predict the magnitude of the Negroid-Caucasoid difference on the same tests in the United States. Results such as these show that genetic estimates are more generalizable across populations than previously thought and also, that there is substantial relatedness among the populations.

RULE FOLLOWING

Silverman (1990) is surely mistaken when he claims that dominance hierarchies, courtship rituals, and other social behaviors are just as precisely

defined among *r* strategists as among *K* strategists. The evolution of "rule-following" behavior has been discussed by Ellis (1986), who showed the occurrence of nonlegal equivalents to rule-breaking and policing strategies in other primates. Ellis (1988) also examined rule-following behavior among humans from an *r/K* perspective, comparing the characteristics of criminals, who are lower in altruism and disrupt rather than maintain social organization and thus represent a more *r* strategy, with the general population representing a more *K* strategy. He found that, in contrast with the general population, criminals had the following *r*-strategy traits: shorter gestation periods (more were born premature), larger number of siblings (or half-siblings), more rapid development of sexual functioning, greater copulatory rate outside of bonded relationships (or a preference for such), less stable bonding, lower parental investment in offspring (as evidenced by higher rates of child abandonment, neglect and abuse), and shorter life expectancy. Thus, the predictions derived from Table 2 seem to be confirmed while those predicted in "the opposite direction" by Silverman, are not.

SEXUAL RESTRAINT

The manner in which a cross-species trait manifests itself must depend on the particular character of the species. With humans, Draper and Harpending (1988) and Blain and Barkow (1988) discuss the partitioning of reproductive strategies into "mating effort" and "parent effort," and review some of the correlates of the former strategy and its culmination in the father-absent child: poor school performance, antiauthoritarianism, aggressiveness, sexual precocity, and criminality. As Draper and Harpending (1988) distinguish "Father-present societies are those where most males act like dads and father-absent societies where most males act like cads" (p. 349).

Silverman acknowledges that the racial differences in sexuality exist but labels the populations as more or less "reproductively potent" rather than "sexually restrained," and he suggests that potency is *K*. It seems to me, however, that strong sexuality is more a "mating" than a "parenting" variable. Silverman also raises additional possibilities for research, including examining sexual dimorphism in the populations with the prediction being that Negroids > Caucasoids > Mongoloids because degree of sexual dimorphism is typically correlated with reproductive (sperm) competition. If height is the desideratum, the evidence may go against the *r/K* perspective on race that I provided because African populations are apparently not very dimorphic on this variable (Alexander et al., 1979).

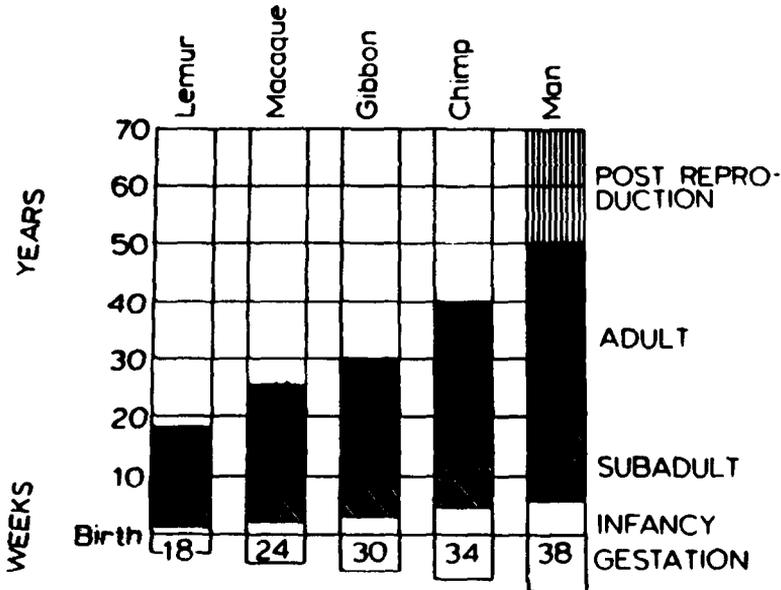
It will not do to cast anger or ridicule on race differences in sexual behavior, nor to turn away in embarrassment, for there are sobering consequences. International comparisons show that the worldwide prevalence of sexually transmitted diseases, such as syphilis, gonorrhea, and herpes, is Mongoloid < Caucasoid < Negroid. Since this is also the pattern for the

deadly AIDS pandemic, the implications of the population differences in sexual behavior should not be underestimated (Rushton and Bogaert, 1989).

SCALA NATURAE AND HUMAN ORIGINS

Whether there is direction or “progress” in evolution is an intriguing question that should not be foreclosed too readily (Bonner 1988; Nitecki 1988). Increments in hominid social organization have been conjectured in the context of how the unique suite of characters that make up human life histories came into being, in particular central place foraging with females remaining stationary and males cooperating to bring food, a strategy that involved bipedality, pairbonding, and reduced male–male competition (Johanson and Edey 1981; Lovejoy 1981). Primates are all relatively *K* strategists, and humans are most *K* of all. Indeed, as depicted in Figure 1, the order primates display a natural scale going from lemur to macaque to gibbon to chimp to humans, in which there is consistent trend toward *K* with progressive prolongation of gestation period and life phases. 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*-selected end of

FIGURE 1. Progressive prolongation of life phases and gestation in primates. From Lovejoy, C.O., The origin of man, *Science* 211: 341–350, 1981. Copyright by the American Association for the Advancement of Science.



the continuum. What has been proposed, however, is that some groups of people are more *K*-selected than others (Rushton 1985).

The behavioral and morphological data shown in Table 1—in which Caucasoids average between Negroids and Mongoloids—may be used to help decide between reconstructions of human evolution. Current thinking among physical anthropologists who use molecular biology (blood group, serum protein, mtDNA, and nuclear DNA) to buttress the paleontological data involves a single recent origin model for the emergence of modern humans instead of alternative multiregional models (Simons 1989; Stringer and Andrews 1988). An African beginning is envisaged, perhaps even as recently as 140,000–290,000 years ago, with an African–non-African split about 110,000 years ago, and a European–Asian split about 41,000 years ago. Thus, the sequence in which the races may have emerged in earth history parallels the phased linearity of the suite of *r/K* characters shown in Table 1. This parallel is not readily predictable from multiregional origin models based on long periods of separation, in which no consistent pattern of character appearance is expected.

The genetic evidence in favor of the single origin model is that a) rates of change in mtDNA place the modern human origin at 140,000–290,000 years ago; b) genetic variation is greatest within African populations, which is predictable if they appeared earliest; c) protein analyses date a Negroid–non-Negroid split at $110,000 \pm 34,000$ years ago and a Caucasoid–Mongoloid split at $41,000 \pm 15,000$ years ago; d) blood group data indicate that Caucasoids are intermediate to Negroids and Mongoloids in genetic distance; and e) genetic variation between human populations is low in comparison with variation within populations or with that found in other hominoids (Stringer and Andrews 1988). Paleontological data are consistent with the foregoing because the oldest human fossils (92,000 years) have been found in Africa and/or the Middle East, which is the likely pathway from Africa into Eurasia (Simons 1989).

But why would Mongoloids have ended up the most *K*-selected? One answer is that as populations moved north, they encountered more predictable and yet more challenging environments, including the ice ages, which ended only about 10,000 years ago. Predictable environments are an ecological precondition for *K* selection. Tropical savannahs, because of sudden droughts and devastating viral, bacterial, and parasitic diseases, are generally less predictable for long-lived species than are temperate and Arctic conditions. Although the Arctic climate varies greatly over 1 year, it is highly predictable among years.

SCIENCE AND VALUES

The ultimate aim of science is to causally explain the natural world rather than only to describe it. Silverman (1990) notes that the power of a theory

is in its predictions. The r/K theory is clearly precise enough to generate new research and to throw anomalies into relief. For example, from Table 2 it would be predicted that Mongoloids would be larger in body size than Caucasoids, who, in turn, would be larger than Negroids and yet, in the United States at least, the opposite appears to be true (Eveleth and Tanner 1976).

I agree with Silverman on the necessity to keep political values out of scientific thinking. His example of "innate schemata" was especially interesting because of the resistance encountered by the hypothesis of innate templates for human kin recognition systems (see commentators in Rushton 1989d). Most current opposition to genetic theories comes from the egalitarian left; apparent nonequivalence of gender, social class, race, and increasingly even-age groups appear for some to threaten not only the way human nature is conceptualized but also what is thought to be right or wrong.

From an evolutionary point of view, it is to be expected that populations will differ, genetically, in the mechanisms underlying their behavior. Adopting such an outlook does not disconfirm the democratic ideal. As E.O. Wilson (1978) put it, "We are not compelled to believe in biological uniformity to affirm human freedom and dignity" (p. 52). He went on to quote Bressler (1968) that "An ideology that tacitly appeals to biological equality as a condition for human emancipation corrupts the idea of freedom. Moreover, it encourages decent men to tremble at the prospect of 'inconvenient' findings that may emerge in future scientific research."

CONCLUSION

Ideas that have the capacity to disturb established social order necessarily evoke spirited resistance. That across human races brain size negatively correlates with gamete production and that both covary with a suite of life history attributes, the whole being predicted on the basis of evolutionary theory backed by empirical studies of animals (and plants) is unlikely to be explained credibly by invoking particularistic analyses of isolated variables. Moreover, if individuals are biased to learn or produce patterns of culture maximally compatible with their genotypes, then dissimilarities in cultural patterns among the populations may be as much a result as the cause of any differences.

REFERENCES

- Alexander, R., Hoogland, J.L., Howard, R.D., Noonan, K.M., and Sherman, P.W. Sexual dimorphisms and breeding systems in pinnipeds, ungulates, primates and humans. In *Evolutionary Biology and Human Social Behavior*, N.A. Chagnon and W. Irons (Eds.). North Scituate, Mass.: Duxbury Press.

- Blain, J., and Barkow, J. Father involvement, reproductive strategies, and the sensitive period. In *Sociobiological Perspectives on Human Development*, K.B. MacDonald (Ed.). New York: Springer-Verlag, 1988.
- Bonner, J.T. *The Evolution of Complexity*, Princeton, N.J.: Princeton University Press, 1988.
- Bressler, M. Sociobiology, biology and ideology. In *Genetics*, M.D. Glass (Ed.). New York: Rockefeller University Press, 1968.
- Bulmer, M.G. *The Biology of Twinning in Man*, Oxford: Clarendon Press, 1970.
- Draper, P., and Harpending, H. A sociobiological perspective on the development of human reproductive strategies. In *Sociobiological Perspectives on Human Development*, K.B. MacDonald (Ed.). New York: Springer-Verlag, 1988.
- Eisenberg, J.F. *The Mammalian Radiations*, Chicago Ill.: University of Chicago Press, 1981.
- Ellis, L. Evolution and the nonlegal equivalents of aggressive criminal behavior. *Aggressive Behavior* 12: 57-71, 1986.
- . Criminal behavior and *r*- vs. *K*-selection: An extension of gene-based evolutionary theory. *Personality and Individual Differences* 9: 697-708, 1988.
- Evelth, P.B., and Tanner, J.M. *Worldwide Variation in Human Growth*, Cambridge, U.K.: Cambridge University Press, 1976.
- Hunter, J.E. Cognitive ability, cognitive aptitudes, job knowledge, and job performance. *Journal of Vocational Behavior* 29: 340-362, 1986.
- Jensen, A.R. *Bias in Mental Testing*, New York: Free Press, 1980.
- . Effects of inbreeding on mental-ability factors. *Personality and Individual Differences* 4: 71-87, 1983.
- Johanson, D.C., and Edey, M.A., *Lucy, The Beginnings of Human Kind*, New York: Simon & Schuster, 1981.
- Lovejoy, C.O. The origin of man. *Science* 211: 341-350, 1981.
- Lynn, M. Race differences in sexual behavior: A critique of Rushton and Bogaert's evolutionary hypothesis. *Journal of Research in Personality* 23: 1-6, 1989a.
- . Criticisms of an evolutionary hypothesis about race differences: A rebuttal to Rushton's reply. *Journal of Research in Personality* 23: 21-24, 1989b.
- Nagoshi, C.T., and Johnson, R.C. (1986). The ubiquity of *g*. *Personality and Individual Differences* 7: 201-207.
- Nitecki, M.H. (Ed.) *Evolutionary Progress?* Chicago: University of Chicago Press, 1988.
- Pagel, M.D. and Harvey, P.H. How mammals produce large brained offspring. *Evolution* 42: 948-957, 1988.
- Rushton, J.P. Differential *K* theory: The sociobiology of individual and group differences. *Personality and Individual Differences* 6: 441-452, 1985.
- . Toward a theory of human multiple birthing: Sociobiology and *r/K* reproductive strategies. *Acta Geneticae Medicae et Gemellologiae* 36: 289-296, 1987.
- . Race differences in behavior: A review and evolutionary analysis. *Personality and Individual Differences* 9: 1009-1024, 1988a.
- . The reality of racial differences: A rejoinder with new evidence. *Personality and Individual Differences* 9: 1035-1040, 1988b.
- . The evolution of racial differences: A response to M. Lynn. *Journal of Research in Personality* 23: 7-20, 1989a.
- . Race differences in sexuality and their correlates: Another look and physiological models. *Journal of Research in Personality* 23: 35-54, 1989b.
- . Japanese inbreeding depression scores: Predictors of cognitive differences between blacks and whites. *Intelligence* 13: 43-51, 1989c.
- . Genetic similarity, human altruism, and group selection. *Behavioral and Brain Sciences* 12: 503-560, 1989d.
- , and Bogaert, A.F. Race differences in sexual behavior: Testing an evolutionary hypothesis. *Journal of Research in Personality* 21: 529-551, 1987.
- , and ———. Race versus social class differences in sexual behavior: A follow-up test of the *r/K* dimension. *Journal of Research in Personality* 22: 259-272, 1988.
- , and ———. Population differences in susceptibility to AIDS: An evolutionary analysis. *Social Science and Medicine* 28: 1211-1220, 1989.
- Silverman, I. The *r/K* theory of human individual differences: Scientific and social issues. *Ethology and Sociobiology*, 11: 1-10, 1990.

- Simons, E.L. Human origins. *Science* 245: 1343–1350, 1989.
- Stringer, C.B., and Andrews, P. Genetic and fossil evidence for the origin of modern humans. *Science* 239: 1263–1268, 1988.
- Van Valen, L. Brain size and intelligence in man. *American Journal of Physical Anthropology* 40: 417–424, 1974.
- Willerman, L., Schultz, R., Rutledge, J.N., and Bigler, E. Magnetic resonance imaged brain structures and intelligence. Paper presented at the 19th Annual Meeting of the Behavior Genetics Association, Charlottesville, Virginia, June 8–11, 1989.
- Wilson, E.O. *Sociobiology: The New Synthesis*, Cambridge, Mass.: Harvard University Press, 1975.
- , *On Human Nature*, Cambridge, Mass.: Harvard University Press, 1978.
- Zuckerman, M., and Brody, N. Oysters, rabbits and people: A critique of "Race Differences in Behavior" by J.P. Rushton. *Personality and Individual Differences* 9: 1025–1033, 1988.