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## MINI COMMUNICATIONS

The objective of this section is short empirical or theoretical papers which inform and would benefit from the input of peers. If readers wish to comment, write directly to the author(s).

### Do $r/K$ Reproductive Strategies Apply to Human Differences?

by: J. Philippe Rushton, Department of Psychology, University of Western Ontario, London, Ontario N6A 5C2, Canada.

The symbols  $r$  and  $K$  originate in the mathematics of population biology and refer to two ends of a continuum in which a compensatory exchange occurs between gamete production (the  $r$ -strategy) and parental care (the  $K$ -strategy). Both across and within species,  $r$  and  $K$  strategists differ in a suite of correlated characteristics including litter size, birth spacing, speed of physical maturation, sexual precocity, longevity, energetic efficiency, encephalization, degree of social organization and altruism (Eisenberg, 1981; Wilson, 1975). Primates are all relatively  $K$ -strategists, and humans are the most  $K$  of all (Lovejoy, 1981). What has been proposed, however, is that some people are genetically more  $K$  than others (Rushton, 1985, 1988a).

Generalizing from the animal literature, the more  $K$  a person is, the more likely he or she is expected to come from an intact family, with more intensive parental care, with fewer and more widely spaced offspring, and with a lowered incidence of multiple birthing and infant mortality.  $K$ 's are expected to have a longer gestation period, a higher birthweight, a more delayed sexual maturation, a lower sex drive, and a longer life. Moreover, the  $K$  person is postulated to be more intelligent, altruistic, law-abiding and behaviorally restrained. Thus diverse organismic characteristics, not otherwise relatable, are presumed to covary along the  $K$  dimension.

Evidence for the expected covariation among the  $K$  attributes has been found in several studies. For example, Rushton (1987a) 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 expected, 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, a greater fecundity, more wasted pregnancies, an earlier menopause, and an earlier mortality. In another domain, Ellis (1988) contrasted the characteristics of criminals who, because they are lower in altruism and social organization can be considered to represent the  $r$ -strategy, with the general population representing the  $K$ -strategy. The former were found to have shorter gestation periods (more premature births), a more rapid development to sexual functioning, a greater copulatory rate outside the bonded relationships (or at least 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.

Additional evidence for  $r/K$  theory comes from the comparison of human populations known to differ in gamete production, namely, lower socioeconomic higher socioeconomic, and Negroids Caucasoids Mongoloids. (While the monozygotic twinning rate is nearly constant at about 3 1/2 per 1,000 in all groups, dizygotic twinning (caused by the release of two eggs at once and representing the  $r$ -strategy) occurs more frequently among

lower than among upper SES women in both European and African samples, and the rate per 1,000 births among Mongoloids is 4; among Caucasoids, 8; and among negroids, 16 (Bulmer, 1970).

To examine whether this pattern of population differences occurred in other aspects of reproductive effort, Rushton and Bogaert (1987) compiled a review of the literature and carried out novel analyses of data from the Kinsey Institute for Sex Research. The predicted pattern of racial differences was consistently observed with estimates made of intercourse frequencies (premarital, marital, extramarital), developmental precocity (age at first intercourse, age at first pregnancy, number of pregnancies per unit of time), primary sexual characteristics (salient voice, muscularity, buttocks, breasts), and biologic control of behavior (menstrual cycle length, periodicity of sexual response, predictability of life history from onset of puberty), as well as in androgen levels and sexual attitudes. These differences do not appear to be due to social class since non-college educated whites scored more *K* than elite groups of college educated blacks (Rushton & Bogaert, 1988; see also Weinberg & Williams, 1988). Within the Caucasian population, social class differences in sexual behavior also occur which parallel the dizygotic twinning frequency (Rushton & Bogaert, 1988; Weinrich, 1977).

The pattern of racial differences observed to occur in sexual behavior has also been found to exist on numerous other indices of *K*. Across ages, samples, countries, and time periods, measures made of health (infant mortality, illness, longevity), brain size and intelligence (cranial capacity, brain weight, test scores), maturation rate (age to hold head erect, age to walk alone, age of death), social organization (marital stability, mental disorder, law abidingness), and temperament (activity level, anxiety, sociability), all suggest that, on average, Mongoloids are more *K* than Caucasoids, who, in turn, are more *K* than Negroids (see Rushton, 1988a, 1988b; for a critique, see Zuckerman & Brody, 1988).

Recently conducted studies have extended the data in favor of *r/K* theory. Thus Mazmanian (1987) found that numerous life-history variables were heritable in a sample of 7,620 Australian twins, and Bogaert (1987) found that though the magnitude of the effects were small, many life history variables were related to each other and cohered in a pattern interpretable as an *r/K* dimension, even within the restricted range of a Canadian university sample.

Further research suggests that *r/K* attributes underlie individual and social class differences in health and longevity (Rushton, 1987b). For example, Black (1980) examined mortality rates in Britain from 1930 to 1980 and found that while everyone was living longer, the professional classes had gained more years than semi-skilled and unskilled workers. In 1930, people in the lowest social class had a 23 per cent greater chance of dying at every age than people in the highest social class. By 1970, this excess risk had grown to 61 percent. A decade later, it had jumped to 150 percent. The increasing correlation of health and social class presents an apparent paradox, for a National Health System has long existed in Britain to minimize inequalities in health-related services. The paradox is resolved from the gene-based perspective being presented here, however, when it is appreciated that with the removal of major environmental barriers to health the variance accounted for by genetic factors must increase (Scriver, 1984). In line with theoretical expectation, large scale adaptation studies consistently show genetic influences on all causes of death (Sorensen, Nielsen, Andersen & Teasdale, 1988). It would appear that individual differences in human life-history traits may belong

in a broader evolutionary context that has been considered to date.

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## BOOK REVIEWS

### *Cognition, Language & Consciousness: Integrative Levels, The T.C. Schneirla Conference Series, Volume 2.*

Hillsdale, New Jersey and London: Lawrence Erlbaum Associates, Publishers, 301 pages, 1987. Edited by Gary Greenberg and Ethel Tobach.

#### Reviewed by Gerard G. Neuman

Institute for Psychodynamics and Origins of Mind, La Jolla, California, U.S.A.

This book adds little glory to T.C. Schneirla, to whose memory and attempts at creating a valid science based on the model of Integrative Levels, the second T.C. Schneirla Conference was devoted. The contributions are very uneven, most of the time only tangentially, if at all, related to the focus of the Conference. The book itself, consisting of these papers given at the Conference, is poorly edited.

After reading the book, which had enticed me by the timely and very important subject matter, I took the occasion to go back to Schneirla's papers on the subject in the early 1950s, only to find that he was far ahead in his concepts, compared to his present followers and students. His presentations were clear, well thought out, and written in good simple English style. The task of building on his ideas is a difficult one as there seems so little room left between the dangers he saw in "reductionism to the physical sciences" on the one hand and the dangers of "vitalism" and/or "anthropomorphism" on the other. He prepared to build a science on the more subtle interaction of built in drives (he eschewed the concept of instincts) with the demands of the "Umwelt" (environment), to make for the best forms of adaptation.

His theory of levels also seemed to be built on a subtle interaction of neurobiologically developmental levels of differentiation (he mentions Sherrington) and meta levels of integrative concepts.

Since in the contributions included here, the biology of the brain and central nervous system has practically dropped out, the conceptual aspects of the Integrative Levels have no footing and therefore either develop into vaguely coherent linguistic integration, if at all mentioned, or seem to be dragged in as red herrings in order to seemingly relate to the Conference — certainly not as the foci of their research. To the interested contributors who consulted her, Ethel Tobach tried to convey the idea of levels, but as becomes obvious from her own paper in this volume, the essence of the ideas have evaporated and we are left with wishful semantics.

Not mentioned are present scientists who could be of help, such as Paul MacLean and his concept of the triune brain, Ernest Mayer who, while not a vitalist himself, tries to maintain that

repeated in his recent book, *Toward a New Philosophy of Biology: Observations of an Evolutionist*. S.J. Gould is mentioned but not very decisively. There is little mention of a new form of reductionism, namely the overwhelming interest in cell biology and the deciphering of the genetic code language, which to present day scientists seems to promise the answer to all our problems. Schneirla would have found it difficult to integrate these millions of computer particles into levels. But these are subject matters for another symposium.

Let us look at the papers themselves. Of the fifteen papers dealing in very diverse subject matters, often far from "comparative psychology," I found the best to be Charles Tolman's *Human Evolution and the Comparative Psychology of Levels*. Tolman traces the prehistoric development of man from the earliest beginnings to the present time, using the finds and findings of more recent prehistorians. His levels are based on a rather ingenious model by Frederick Engels, developed in his *Ape to Man*, published in 1876 — ingenious because Engels based his concept of the development of "labor" on the development from the use of the hand to the use of tools. Tolman mentions in passing V.I. Kochetkova who, with her *Palaeoneurology*, could provide a more important link in the progressive development of "levels of human functioning" by adding the necessary ingredients of the underlying neurology. All in all, anthropologist Tolman's contribution is enormous when compared with the fears of his colleagues to "interpret" the fossil findings beyond geologic-like appropriateness.

I also found Roger S. Fouts' paper on *Chimpanzee Signing and Emergent Levels* a good summary of research related to teaching language to apes. We learn about his successes as well as those of Premack's and the Gardners'. Taken in combination with the very interesting paper of Irene Pepperberg, *Interspecies Communication: A Tool for Assessing Conceptual Abilities in the African Grey Parrot*, I wonder whether there is not a new form of anthropomorphism creeping in when these researchers so fervently hope that these animals could talk and understand more like human beings or, shall we say, themselves? "If you can get attention and playful exercise in making human-species-like sounds, who needs to worry about deeper meanings" we can imagine the Pepperberg parrot "thinking". Maybe we are just as lonesome in our way as the parrot in his and in our quest resemble "Why can't a woman be more like a man?" (Professor Higgins of *My Fair Lady*.)

We have the parrot think in terms of our own experience. What is overlooked is the developmental level of the ape and avian brain and central nervous system as compared with the human. When it may become functional to think and talk in propositional terms for the sake of his own species' development, the chimp and the parrot, over hundreds and thousands of years, may develop these faculties and teach them to their youngsters. By the way, more luck might have been had by including papers on the language experiments with dolphins.

Gerard Piel in his short introductory paper, *Each Animal in its Own Psychological Setting .....* makes this point, as implied in his title. Unfortunately, looking at the rest of the field, "comparative" as comparative psychology still seems to mean: "How comparatively close to us are the subjects under study?" (Egocentricity supported by underlying narcissism.)

Most of the remaining papers only relate tangentially to the subject and don't seem to make too many important new points in their own right. Bernard J. Baars talks about some aspects of artificial intelligence research; a few papers deal in the linguistic research area and are either supportive or critical of the assumed leader of the field, Chomsky. The philosopher, Allen, in his *Materialism and Reductionism in the Study of Animal*