

THE EVOLUTIONARY SELECTION OF HUMAN RACES: A RESPONSE TO MILLER

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Summary—Miller's (1993, *Personality and Individual Differences*, 15, 665–675) theory of the origin of "the African Personality" is not new. The focus on testosterone as a mediator of male–male agonistic interaction and strong sexuality has been a component of the r–K analysis of human race differences from the outset. Several aspects of Miller's paper are discussed.

INTRODUCTION

The step-wise function of racial characteristics shown in Table 1 is our starting point for this discussion. Mongoloids and Caucasoids have the largest brains, whether indexed by weight at autopsy, external head size or endocranial volume, but also have the slowest rate of dental development, indexed by onset of permanent molar teeth, and produce the fewest gametes, indexed by double ovulation and frequency of twin birthing (Rushton, in press).

No known environmental factor can cause so many diverse variables to correlate in so comprehensive a fashion, or produce the inverse relations between brain size, maturational speed, and reproductive potency. There is, however, a genetic factor: evolution.

The explanation for this racial pattern lies in primate life-history theory. A life history is a genetically organized suite of characters that have evolved so as to allocate energy to survival, growth, and reproduction. For example, across 21 primate species, age of eruption of first molar correlates 0.89, 0.85, 0.93, 0.82, 0.86, and 0.85 with body weight, length of gestation, age of weaning, birth interval, sexual maturity, and life span. The highest correlation is 0.98 with brain size (Smith, 1989).

Brain size, in turn, places an upper limit on the size of the group that can be cohesively maintained through time (Dunbar, 1992), as well as on speed of physical maturation, degree of infant dependency and longevity (Harvey & Krebs, 1990). Racial differences in human brain size, age of first molar eruption and speed of physical development are increasingly well established (Rushton, 1992, in press).

The reality of the differences in Table 1 has been contested (Fairchild, 1991; Zuckerman, 1990), but Miller (1993) and others (Ellis, 1987; Lynn, 1987, 1991) have offered gene-based evolutionary explanations for them. Nonetheless, Miller disagrees with the model Rushton has presented. This response clarifies some of the issues.

MILLER'S PAPER

Although Miller's model is expressed in a different language, it is really a variation on r versus K selection. There are also some inelegancies. For example, Miller focuses on drought and famine in modern agricultural communities instead of on factors such as diseases, parasites, and famines which have shaped evolution in Africa for millenia. But this becomes irrelevant when he does conclude that Africans do indeed show more r-characteristics than do other races. However, Miller argues that these characters didn't evolve via r-selection.

Miller confuses ultimate and proximate explanations for the racial differences in testosterone; he suggests that they are the cause of racial differences in other traits when, of course, the differences in testosterone are simply another result of r–K selection. Testosterone is the likely neurohormonal mediator of many of the other genetically based characteristics. Human testosterone levels are

from 25 to 76% heritable, depending on the particular measure examined (Meikle, Bishop, Stringham & West, 1987). Miller theorizes that racial differences are due to a trade-off between parental investment and mating effort. There's nothing new here. Rushton (1985, 1988, 1989a, b, 1991) has stated this numerous times, not surprisingly, because it is a major trade-off involved in the r-K selection process.

Miller's alternative is that African males were selected for fighting and mating rather than provisioning and that this "alternative explanation" was not discussed. Consider, therefore, this quote from Rushton (1989a, p. 10) (a paper cited by Miller):

"Lovejoy (1981) describes the consequences of human pair-bonding; more offspring could be successfully raised per unit of time because the female would not have had to be so mobile. The more pair-bonding there was, the fewer male-male agonistic interactions would need to occur in the perpetual competition for mates. This would reduce the need for anterior dentition, heavy musculature, and general robustness, and would make cooperation and wider social bonding possible. In populations taking the process furthest there would be a concomitant reduction in female epigamic displays (breasts, buttocks) and in the size of the male genitalia. Decreased emphasis on sexual competitiveness would also allow for an increase in the complexity of social organization and again increment the number of children successfully raised to reproductive maturity."

ARCTIC VERSUS TROPICAL SELECTION

There is widespread confusion about climatic conditions most likely to produce K-selection. For example, Barash (1982, p. 306) wrote, in his textbook *Sociobiology and Behavior*:

"Although the distinction between r and K-selection was first made explicit by MacArthur and Wilson (1967), it was actually suggested nearly 20 years previously by the great evolutionary geneticist Theodosius Dobzhansky (1950). He noted that, in general, inhabitants of the temperate and arctic zones suffered mortality that was largely independent of their population density, occurring because of large-scale environmental fluctuations, such as drought, storms,

Table 1. Relative ranking of races on diverse variables (after Rushton, in press)

	Oriental	Whites	Blacks
Intelligence			
IQ test scores	100-107	100	70-90
Decision times	Faster	Intermediate	Slower
Cultural achievements	Higher	Higher	Lower
Brain size			
Autopsy data (grams)	1304	1309	1180
External head measure (cm ³)	1343	1341	1284
Endocranial volume (cm ³)	1415	1362	1268
Maturation rate			
Gestation time	?	Intermediate	Earlier
Skeletal development	?	Intermediate	Earlier
Age of walking	Later	Intermediate	Earlier
Dental development	Later	Intermediate	Earlier
Age of first intercourse	Later	Intermediate	Earlier
Age of first pregnancy	Later	Intermediate	Earlier
Life-span	Longer	Intermediate	Shorter
Reproductive effort			
Androgen levels	Lower	Intermediate	Higher
Two-egg twinning per 1000 births	<4	8	>16
Size of genitalia	Smaller	Intermediate	Larger
Secondary sex characteristics	Smaller	Intermediate	Larger
Intercourse frequencies	Lower	Intermediate	Higher
Permissive attitudes	Lower	Intermediate	Higher
Sexually transmitted diseases	Lower	Intermediate	Higher
Personality			
Activity	Lower	Intermediate	Higher
Aggressiveness	Lower	Intermediate	Higher
Cautiousness	Higher	Intermediate	Lower
Dominance	Lower	Intermediate	Higher
Impulsivity	Lower	Intermediate	Higher
Sociability	Lower	Intermediate	Higher
Social organization			
Law abidingness	Higher	Intermediate	Lower
Marital stability	Higher	Intermediate	Lower
Mental health	Higher	Intermediate	Lower
Administrative capacity	Higher	Higher	Lower

sudden influx of large numbers of predators. In such conditions, mortality was relatively independent of individual characteristics, so parents ensured their reproductive success by generating a large number of offspring (that is, r-selection). By contrast, Dobzhansky emphasized that tropical species competed most intensely with one another rather than with the environment. The relatively benign habitat was virtually filled with organisms, so the difference between success and failure was by producing not a large number of offspring but rather a smaller number of well-endowed descendants (that is, K-selection)."

This, however is incorrect. *Predictability* is the ecological necessity for K-selection. This can occur in either a stable environment or a *predictably* variable one. What has apparently been misunderstood is that sub-tropical Savannahs, where humans evolved, because of sudden droughts and devastating viral, bacterial, and parasitic diseases, are less predictable for long lived species than are temperate and especially Arctic environments. Although the Arctic climate varies greatly over 1 year, it is highly *predictable*, but harsh, among years.

Miller made the classic mistake (many ecologists do also) of confusing variable and unpredictable. A Martian biologist who understood r-K selection would not, as Miller asserts, predict that Arctic animals would be r-selected. And, of course, they are not. Long lived Arctic mammals like polar bears, caribou, muskox, seals, and walruses are highly K-selected, as are Arctic people. The reason is that the Arctic environment is not only highly variable, but more importantly, is highly *predictable* as well. (More generally, data show that plants, lizards and mammals become more K-selected with increasing elevation and latitude; Zammuto & Millar, 1985.)

Annual food shortage in the Arctic is predictable, i.e. people knew that it would be difficult to find food for 4 to 6 months every year. Thus, this selected for K-traits. If an individual had the traits necessary to plan ahead as well, the individual's genes survived. Contrast this with tropical Savannahs where disease epidemics and prolonged droughts were (and are) unpredictable. Under such conditions an individual that produced many descendants during favorable conditions would be most likely to have some that survived (unpredictable) catastrophes. Alternatively, if an Arctic dwelling person put maximal effort into mating/reproduction, he or she likely wouldn't survive for 1 year; their offspring certainly would not.

OUT OF AFRICA

The best current evidence for evolution of the human races is a single origin, from the earlier *Homo* line, about 200,000 years ago, somewhere in east Africa. A dispersal event then occurred in the Middle East about 110,000 years ago, followed by a migration throughout the rest of the Old World, with a replacement of earlier *erectus* and Neanderthal populations. The Mongoloid-Caucasoid split likely occurred about 41,000 years ago (Stringer & Andrews, 1988). Genetic, archeological, and fossil evidence support the general timing of these migration patterns (Cavalli-Sforza, Menozzi & Piazza, 1993).

These modern human radiations were caused, in part, by a major coevolution of culture and brain biology. The human brain had increased substantially before the recent migration out of Africa. During this period, modern language likely also evolved to near its present sophistication and was a major support of the migrations (Cavalli-Sforza *et al.*, 1993).

The r-K scale of reproductive strategies can be mapped on the evolutionary racial succession. Bonner (1980) has shown that animals emerging later in earth history had larger brains and greater culture. Thus, Rushton (1989a) proposed that more K-selected groups emerged later in the evolutionary process than did less K-selected groups. Archaic Negroids, earliest to emerge, were least K-selected; archaic Caucasoids, emerging later, were next least K-selected; and archaic Mongoloids, emerging latest, were most K-selected. Such an ordering seems to fit with and explain how the variables clustered. The sequence in which the races emerged in earth history paralleled the step-wise linearity of their differences in brain size.

EXACT MECHANISMS

Miller's discussion of the evolutionary and neurohormonal mechanisms by which the races became differentiated is useful. The more attention that is given to this scientific problem, the

sooner that it will be solved. In most discussions of evolution of hominid life histories, the term "cause" is eschewed and a series of feedback loops are hypothesized. This was the approach taken by Lovejoy (1981) in his analysis of how, 3 to 5 million years ago, australopithecenes began the line leading to modern humans. Although equipped with a brain of only 500 cm³ (equal to that of a chimpanzee and about one-third that of a modern human), australopithecenes evolved pair bondings. This resulted in females and infants being provisioned with food by males, which resulted in females becoming less mobile, but also able to raise more children at a time. Those hominids more capable of solicitous parental care increased the survival rate of their infants vis-a-vis infants of less solicitous mothers. Increased parental care required more intelligence, hence more brain development. That meant a longer childhood. The best way to learn during childhood is to play. Thus one must learn acceptable social behavior which again loops back to intelligence.

But bigger brains require longer gestation times, larger young at birth, later weaning, later sexual maturity, and longer interbirth intervals which leads to longer lifespans. Clearly, identification of a causal network is difficult. Irregardless, as Johanson and Edey (1981, p. 326) succinctly summarized Lovejoy: "More brains, fewer eggs, more 'K'."

CONCLUSION

Miller should do as promised at the end of his paper, i.e. detail the differential predictions that emanate from his "high theorizing" relative to the r-K model. Of great value, however, is that Miller agrees with Ellis, Lynn and Rushton that if there is a better explanation than Rushton's (1985, 1988) for the correlated suite of characters featured in Table 1, it only will be derived from a better understanding of human evolution via natural selection.

REFERENCES

- Barash, D. P. (1982). *Sociobiology and behavior* (2nd Ed). New York: Elsevier.
- Bonner, J. T. (1980). *The evolution of culture in animals*. Princeton, NJ: Princeton University Press.
- Cavalli-Sforza, L. L., Menozzi, P. & Piazza, A. (1993). Demic expansions and human evolution. *Science*, 259, 639-646.
- Dobzhansky, T. (1950). Evolution in the tropics. *American Scientist*, 38, 209-221.
- Dunbar, R. I. M. (1992). Neocortex size as a constraint on group size in primates. *Journal of Human Evolution*, 20, 469-493.
- Ellis, L. (1987). Criminal behavior and r/K selection: An extension of gene-based evolutionary theory. *Deviant Behavior*, 8, 149-176.
- Fairchild, H. H. (1991). Scientific racism: The cloak of objectivity. *Journal of Social Issues*, 47, 101-115.
- Harvey, P. H. & Krebs, J. R. (1990). Comparing brains. *Science*, 249, 140-145.
- Johanson, D. C. & Edey, M. A. (1981). *Lucy: the beginnings of humankind*. New York: Simon & Schuster.
- Lovejoy, C. O. (1981). The origin of man. *Science*, 211, 341-350.
- Lynn, R. (1987). The intelligence of the Mongoloids: A psychometric, evolutionary and neurological theory. *Personality and Individual Differences*, 8, 813-844.
- Lynn, R. (1991). The evolution of racial differences in intelligence. *Mankind Quarterly*, 32, 99-121.
- MacArthur, R. H. & Wilson, E. O. (1967). *The theory of island biogeography*. Princeton, NJ: Princeton University Press.
- Meikle, A. W., Bishop, D. T., Stringham, J. D. & West, D. W. (1987). Quantitating genetic and nongenetic factors that determine plasma sex steroid variation in normal male twins. *Metabolism*, 35, 1090-1095.
- Miller, E. M. (1993). Could r selection account for the African personality and life cycle? *Personality and Individual Differences*, 15, 665-675.
- Rushton, J. P. (1985). Differential K theory: The sociobiology of individual and group differences. *Personality and Individual Differences*, 6, 441-452.
- Rushton, J. P. (1988). Race differences in behavior: A review and evolutionary analysis. *Personality and Individual Differences*, 9, 1009-1024.
- Rushton, J. P. (1989a). The evolution of race differences: A response to M. Lynn. *Journal of Research in Personality*, 23, 7-20.
- Rushton, J. P. (1989b). Race differences in sexuality and their correlates: Another look and physiological models. *Journal of Research in Personality*, 23, 35-54.
- Rushton, J. P. (1991). Do r-K strategies underlie human race differences? A reply to Weizmann *et al.* *Canadian Psychology*, 32, 29-41.
- Rushton, J. P. (1992). Cranial capacity related to sex, rank and race in a stratified random sample of 6,325 U.S. military personnel. *Intelligence*, 16, 401-413.
- Rushton, J. P. (in press). *Race, evolution and behavior: A life history perspective*. New Brunswick, NJ: Transaction Publishers.
- Smith, B. H. (1989). Dental development as a measure of life history in primates. *Evolution*, 43, 683-688.
- Stringer, C. B. & Andrews, P. (1988). Genetic and fossil evidence for the origin of modern humans. *Science*, 239, 1263-1268.
- Zammuto, R. M. & Millar, J. S. (1985). Environmental predictability, variability, and *Spermophilus columbianus* life history over an elevational gradient. *Ecology*, 66, 1784-1794.
- Zuckerman, M. (1990). Some dubious premises in research and theory on racial differences. *American Psychologist*, 45, 1297-1303.