the universe), 55% ($n = 11$) from the British Isles (Great Britain and Ireland), and 100% of the Germans ($n = 1$). No other nationality was available for the study, possibly suggesting that interest in altruism, genetics, and group selection is restricted to these countries. A 2 × 3 chi square test, pooling commentators from Germany, Ireland, and Great Britain to avoid cells with too small frequencies (Siegel 1956), shows that the frequencies differ significantly among the various nationalities ($\chi^2 = 6.18$, $p < 0.05$).

If a similar analysis is performed assessing genetic similarity through professional similarity, no significant correlation appears. Of the 15 psychologists, 40% were favorable to Rushton, 33% of the 6 biologists, and 50% of the 6 commentators from anthropology, education, and sociology; 6 cases could not be classified for lack of information in the addresses given. A chi square test showed no significant differences among disciplines ($\chi^2 = 2.2$, $p > 0.1$).

As the data clearly show, a gradient in the index of favorableness is inversely proportional to the distance from Rushton's working place, suggesting that genetically similar people are more likely to disagree in scientific matters. This result would on first view seem to contradict Rushton's theory. But if group selection is at work, it is highly probable that humans have evolved cultural or genetic mechanisms maximizing disagreement in rational activities: "The wider the range of differing views, the deeper the insight" (Socrates, unpub). As these mechanisms will work more efficiently among similar individuals, increasing academic conflicts among similar minded people, our results would be consistent with the theory under discussion.

Corollary. Any theory can be stretched *ad libitum* to explain a given set of data. This is in itself not negative for science, as long as we agree that the main value of any scientific theory lies in its heuristic quality. In that sense, Rushton's approach in explaining human behavior is very important. Reality, though, might be different, and approaching it will require the insight of as many different thinking minds as possible. Thus, a wider assortment of criticism is very much needed. I recommend that *BBS* make efforts to extend scientific interchange to countries outside the world of the Anglo-Saxons, the more so if racial and ethnic theories are in discussion.

EDITORIAL COMMENTARY

All suggestions as to how *BBS* can increase participation of under-represented parts of the academic world will be gratefully accepted and followed. Currently (1) we explicitly solicit the nominations of non-US and non-Anglo commentators from all authors, referees, and editors in compiling the commentator list, (2) we do computer literature searches to find authors, commentators, and referees all over the world (and add them to the *BBS* Associateship, now more than 6,000) and (3) most promising of all, *BBS* Calls for Commentators are regularly being disseminated on such electronic networks as Bitnet, Earn and Internet. (Please send your email address to: harnad@clarity.princeton.edu or harnad@pucc.bitnet.)

Author's Response

Ethnic nepotism in science?

J. Philippe Rushton

Department of Psychology, University of Western Ontario, London, Ontario N6A 5C2, Canada

Electronic mail: *rushton@vaxr.uwo.ca*

Genetic similarity theory was first co-authored with two Anglo-Saxons living in the UK (Rushton, Russell & Wells 1984). The theory has been presented most often at conferences in Europe, next most often in the United States, and least often in Canada. Perhaps these facts help explain the pattern observed by **Jaffe.** Given the multiethnic composition of modern day Britain, Canada, and the United States, and no doubt Germany and Venezuela, too, the procedures devised by Jaffe, if not intended merely to be humorous, must be considered insensitive for testing his hypothesis.

If one were to look for the role of genetic similarity in scientific networking, journal citation analysis would be a better tool. Garfield (1984) showed that nationals preferentially cite fellow nationals, though most citations occur to international-quality articles. English is the *lingua franca* of science, including Third World science; Spanish, a distant second, accounted for 11% (Garfield 1984). Facts such as these have led to charges of linguistic imperialism. Michel Debré, a former prime minister of France, suggested that if French scientists were encouraged to publish in English it might threaten "the existence and permanence of the French nation" (cited by Garfield 1984, p. 261).

National and ethnic rivalries for priority are known from the invention of the calculus to the discovery of the AIDS virus. Equally disputatious are claims and charges about whether Negroids or Caucasoids founded the ancient civilizations of Egypt, whether Caucasoids or Mongoloids were the first to use gunpowder in weapons, and whether Islamic culture was based on African slaves (Lewis 1990; Stanton 1965). The position taken on scholarly topics, as on political issues, may be influenced by ethnicity.

Do citations within a country follow ethnic lines? This question unites three of my research interests: genetic similarity theory, the science of science (Jackson & Rushton 1987; Rushton 1984; 1989), and profiles of ethnic achievement (Rushton 1988). To pursue the research one would have to be able to categorize names by ethnic origin. Following Weyl (1989), typical English names include Fowler, Spence, and York; Jewish names include Cohen, Gold, and Katz; and Chinese names include Chen, Ho, and Wu. Weyl (1989) was interested in ethnic achievement within the United States and found that Jewish names were "overrepresented" by 500% on such rosters as *Who's Who in America* and *American Men and Women in Science.* Chinese names are similarly overrepresented in science and technology although underrepresented in law, a finding that Weyl suggested may be related to the typical Asian profile on tests of mental ability (high spatial relative to low verbal). If one were to use ethnic names as a basis for a citation analysis one would need to estimate the baselines of the different groups.

To really test genetic similarity theory, however, we must await the results of ongoing studies in the UK (Leek & Smith 1989); the USSR (Svetlov, personal communication), and elsewhere using DNA fingerprint techniques (Jeffreys 1987). To test whether spouses are genetically closer than randomly chosen individuals, Vladimir Svetlov (personal communication) re-examined DNA fingerprints already obtained during forensic and population studies and found spouses are about 10–15% more similar to each other than are randomly chosen samples. Svetlov also reports to me that mice from distinct family

groups reared together *in vivarium* tend to form couples of related individuals rather than of unrelated ones, and a similar tendency seems to be occurring in studies of wild mice. These and numerous other imaginative studies will be used to throw light on the biology of human social relationships, including those occurring in science.

References

Garfield, E. (1984) Third world research. Part 1. Where it is published and how often it is cited. In: *Essays of an information scientist*, vol. 6, ed. E. Garfield. ISI Press. [rJPR]

Jackson, D. N. & Rushton, J. P. (1987) *Scientific excellence*. Sage. [rJPR]

Jaisson, P. (1987) The construction of fellowship between nestmates in social Hymenoptera. In: From individual to collective behavior in social insects. *Expoerientia Supplementum* 54:313. [KJ]

Jeffreys, A. J. (1987) Highly variable minisatellites and DNA fingerprints. *Biochemical Society Transactions* 15:309–17. [rJPR]

Leek, M. & Smith, P. K. (1989) Phenotypic matching, human altruism, and mate preference. *Behavioral and Brain Sciences* 12:534–35. [rJPR]

Lewis, B. (1990) *Race and slavery in the Middle East*. Oxford University Press. [rJPR]

Rushton, J. P. (1984) Evaluating research eminence in psychology: The construct validity of citation counts. *Bulletin of the British Psychological Society* 37:33–36. [rJPR]

(1988) Race differences in behaviour: A review and evolutionary analysis. *Personality and Individual Differences* 9:1009–24. [rJPR]

Rushton, J. P. (1989a) Genetic similarity, human altruism, and group selection. *Behavioral and Brain Sciences* 12:503. [KJ]

(1989b) Similarity and ethnicity mediate human relationships, but why? *Behavioral and Brain Sciences* 12:548. [KJ]

(1989c) A ten-year scientometric revisit of British psychology departments. *The Psychologist: Bulletin of the British Psychological Society* 2:64–68. [rJPR]

Rushton, J. P., Russell, R. J. H., & Wells, P. A. (1984) Genetic similarity theory: Beyond kin selection. *Behavior Genetics* 14:179–93. [rJPR]

Siegel, S. (1956) *Non parametric statistics for the behavioral sciences*. McGraw-Hill Kogakusha, Ltd. [KJ]

Stanton, W. (1965) *The leopard's spots*. University of Chicago Press. [rJPR]

Weyl, N. (1989) *The geography of human achievement*. Scott-Townsend. [rJPR]

Commentary on **Dean Falk (1990) Brain evolution in *Homo*: The "radiator" theory. BBS 13:333–381.**

Abstract of the original article: The "radiator" theory of brain evolution is proposed to account for "mosaic evolution" whereby brain size began to increase rapidly in the genus *Homo* well over a million years *after* bipedalism had been selected for in early hominids. Because hydrostatic pressures differ across columns of fluid depending on orientation (posture), vascular systems of early bipeds became reoriented so that cranial blood flowed preferentially to the vertebral plexus instead of the internal jugular vein in response to gravity. The Hadar early hominids and robust australopithecines partly achieved this reorientation with a dramatically enlarged occipital/marginal sinus system. On the other hand, hominids in the gracile australopithecine through *Homo* lineage delivered blood to the vertebral plexus via a widespread network of veins that became more elaborate through time. Mastoid and parietal emissary veins are representatives of this network, and increases in their frequencies during hominid evolution are indicative of its development. Brain size increased with increased frequencies of mastoid and parietal emissary veins in the lineage leading to and including *Homo*, but remained conservative in the robust australopithecine lineage that lacked the network of veins. The brain is an extremely heat-sensitive organ and emissary veins in humans have been shown to cool the brain under conditions of hyperthermia. Thus, the network of veins in the lineage leading to *Homo* acted as a radiator that released a thermal constraint on brain size. The radiator theory is in keeping with the belief that basal gracile and basal robust australopithecines occupied distinct niches, with the former living in savanna mosaic habitats that were subject to hot temperatures and intense solar radiation during the day.

Uniqueness of human intelligence may be underrated in current estimates

Konrad R. Fialkowski

Member of the Committee for Evolutionary and Theoretical Biology, Polish Academy of Science, Iglaseegasse 68, 1190 Vienna, Austria

Falk's (1990) *BBS* target article is another attempt after mine (Fialkowski 1978; 1986) to justify the increase in volume of the human brain by heat stress experienced during hominid evolution. Such an approach has far-reaching consequences, especially when heat stress is treated as the prime mover in human evolution. This is the case in my hypothesis, at least for the earlier, exponential part of the increase of the brain volume. Heat stress as a prime mover results in an evolutionary scenario in which the facts are linked causally and temporally (Fialkowski 1987) and some research findings can be deductively predicted (Fialkowski 1990a).

Other consequences of the heat stress approach, however, reach far beyond the field of anthropology. In spite of their highly speculative character, they may be worth presenting in such an interdisciplinary forum as *BBS*.

In my commentary (Fialkowski 1990b) on Falk's paper (1990) I summarized the mechanism of reliability adaptation (Fialkowski 1978), which can be outlined as follows:

> Persistence hunting → heat stress → reliability adaptation (according to von Neumann's [1963] mathematical principle) ≡ more parallel organization and the increased volume of the brain ≡ preadaptation to abstract thinking → abstract thinking;

where → should be read as "results in" and ≡ should be read as "equivalent to."

Von Neumann's mathematical principle (1963) of the synthesis of reliable systems from unreliable elements indicates a mechanism that, if adopted in an evolutionary process, may lead to the emergence of intelligence (Fialkowski 1986).

As reliability adaptation (following von Neumann) justifies both an increase in brain volume and its parallelism without invoking any selective pressure except heat stress, the evolutionary mechanism discussed does not involve any effectors (e.g., hands) as a *prerequisite* to the emergence of enhanced cognitive powers. Generally, this mechanism, if activated in an adaptative process, should result in the emergence of intelligence without effectors (a kind of "observing" intelligence, perhaps like the intelligence found in whales, Fialkowski 1986) unless these effectors emerged independently as a result of quite a different adaptation.

As the assumptions for von Neumann's mechanism are not necessarily bound to the specific environment, the mechanism is universal. If an initial primitive brain-like structure is an object of evolution in an environment that randomly and with low probability destroys elements of this structure, the evolutionary response to it may be a more parallel brain-like structure with enhanced cognitive powers beyond the requirements of its