

NATURE VERSUS NURTURE

Nature Via Nurture: Genes, Experience, and What Makes Us Human, by Matt Ridley. New York, HarperCollins, 2003, 326 pp., \$25.95.

Matt Ridley is a science journalist with a penchant for evolutionary theorizing. This book comes with recommendations from three major wordsmiths of popular scientific journalism who describe it as “bracingly intelligent” (Oliver Sacks), “written with insight, wisdom and style” (Steven Pinker), and “a real page turner” (Richard Dawkins). But is it science, and does it relate to evolutionary theory?

My suspicion was aroused by the chapter on schizophrenia. Here the author plays with a number of themes that he has picked up from the literature or from conversations with diverse characters in and around the field. I think he too readily accepts what he reads or hears at face value without regard for the inconsistency or banality of the conclusions that it leads him into. On page 107 he pokes fun at those who have claimed to find linkage for psychosis somewhere on each of all but six human chromosomes: “But few links proved durable, and every study finds a different link.” Here I happen to agree with him, although we reached the conclusion on the basis of a grueling study of 382 sibling pairs (1). But then he concludes that there is something highly heritable about the syndrome and that “many genes clearly influence susceptibility to schizophrenia.” But which genes and why is there no consistent linkage? At this stage it seems not to matter because he has already concluded that schizophrenia is sometimes attributable to prenatal exposure to influenza (p. 112) (I thought that I had finally nailed that one on the basis of the U.K. National Child Development cohort [2, 3]) but sometimes also caused by (correctable!) deficits in arachidonic acid in the cell membrane (p. 119). Any theory is equal grist to the verbal mill.

Ridley is particularly vague on epidemiology. On page 99 he writes, “The balance of the evidence suggests that...there was a real increase in mental illness during the course of the nineteenth century and that schizophrenia in particular had been a rare disease before the middle of the century” (Hare’s thesis), but on page 121 he writes that “schizophrenia is about equally common all over the world and in all ethnic groups, occurring at the rate of about one case per hundred people” (a poor man’s version of the conclusions of a WHO 10-country study) and, “It takes much the same form in Australian Aborigines and the Inuit” (unreferenced to the original studies of Bryan Mowry and Jane Murphy).

There is a discrepancy here, and it matters. If one takes the first view one is quickly lost in speculation about diverse and elusive environmental causes. If one takes the second (in my view correct), uniformitarian interpretation one encounters the central paradox (identified but not solved by the evolutionary theorists Julian Huxley and Ernst Mayr in 1964) that schizophrenia is a genetic condition that persists in the face of a fecundity disadvantage. There must be a balancing advantage. If one asks the further question of how old is the genetic predisposition, one is drawn to the conclusion that the genetic predisposition is a pointer to the speciation event and

that schizophrenia is “the price that Homo sapiens pays for language” (4).

Now that evolutionary theory may be wrong, but Ridley does not contemplate it, because, in my view, he has got lost in erroneous sidetracks and amusing anecdotes along the way. Moreover, the genetic mechanism (the Xq21.3-to-Yp translocation and subsequent paracentric inversion [5]) and its proposed association with cerebral asymmetry are relevant to the evolution of language and the theme of Ridley’s subtitle, *What Makes Us Human*. To my mind, Ridley has buried the real evolutionary problem of the nature of the speciation event together with the clues provided by the phenomena of psychosis and its relationship to language in a wordy and sometimes entertaining but ultimately nonchallenging (i.e., nonheuristic) thesis that nature and nurture interact in humans in diverse ways.

I see on page 281 that I am acknowledged as contributing something to this book. I can’t remember this, but if I did I regret I failed to have any impact on what I regard as important lessons from psychosis for evolutionary theory. The book represents opportunistic journalism, not a serious inquiry into the origins of psychosis or humanity.

References

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T.J. CROW, M.D.
Oxford, U.K.

The Development of Psychopathology: Nature and Nurture, by Bruce F. Pennington. New York, Guilford Publications, 2002, 380 pp., \$48.00.

Psychology has undergone the type of evolutionary change described by Thomas Kuhn in his seminal work *The Structure of Scientific Revolutions* (1). Like other paradigm shifts, this has been a radical change. We have moved from introspection, speculation, and observation to experiment, neurophysiology, and imaging. From the classical Greek era onward, the dualism between mind and body has existed as the constant dilemma, either implicitly, as in Plato, more mechanically, as in Aristotle, or, most notably, in the philosophy of Descartes. As eloquently described by Michael Stone in *Healing the Mind* (2), there was a transition from earlier thinkers’ emphasis on introspection and the “body-mind problem” to biological psychiatry. This emphasis on biology and chemistry, however, neglects the human personality itself and the entire question of consciousness. Early investigators were like the physicist described by Albert Einstein in his analogy of the watch:

In our endeavor to understand reality we are somewhat like a man trying to understand the mechanism of a closed watch. He sees the face and the moving hands, even hears its ticking, but has no way of opening the case. If he is a genius he may form some picture of a mechanism which could be responsible for all of the things he observes, but he may never be quite sure his picture is the only one which could explain his observations. (3)

In the 21st century, however, we have opened the watch and have started to disassemble the mechanism. For many years, the brain was a “black box” that was subject to an input-output analysis, such as constitutes a neurological examination. A neurologist strikes the patellar reflex, causing a stretch of the tendon, which is followed by a muscular contraction. Given that observation, and many others, the location of a brain lesion may be inferred by an analysis of the response to that stimulus and some knowledge of neuroanatomy. Unfortunately, as one works up the spinal axis toward the brain, the same input may produce quite different outputs, i.e., speech or action, not only by different people but also within the same individual at different moments in time. Whether one ascribes this to the concept of “will” or to the grand results of chaos theory, the situation is extremely complicated. Psychology attempts to explain deviations from normal behavior (if that can be defined) to psychopathology by analyzing the interplay among biological processes and the external world. It seems remarkably simple and obvious to consider the problem of mental illness in a developmental way, in the way that a botanist might understand the complexity of a tree by examining the sprouting of a seed, or an embryologist the shape of the body by looking at the embryo transiting from a fetus to maturity.

What Bruce Pennington has done is to integrate the biological and psychological levels, including molecular genetics, neuroanatomy, and neuropsychology, with the help of epidemiology and experimental psychology, into one multidisciplinary work, which attempts to produce a new understanding of psychopathological disorders.

The book is organized into six sections: 1) Fundamental Issues, 2) Methods of Syndrome Analysis, 3) Disorders of Motivation, 4) Disorders of Action Regulation, 5) Disorders of Language and Cognitive Development, and 6) Conclusions.

Pennington deals with the nature-nurture problem by demonstrating that it is an interaction rather than an either/or situation. Not subscribing to one universal theory, he puts together insights from all of the various ways of looking at the brain and behavior, using the principle of mutual constraint. Pennington describes this as “conceptual integration” or “vertical integration.” He points out that as physics constrains chemistry, and chemistry constrains biology, all of these are constrained by evolutionary theory. A theory that violates the laws of physics or chemistry obviously is invalid. The “black box” or “Einstein’s watch” are no longer entirely mysterious, because whatever is in them must follow the reactions described by neuroscience.

Pennington begins the book with a concise and lucid discussion of the fundamental issues, emphasizing that despite the genetic endowment, each stage in development will have sensitivities related to the timing of environmental events, or teratogens, and social risk factors. There are no grand theories

here but, rather, a quite readable exposition of the tools of epidemiology, behavioral and molecular genetics, neurobiology, and neuropsychology. Each of these tools has its own rules, and all are essential to understanding psychopathology. Neuropsychology, with its emphasis on measurement and localization, also depends on development. At the analysis level of symptoms it is demonstrated that a given psychopathological change varies with a developmental stage. As physiologists of human behavior, psychologists are incorporating genetics and human interactions with the environment in a longitudinal view of the development of psychopathology.

Having briefly and succinctly described the methods of behavioral and molecular genetics, epidemiology, neurobiology, and neuropsychology, Pennington divides the areas of psychopathology to be considered into disorders of motivation, disorders of action regulation, and disorders of language and cognitive development. The disorders of motivation include depression and dysthymia, the anxiety disorders, posttraumatic stress disorder, and bipolar disorder. Beginning with the definitions, moving on to distribution in populations, epidemiology, and brain mechanisms so far as they are currently understood, Pennington discusses the major psychological theories, including those of Freud, Seligman, and Beck, and the theories of reinforcement. After reviewing these theories and demonstrating the social integration that demonstrates the incompleteness of each, he presents a section on treatment. Again, empirical data are presented regarding pharmacological and psychosocial treatments. The same scheme is followed in the disorders of action regulation, which include attention deficit hyperactivity disorder, conduct disorder, Tourette’s syndrome, obsessive-compulsive disorder, and schizophrenia. Particularly interesting are the disorders of language and cognitive development, including autism, mental retardation, dyslexia, and other language disorders. These are treated in some detail, including findings on structural neuroimaging studies and genetics. Because these disorders touch more directly on the fundamental processes of thinking, they are particularly important to the understanding of the developmental approach. Distinctions between the spatial cognition of Williams syndrome and autism, and the various forms of dyslexia and other language disorders, bring us closer to understanding the brain mechanisms of all sorts of thinking.

Pennington has a gift for lucid and logical exposition. For instance, in the Neuropsychology of Dyslexia section, the importance of listening comprehension to skill in reading is contrasted to written language, which must be explicitly taught as a cultural invention, unlike learning to speak. Experimental evidence has shown that skilled readers understand words either in isolation or in connected text, whereas poor readers have to guess the meaning of single words. Eye movement studies show that skilled readers skip “function words” such as “the,” and “and.” The experimental data showing the difference between normally developing readers and those with dyslexia allow for hypothesis testing using the tools of neuroscience and epidemiology. Mapping the symptoms of dyslexia to underlying processing mechanisms and incorporating data from lesion patients point the way to developing new cognitive theories and research.

Pennington does not disparage the autonomy of the multiple scientific disciplines required for integration into the new

science of psychology. Rather, he demonstrates how each pulls on the other to produce the neuroscience approach. He summarizes this approach:

The principle of mutual constraint or conceptual integration needs to be taken seriously by social sciences.... Especially with continuing advances in genetics and neuroscience, the social sciences cannot develop in isolation from the natural sciences.

According to Pennington, the provisional nature of DSM-IV-TR, a descriptive book based on symptoms, may result in misleading distinctions. What is needed is a classification based on causality. Unfortunately, we lack a pathogenesis: many of the conventional mental illnesses have multifactorial interacting causes. Of course, this problem is not exclusive to psychiatry. Throughout the history of medicine thematic classifications have yielded to etiological ones as science progressed. Epidemiology and genetics have rejected the "one disorder one gene hypothesis" and replaced it with the concept of "quantitative trait loci" acting probabilistically with environmental factors to raise or lower risk.

We do not yet know which genes are necessary or sufficient, except for a very small number of conditions. Most of the psychiatric conditions are more complicated than, for instance, Huntington's chorea or fragile X syndrome. Even finding the genes for a human condition does not reduce the importance of the developmental process. How risk factors influence genetic mechanisms is a major area of ongoing research. Likewise, the study of brain chemicals is limited by the sensitivity of the methods and the multiplicity of the neurotransmitters involved. PET and fMRI are still too crude to be used for the diagnosis of mental illnesses. We do not know which of the changes seen on these wonderful pictures are the causes, which are correlations, and which are effects. Again, a developmental approach could help to elucidate the changes seen in our imaging and neurochemical studies. *The Development of Psychopathology: Nature and Nurture*, therefore, describes the new paradigm of psychology, which emphasizes the complex interacting systems from genetics to the person in the environment. Psychopathology, according to Pennington, restricts the options for individuals to deal with the world around them or may be adversely affected by feedback, which then modifies gene expression.

This is an excellent textbook that provides a concise summary of the methods for genetics, epidemiology, brain mechanisms, and neuropsychology, by going through the four levels of analysis: the etiological level of genetic and environmental influences, the level of brain mechanisms dealing with neuroanatomy and neurochemistry, the level of neuropsychology, and the level of symptoms. Pennington provides a road map for future research with a framework from which to organize psychological constructs of personality and motivation. He argues against both dualism and reductive materialism when examining the mind/body problem but presents the strong argument that none of it makes very much sense without a developmental approach. This volume succeeds as an introduction to an integrative approach to the complexities of understanding the brain. With an emphasis on methodology, it provides an outline for research and psychopathology. Every clinician and researcher of psychiatry or

psychology, especially those who want more than a cookbook or a work of interest only to historians of science, should read this book. This is a useful reminder that science is a method, not a compendium of "facts." As Einstein pointed out, a scientist believes that, as knowledge increases, one's picture of reality will become simpler and simpler and would explain a wider and wider range of sensuous impressions. The scientist may also believe in the existence of the ideal limit of knowledge and that it is approached by the human mind (3).

References

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JAMES R. MERIKANGAS, M.D.
Washington, D.C.

ETHICS AND FORENSICS

Life and Death Decisions: Psychological and Ethical Considerations in End-of-Life Care, by Phillip M. Kleespies, Ph.D. Washington, D.C., American Psychological Association, 2004, 203 pp., \$39.95.

What are the imperatives that spur us on to question whether to play a role in prolonging life or affirmatively terminating it? In *A Shropshire Lad*, A.E. Houseman wrote,

And the name died before the man.

—To an Athlete Dying Young, XIX

Still you'll help me, hands that gave
A grasp to friend me to the grave.

—As Through the Wild Green Hills of Wyre,
XXXVII

Currently, we leave the end-of-life decision to personal autonomy.

Kleespies' discriminating discourse deals mainly with the terminally ill, most of whom he sees as suffering from debilitating illnesses that "corrode the human spirit," and he ponders some values of curative efforts despite the "futility of the situation." By exploring life-and-death decisions about the dying process, the book hopes to prompt psychologists, with their skill in conflict management, to become important members of the consultation team and not be "locked out" of the team of "core hospice service providers." The psychologists would then become more visible "among the disciplines involved in end-of-life care...about hastening death, assisted suicide, futility of treatment, and the rationing of scarce medical resources." But there are substantial informational and ethical weaknesses in the book, which could blunt its value for the very audience it hopes to reach, since only the medical profession is in a position to provide palliative care to those dying in pain.