

Review: ***INTELLIGENCE: A New Look***, Hans J. Eysenck, Transaction Publishers, New Brunswick, NJ, 1998, 227 pp., £23.95.

This is the last book among the phenomenal total of 61 books (in addition to more than 1000 journal articles) written by the late Professor Hans Eysenck. Eysenck was one of the world's most famous psychologists in the latter half of the 20th century, rivaled in this respect only by Jean Piaget and B F Skinner. He founded and for over 30 years headed the University of London's graduate Department of Psychology in the Institute of Psychiatry. He was a long-time Fellow of The Galton Institute, served on Council from 1949 to 1953 and delivered the Galton Lecture at its annual conference in 1986, appropriately on the biological basis of intelligence.

It seems fitting that Eysenck's final book should be on intelligence. He claimed that this subject was his first interest in psychology. He was attracted to it because it was the first mental trait that was actually susceptible to measurement. That was a most important point for Eysenck. He saw objective measurement and the quantitative treatment of data as the essential means for advancing psychology as an empirical natural science. If he had a mission, surely that was it. As a research professor in the Institute of Psychiatry, however, Eysenck naturally focused his major research efforts on personality, abnormal psychology, and behavior therapy. But he periodically returned to the topic of intelligence, on which he wrote, in all, three books, edited two books, and published many articles. His viewpoint, though not popular, has been influential in professional circles. It is certainly impossible for anyone to write a serious book on intelligence without citing his work. Eysenck's thinking on this subject is actually an extension of that associated with the so-called 'London School'. With its roots in the works of Darwin and Galton, this line of psychology was developed and methodologically implemented by Charles Spearman, Professor of Psychology in the University of London (1907-1931) and arguably Britain's greatest psychologist. He was the originator of the mathematical and statistical techniques that became the basis of what is now known as psychometrics, classical test theory, and factor analysis. Spearman's successor (and Galton's chief exponent in psychology) was Sir Cyril Burt, who was Eysenck's mentor at University College, London. This background clearly orients Eysenck's own contributions to the study of intelligence. This venerable line, known as the London School, has long since been generally regarded in Britain and America as the mainstream science on intelligence.

The book's subtitle, *A New Look*, refers not to any essentially new formulations or ways of thinking about intelligence, but to recent developments and extensions of the essential paradigm of the London School. This is cumulative science, in marked contrast to the passing parade of short-lived fads witnessed in the popular literature on intelligence in recent years. For those who want the shortest, the most readable, the least technical, yet the most authoritative, book explaining exactly how the vast majority of the leading scientists working in this field actually view it, this is the ticket. Even as one who has been steeped in the research literature on mental abilities for some 40 years, I found this book both informative and enjoyable reading. Eysenck is a master expositor of this material for the nonspecialist reader, as his talent combines the best features of the working scientist and the popular science writer. The basis of fact and theory from which modern research on human intelligence operates and the kinds of questions presently considered important for further research are laid out here in a clear and even entertaining style. It is unlike a typical college textbook, which today, at least in psychology, is expected to maintain an uncritical neutral 'balance' between every different viewpoint in the field regardless of its empirical support or

theoretical coherence. Eysenck has a definite and consistent viewpoint, concisely and forthrightly expressed. He pulls no punches in opposing empirically unsupported, extra-scientific, ideologically based, or misleading claims about intelligence and mental tests, such as too often are promoted in the popular media.

Eysenck credits Galton as “The person most directly responsible for making intelligence a scientific and measurable concept . . . His major contribution to differential psychology [the study of individual differences] arose from his conviction that all human characteristics, both physical and mental, could ultimately be described quantitatively... He conceived of intelligence as a general ability, largely inherited, and best measured in terms of speed of mental processes... [He was] firmly convinced that general cognitive ability was by far the most important influence on a person’s life achievements.” The present book tells how these Galtonian ideas have played out during the past century of research on mental ability. It turns out that Galton’s reasoning and scientific intuition have proved to be remarkably correct in all of these original conjectures. The book’s topics are indicated by the fifteen chapter titles: The Paradox of Intelligence and Its Measurement, Origin and Meaning of IQ, Nature and Nurture: The Great Partnership, Intelligence, Reaction Time, and Inspection Time, The Biological Basis of Intelligence, What is the Use of IQ Tests, Can We Improve IQ?, Many Intelligences? Creativity in History: What is Genius?, Creativity and Intelligence, Conditions for Excellence and Achievement, Genius and Heredity, Psychopathology and Creativity, Cognition and Creativity, Much Ado About IQ. The appendix includes an important document that originally appeared in the *Wall Street Journal* (December 13, 1994) and was reprinted in the psychological journal *Intelligence* (1997, Vol. 24). Titled *Mainstream Science on Intelligence*, this statement lists 25 points summarizing the present scientific knowledge about intelligence and signed by 52 professors known for their research in this field. Eysenck no doubt included this statement so readers could judge for themselves whether his book is consonant with the ‘mainstream science.’ It certainly is.

Before mentioning ‘The New Look’ aspects of recent intelligence research that Eysenck presents, it should be noted that he takes for granted the well established mainstream view of the statistical structure of the whole variety of human mental abilities as revealed by what is termed a *hierarchical factor model*. For this nontechnical book, however, Eysenck mercifully eschewed any attempt to explain the field’s principal research tool, *factor analysis*, just as a popular book on, say, relativity theory, would not try to explain tensor calculus. [Readers who may wish to brave even a fairly brief and non-technical explanation of how factor analysis works will find it in Chapters 2 to 4 of my book *The g Factor* (1998).] But as Spearman realized even as far back as 1904, the term intelligence really has no scientific meaning. In Spearman’s exact words, “... ‘intelligence’ has become a mere vocal sound with so many meanings that finally it has none.” What Eysenck is really writing about, however, is more accurately and precisely called the *g* factor, rather than the undefined ‘vocal sound’ *intelligence*. The *g* factor is derived, by means of the mathematics of factor analysis, from the correlations among a great variety of tests of almost every imaginable kind. The main latent abilities, or factors, that underlie the observed test measurements and account for all the correlations among them can be arranged in the form of a hierarchy according to their generality. That is, certain tests show significant correlations with only a very few other tests that are very similar in the information or skill required, while some other tests show correlations with a great variety of other tests, even very dissimilar ones. Thus the underlying mental ability factors reflected by various tests differ greatly in their generality. The apex of the triangle-like hierarchical factor structure shows the *general factor*, symbolized as *g*, which is common to *all* tests of cognitive ability, however diverse. The *g* factor defies description in psychological terms, because it is really not an ability at all, but something that empowers all other psychologically describable abilities. At the stratum of the hierarchy just below *g* there are a number of independent *group factors*; only certain classes of rather similar tests have one or more of these group factors in common, such as verbal, or spatial, or numerical tests, to name but a few. Below these group factors and forming the base of

the triangle are all the various psychometric tests themselves. Every kind of test of any cognitive abilities measures, besides *g* and one or more group factors, some very specific aspect of skill, or knowledge entirely peculiar to the given test. It is termed that test's **specificity**, that is, what any particular test does not measure in common with any of the other tests included in the factor analysis. Thus there are many sources of individual variation in any large collection of diverse tests. The *g* factor, however, typically accounts for more of the variation in performance among people than any other single common factor independent of *g*. In many test batteries *g* accounts for more of the individual differences than all the various group factors combined. Now it just so happens that the so-called IQ reflects the *g* factor to a high degree, although many IQ tests also reflect certain group factors as well, particularly a verbal factor (but to a much lesser degree than *g*). This is why the IQ is so important and why Eysenck is justified in using it throughout as a stand-in for *g*.

Briefly, here are some of the 'New Look' points about IQ (or *g*) explained in this book. It has long been known, of course, that IQ is highly heritable (and *g* is even more heritable), based on studies of twins and other genetic kinships. Yet this fact is still debated in some circles. But now behavioral geneticists, led by Professor Robert Plomin at the Institute of Psychiatry, are discovering the precise loci of the genes for IQ by comparing the DNA of groups of exceptionally high IQ persons with that of groups with average IQ. Several such genes have already been identified and the search for more continues apace. The next step will be to discover the biochemical actions of these genes to decipher the chain of processes in the brain through which individual differences in *g* come about. These findings mean there can no longer be any argument about a genetic component in IQ differences. Even the influence of environment is governed to a considerable extent by the genes, in that individuals select and create different environments so they are compatible with their own genotypic propensities. Studies of siblings and adopted children show that differences between the family environments per se have exceedingly little influence on individual differences in IQ. The modern paradigm is not 'nature *or* nurture' but 'nurture *via* nature.' Galton also was right on another point: It is now established that IQ is correlated with the speed of information processing as measured by various tests of choice and discrimination reaction time. Such tests do not depend on acquired knowledge or skills; virtually everyone above about the age of three years can perform on these tests, and each trial on such tests typically takes less than one second. Yet the tests discriminate significantly between groups at different levels of IQ, even within the population of high-IQ university students. A biological basis of IQ is indicated by recent research on its physical correlates, such as brain size, the brain's electrical potentials, brain glucose metabolic rate, nerve conduction velocity, and biochemical factors such as hormones and neurotransmitters. IQ level plays a crucial role in achievements outside the testing room, in school, college, occupations, income, and genius and creativity. But a superior IQ alone is not sufficient to result in any outstanding and socially valued intellectual achievements. For this, IQ must also interact favorably with a number of variables in the environment and especially in the personality sphere. A large part (36%) of this book deals with the role of intelligence in creativity and genius. The fascinating 'new look' here is the modern research on the ancient belief that genius and madness are closely allied. Genius is a result of what behavioral geneticists now call *emergence*, that is, it emerges from a rare combination of diverse inherited traits and certain environmental circumstances. A fairly high IQ is a necessary but not sufficient condition for genius; but another necessary (but certainly not sufficient!) condition is what Eysenck terms *trait psychoticism*, which is not a psychiatric illness, but a particular constellation of largely inherited personality characteristics. It is seen in a great many of the world's famous geniuses – far too many to list here. The three chapters on genius and creativity succinctly summarize the theory and research presented in much greater detail in one of Eysenck's most important works, *Genius: The Natural History of Creativity* (1995).

The chapter titled 'Can We Improve IQ' will probably be considered the most controversial, yet it is the most potentially fruitful if further research bears out the promise of the still rather tentative findings. Several studies have shown that certain vitamin and mineral

supplements given to children can, over a period of months, raise their IQs by even as much as 10 points or more. And these are not deprived children in the usual sense, but middle-class Americans and Britons. Blood tests to detect deficiencies in essential vitamins can predict which children will benefit from supplements. Usually only one child in a family shows these deficiencies, while the child's siblings do not, and hence receives no benefit from the supplements. It is more a matter of individual differences in particular vitamin requirements than of the general malnutrition associated with poverty. Considering the massive failure of strictly educational and psychological interventions to have any lasting effects in raising IQ, the type of nutritional treatment indicated by Eysenck surely merits much further research. It would call for only a modest proportion of the immense funding that is still being expended on the various social-psychological programs that over the last three decades have produced no beneficial effect on IQ per se. Nor have they had any appreciable effect on scholastic achievement. How is it that knowledge of these nutrition studies has been around for a good many years now, yet so little has been done by way of further investigation? Could it be that a biological rather than a purely social attempt to raise IQ is such an anathema in the recent environmentalist Zetgeist? Further large-scale research on nutrition and IQ, which might uphold the preliminary findings cited by Eysenck, runs the risk, if successful, of adding one more blow against the doctrine of socioeconomic factors as the sole cause of individual and group differences in IQ, including all its educationally and socially important correlates. Overcoming such obstacles will depend in large part on getting more people to understand the now known facts about the nature of human mental abilities that are so well presented in Eysenck's book.

Arthur R Jensen