

# Nature via Nurture: Genes, Experience, and What Makes Us Human

Matt Ridley

(2003). New York: HarperCollins. 328pp, US\$25.95, ISBN 1-84115-745-7.

**Editor's note:** We published a review by Dorret Boomsma of this book soon after it appeared in 2003 (*Twin Research*, 6, 240). This new review by Hiram Caton, a historian of ideas, is more by way of a continuing appreciation and is aimed to stir the interest of any readers who have not yet discovered this wonderful book. NGM.

Bench scientists tend to scowl at the science–public opinion interface as a sleaze zone of exaggeration, sensation-seeking, misreporting, and in the worst case, ‘junk science’. The scowl is usually accompanied by a personal decision not to get involved. That assessment is, alas, often on target. But it doesn’t address the fact that interface there must be. The quality of the interface is important, beginning with the elementary point that science depends on tax dollars and voluntary contributions for its funding. Disengagement from public opinion isn’t an option.

Matt Ridley is among the handful of authors who have harvested deserved acclaim for rendering the complexities of genetics into everyday idiom. This is his fourth and, as I believe, his best effort. He commences his journey with an example of the messy science–public interface — the story about Craig Venter’s headline-grabbing stunt concerning the announcement of the Human Genome Project result. Venter’s Celera Genomics was party to agreement with the International Genome Project and the Sanger Institute for a joint announcement of the result, but a week prior to the agreed release date, Venter went public with the news that the human genome had far fewer genes (30,000) than anticipated. To this he added the spin that the result ‘refutes’ the idea of biological determinism. ‘The wonderful diversity of the human species’, he proclaimed, ‘is not hard-wired in

our genetic code. Our environments are critical’. Thus a leading genome scientist casually abandoned a solemn agreement in order to capture the limelight of the highest profile science story of the decade. It was a disconcerting example of opportunism trumping basic professional ethics.

Ridley easily disposes of Venter’s spin and adroitly converts it to a launch pad for his study. The real issue isn’t the nature versus nurture, but how nature and nurture interplay to produce the diversities and uniformities of human nature. His alternative formulation, nature via nurture (or experience), asserts that ‘genes are designed to take their cues from nurture’. ‘My argument in a nutshell is this: the more we lift the lid on the genome, the more vulnerable to experience genes appear to be’ (p. 4). Otherwise stated, we’ve come a long way from the Beadle–Tatum dictum ‘one gene, one enzyme, one protein’, which expressed the core of unidirectional genic thinking that in its day was good enough for the Nobel Prize.

Ridley devises an ingenious fantasy to organize his complex material. He invites the reader to imagine 12 men assembled at the fashionable Biarritz resort in 1903. They are Francis Galton, William James, Hugo De Vries, Ivan Pavlov, John B. Watson, Ivan Pavlov, Emil Kraepelin, Sigmund Freud, Emile Durkheim, Franz Boas, Konrad Lorenz and Jean Piaget. Each grasped something important about human nature although each also committed errors, especially

errors exaggerating the scope of their insights. Ridley suggests that if this company really did assemble, they would have entangled in argument rather than pooled their genius into a higher synthesis. However, their conflicts are serviceable to Ridley as a guide to the century-long entanglement of the nature–nurture controversy. His 12 apostles provide a thread of biographical anecdotes that he uses to exemplify the interaction of doing science with personal strengths and failings, and with social context. This stream of the book adapts it to a general audience, but it also enables him to discuss the controversies about human nature that so often swirled around the great men. The controversies aren’t merely human interest diversion; they are themselves evidence relevant for interpreting human nature.

Readers will be gratified that the author devotes considerable space to behavior genetics and even more gratified that he clarifies numerous aspects of the field, such as the meaning of heritability, that are stumbling blocks for the non-specialists. Twin studies in particular are discussed in detail; Ridley leaves no doubt that they provide strong evidence for trait heritability, including one of the five personality factors (neuroticism) and intelligence. That brain size correlates with intelligence has long been suspected, based on comparative evidence of encephalization in mammals, primates in particular. But can it be proved? The discovery of a gene, or genes, for *g* would settle the question.

The investigation of the PLP and ASPM genes as candidates for the *g* gene is reviewed and declared inconclusive,<sup>1</sup> but the finding of a 95% correlation of grey matter in MZ twins is recognized to be a significant confirmation that gray matter volume is 'due completely [sic] to genetic factors'. Ridley leaves it with the statement that 'some of the genes of *g* will soon be found'. The role of environment in determining *g* seems to be mainly of a background character. He cites Eric Turkheimer's study of 350 twin pairs, many of whom were drawn from impoverished families, as evidence that nutritional and sanitation components of nurturing impede brain development. While elucidating exactly what deficits impede development is an important research program, the global conclusion, that failure to thrive imposes lifelong losses, seems obvious and remedial, at least in principle. On the other side of the coin is the rise of average IQ scores at the rate of 5 points per decade (the Flynn Effect). This is probably due to improvements in nutrition, sanitation, and health care, plus increased stimulus to realize native ability. These conditions have produced steady increases in a range of skills, such as athletic performance, as well as height and strength.

If the ontogeny of intelligence is relatively stable across a wide variety of nurturance, schizophrenia exemplifies an extreme of multifactorial causality. The prevalence of schizophrenia is about 1.3% of adult populations, slightly less than bipolar disorder. The condition was first recognized by Emil Kraepelin; Eugen Bleuler improved the diagnostic criteria and conferred the name, schizophrenia. The extraordinary mingling of thought disorder (memory, attention, problem-solving) and emotional disorder (ranging from catatonic flattening of effect to traumatic paranoid delusion) has meant that the development of reliable diagnostic criteria, etiology, and treatment regimes has been

slow and error-burdened. Psychoanalysts, Ridley tells us, were the first to propose that the catatonic symptoms of schizophrenia were the result of harsh and unsympathetic mothering (the 'refrigerator mother'). This diagnosis was extended to autism. The diagnosis had rebound effect on parents, who, already stressed by the autistic child's behaviour, were stressed even more by the thought that their parenting induced the disorder. But even as the nurturing etiology achieved dominance, twin studies by Aaron Rosenoff and Franz Kallmann between the wars were revealing high concordance (68% and 86%, respectively) of schizophrenia in MZ twins (as opposed to 15% concordance in DZ twins; p. 104). Despite intense hostility from psychiatrists, postwar studies of the heritability of schizophrenia resulted, in 1988, in the discovery of the 'schizophrenia gene', so identified by a marker on chromosome 5. However, this finding proved to be one of many faulty identifications in the initial boom years of molecular genetics: it turned out that all but six chromosomes had schizophrenia markers (p. 107). The error was driven by extending the single gene etiology of Huntington's chorea and cystic fibrosis (confirming the Beadle-Tatum dictum) to all neurogenic illness. Neurotransmitters were another line of attack. Initially dopamine was singled out, but there proved to be five kinds of dopamine on different chromosomes; the attempt to identify a deficiency specific to schizophrenia fizzled. The next neurotransmitter investigated was serotonin. It too failed, but the data derived from the then new microarray techniques for measuring gene expression supported the concept that schizophrenia involves some dysfunction in prefrontal cortex synapses. Ridley next follows this extraordinary story down the paths of influenza viral involvement, developmental dysfunction, and deficiency of cellular release of the fatty acids. In each case he dili-

gently specifies the evidence that stimulated a research path and the outcomes that denied the research a univocal conclusion. After this careful preparation, Ridley suggests that schizophrenia may not simplify to univocal causality but may require circular causality, where A and B are mutually cause and effect. If so, the situation is 'a perfect illustration that nature and nurture both matter' (p. 124).

The most overt confrontation between nature and nurture is the blank slate agenda of conditioning theory (Pavlov, Watson, Skinner) and nativism in the form of imprinting, promoted by Lorenz, Tinbergen, Piaget, Harlow and cognitive psychology. Conditioning theory had historical roots back to John Locke. In the 18th and 19th centuries, it was associated with meliorist agendas such as utilitarian liberalism and socialism. Meliorism was thrust into high focus by the rise of social welfare professions. Pavlov's experiments, if not his theory, assumed that the psychological and neurological space between sensory excitation and the motor response could be black-boxed without loss of descriptive accuracy. Watson and Skinner, by contrast, declared triumphantly that there was nothing in the black box, hence there was no limit to meliorist social control. (Their initiative was paralleled in anthropology by Franz Boas, who attacked the concept of an evolutionary development for the human species in a graded gene-culture coevolutionary hierarchy.) Ridley's treatment of this confrontation was for me the most illuminating and instructive section of the book. He organizes his material to show how Lorenz's key insight into the existence of critical developmental windows (an idea inaccessible to conditioning theory) escaped the limitations of Lorenz's own partiality for 'instincts' to become the detailed and complex description and explanation of the developmental biology of many species. A proper summary of this material is not possible in this limited space. Suffice to say that the

nature via nurture theme finds its most persuasive and instructive elucidation in this portion of the book (pp. 125–176). I read it three times, and continued to learn on each run.

Having praised the book's merits, what might be said in criticism? I feel that his enthusiasm leads Ridley to underestimate the extent of the attachment to the nurture-only point of view. The American Anthropological Association, for example, has adopted a statement on race which declares, directly contrary to Ridley's view, that 'human cultural behaviour is learned, conditioned into infants beginning at birth, and always subject to modification ... . Our

temperaments, dispositions, and personalities, regardless of genetic propensities, are developed within sets of meanings and values that we call 'culture'. Studies of infant and early childhood learning and behavior attest to the reality of our cultures in forming who we are ... it is a basic tenet of anthropological knowledge that all normal human beings have the capacity to learn any cultural behavior' (<http://www.aaanet.org/stmts/racepp.htm>). This is exactly where Franz Boas positioned anthropology 80 years ago. It is a perspective that optimizes the meliorist vision. But what if all normal persons cannot learn algebra or excel in sport? What if

there are indeed heritable race differences in behaviour? The struggle isn't over yet.

### Endnote

1 While this review was in press, Bruce Lahn and associates published two articles in *Science* on Microcephalin and ASPM variants, showing that they arose 37,000 and 5800 years ago, respectively, probably under strong selection pressure. This exceptional finding is likely to figure in future investigations of the evolution of intelligence.

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## Indivisible by Two: Lives of Extraordinary Twins

Nancy L. Segal

(2005). Harvard University Press. 280pp, \$US24.95, ISBN 0-674-01933-4.

Nancy L. Segal, Distinguished Professor in Humanities and Social Sciences and Director of the Twin Studies Center at California State University has delivered a second delightful book about twins that will appeal to anyone fascinated by the similarities and differences of those who are genetically identical. In her first book, *Entwined Lives: Twins and What They Tell Us About Human Behavior*, published in 1999, Nancy Segal compiled a unique mix of research findings and personal stories. In *Indivisible by Two*, Professor Segal focuses on 12 diverse case studies of, almost exclusively, monozygotic (MZ; or identical) twins or higher multiples. Each example is so unique in its own way that the reader is left to wonder at the extensiveness of Professor Segal's case notes that she is able to create a book with so

many examples that are so different. It is a credit to her that so many twins and their families are willing to share their experiences with her, invite her into their lives and agree to have their stories included in a book. Her attention to detail, humor and chatty style will ensure the book's appeal to a far-reaching audience.

*Indivisible by Two* is divided into four sections, each of three chapters. In the first section, 'Separated at Birth', we meet three sets of twins who have been reunited after being reared in different families. All three examples have been reported elsewhere, including by Professor Segal herself. Nonetheless, these examples are so interesting that the repetition is justified and it is nice to have the breadth of detail allowed by this book. First, we meet Mark and Gerry, who grew

up 30 miles apart and first met in their early 30s after both entering the fire service. Later we meet Oskar, raised a Catholic by his mother in Hitler's Germany, and Jack, raised a Jew by his father in Trinidad. Their extremely different cultural environments made their first meeting in 1954, aged 21, difficult. They were finally brought together 25 years later by the University of Minnesota 'Twins Reared Apart' program. Their story was the subject of the 1995 documentary *Oskar and Jack*. In both these cases, it is the numerous ways in which these twins are similar that makes such fascinating reading — the pinky held under the beer can for Mark and Gerry, the obsessive sensitivity to germs of Oskar and Jack. Of course, cynics might say that if you took two unrelated people and compared enough habits that you