



Book Review

On Nature ~~Versus~~ *And* Nurture

By Dustin Penn

A review of *Nature Via Nurture: Genes, Experience, and What Makes Us Human* by Matt Ridley. 2003, New York: HarperCollins.

Matt Ridley's latest book, *Nature Via Nurture*, addresses widespread misconceptions about genes and behavior. He examines how genes determine behavior, and at the same time, how the expression of many genes is determined by an individual's behavior and their environment. Our behavior, he argues, is determined by circular rather than linear causation. The upshot is that the age-old nature *versus* nurture dichotomy is completely erroneous. Ridley suggests that this causal circularity rescues the idea of freewill; however, he fails to recognize that the freewill/determinism dichotomy is also erroneous. Still, this book is popular science writing at its best: it is entertaining and informative, and offers provocative and original ideas.

What determines an individual's behavior, personality, intelligence, and sexual orientation? Is it largely the result of the environment in which we are reared or heredity? Francis Galton, the founder of behavioral genetics (and Darwin's cousin), was impressed by the similarity of twins in their personalities. His research on twins was far ahead of its time. However, Galton erroneously assumed that the

relative influences of nature (heredity) and nurture (environment) could be separated, and he concluded that nature was far more important than nurture. Interest in genetics was abandoned in the social sciences during the twentieth century, not because Galton's observations were disproved, but because he was also the founder of the infamous eugenics movement. Eugenicians aimed to improve our species by encouraging the propagation of the fit, and discouraging the propagation of the unfit. After the Nazi atrocities, eugenics lost its popularity and social scientists distanced themselves completely from genetics and other biological sciences. They generally dismissed evidence that genes influence behavior and that humans have instincts. They decided that humans were born with a blank slate, and that nurture was far more important than nature. A wall was erected not only in Berlin, but also between the social and biological sciences. The last twin studies to examine behavior for many years were conducted by Josef Mengele in Auschwitz.

Ridley's recent book, *Nature Via Nurture*, explains how social scientists threw Galton's

genetics baby out with his eugenics bathwater. He shows that genes influence human behavior, and he provides excellent overviews of several books recently written on the subject [1-4]. Ridley goes further though and addresses a fundamental misunderstanding about genes and behavior. He complains that “During most of the twentieth century ‘determinism’ was a term of abuse, and genetic determinism was the worst kind of term. Genes were portrayed as implacable dragons of fate, whose plots against the damsel of free will were foiled only by the noble knight of nurture” (p. 98). Ridley’s goal is to demolish this view and explain why Galton’s nature/nurture dichotomy is erroneous.

In short, Ridley points out that there are many misconceptions about nature and nurture. The genome is like a recipe, rather than a blueprint, which means that the effects of genes and the environment cannot be separated or partitioned any more than one can attribute different crumbs of a cake to different words in a recipe. Behavior, being a phenotype, is determined by complex interactions of many genes and inextricable interactions among themselves and the environment. Learning is not the opposite of innate or genetically programmed instincts, contrary to popular belief, because our genes are what enables us to learn. Heredity is controlled by genes, but their expression is turned on and off throughout life depending upon environmental cues. Ridley explains the point eloquently:

It is genes that allow the human mind to learn, to remember, to imitate, to imprint, to absorb culture, and to express instincts. Genes are not puppet masters or blueprints. Nor are they just the carriers of heredity. They are active during life; they switch each other on and off; they respond to the environment. They may direct the construction of the body and brain in the womb, but then they set about dismantling and rebuilding what they have made almost at once—in response to

experience. They are both cause and consequences of our actions (p. 6).

Ridley’s attack on the nature/nurture dichotomy is not new, and the error had been widely recognized for decades among ethologists and other researchers studying animal behavior. Konrad Lorenz attempted to “demonstrate the fallacy of treating the ‘innate’ and the ‘learned’ as opposed, mutually exclusive concepts” (p.29). He pointed out that “The ‘dichotomy’ of behavior into ‘innate’ and ‘learned’ components is indeed misleading...” (p. 18). “I think that I can show that this assumption [of dichotomizing of behavior or insensibly graduated mixtures of the two] is not only bad for research but completely unfounded and in all probability false” (p. 29). This was 1961 (the book was translated into English in 1965) [5]. So, why are nature and nurture still pitted against each other, and why has this debate persisted?

One reason for the confusion is that the effects of genes versus the environment can be compared when analyzing *differences among individuals*, and variation in even the most complex behaviors may be due to genetic differences controlled by one or few genetic loci. Behavioral geneticists attempt to determine how much of the variation among individuals in a population is due to genetic versus environmental sources, which they quantify with “heritability.” Ridley explains why heritability is a slippery concept: “it is a measurement of what is varying not what is determining” (p. 77). The heritability of personality, for example, is 40%. Yet, contrary to what is often assumed, this does not mean that genes control 40% of an individual’s personality. It means that 40% of the variation in personality among individuals is associated with genetic differences. Counter-intuitively, some traits, such as number of fingers, are genetically determined, and yet their heritability may be zero if the variation is completely due to environmental causes. Also, measurements of heritability are

context-dependent such that reducing environmental sources of variation increases heritability. This means that efforts to standardize education or other aspects of the environment will magnify heritability, and we will be selecting students based mainly on genetic differences in their performance or IQ. “Paradoxically,” Ridley points out, “the more equal we make society, the higher heritability will be, and the more genes will matter” (p. 77).

Along with Steven Pinker’s recent book *The Blank Slate* [6], Ridley’s book will strike a major blow against the nature/nurture dichotomy, and should help to spark more interest in biology and genetics. Ridley (like Pinker) makes diplomatic efforts to appease those who emphasize the importance of nurture. He alleviates concerns that genes might control our fate: “Your genes are not puppet masters pulling the strings of your behavior...” “Genes are designed to take their clues from nurture” (p. 4). “They are “devices for extracting information from the environment” (p. 248). His words will be music to the ears of many readers. He tries hard to help the antagonists of genetics—the ‘nurturists’ who prefer to emphasize human uniqueness, our capacity for language, culture, and reason—to understand that genes are their friends, and not their enemies. “Somehow adherents to the ‘nurture’ side of the argument have scared themselves silly at the power and inevitability of genes and missed the greatest lesson of all: genes are on their side” (p. 6). Ridley’s efforts to stress the importance of nurture, and the contributions of social scientists to understanding human nature should help to better integrate the biological and social sciences.

Ridley’s book provides a wonderful sense of excitement for how new molecular genetic tools how currently elucidating the mechanisms through which genes influence behavior, and *vice versa*. For example, how do genes determine whether a species is monogamous and or polygamous? Recent experiments with rodents indicate that such differences in sexual behavior are due to differences in the expression of the

receptors in the brain for the hormone oxytocin. Differences in gene expression are controlled by genetic transcription factors (promoter genes that control the expression of other genes), rather than differences in hormone levels or sequences of receptor genes themselves. The conclusion is “devastating in its simplicity. The ability of a rodent to form a long-term attachment to its sexual partner may depend upon a piece of DNA test in the promoter switch at the front of a certain receptor gene. That in turn decides precisely which parts of the brain will express the gene” (p. 45). Thus, small genetic differences can make enormous changes in behavior. (Although Ridley doesn’t point this out, an exciting new field, called ‘epigenetics,’ is emerging that focuses on how heritable changes in gene function, such as DNA methylation, often occur without altering DNA sequences). After considering the new molecular tools being developed in genetics, Ridley urges us to “Pause here to roll the idea around in your mind a few times to appreciate just what science can do these days” (p. 44).

In addition to teaching his readers about recent findings in behavioral genetics, Ridley provides entertaining stories about the personalities and the lives of the scientists who played key roles in the history of the field, i.e., William James, Hugo De Vries, Ivan Pavlov, J. B. Watson, B.F. Skinner, Franz Boas, Sigmund Freud, Emil Kraepelin, Émile Durkheim, Jean Piaget, and Konrad Lorenz. I appreciated that Ridley does not shy away from politically controversial topics, such as homosexuality, IQ, race, and discrimination, and that offers his own questions, criticisms, and insights into a variety of topics concerning human behavior. For example, he ponders how natural selection maintains the genetic variation influencing personality, and apparently deleterious genes that influence schizophrenia. Ridley addresses human history, and he offers a challenge to the idea that gene-culture coevolution will provide an adequate explanation for the “Great Leap Forward” (i.e., 50,000 years ago when major

changes in human behavior and technology occurred during the Upper Paleolithic revolution, and people suddenly started moving around and producing complex technology). You may not agree with Ridley's analyses, though I suspect that you will agree that he is a broad and critical thinker, and a creative writer. Ridley's book is popular science writing at its best: entertaining and provocative, as well as informative.

Although I highly recommend Ridley's book to anyone interested human behavior (and who isn't?), I have a couple of criticisms. Ridley failed to provide a complete explanation for why the nature versus nurture debate has persisted. He claims that the geneticists and evolutionary biologists are misunderstood as "nurturists," and they erroneously attack their critics as "nurturists." Both sides have supposedly erected straw men. It is admirable that Ridley tries to bring these warring camps together and find common ground (like religious factions, they have more in common than either side would like to admit). However, he perpetuates a common misconception that the battle has been nature versus nurture. It is true that biologically trained scientists (ethologists, sociobiologists, behavioral ecologists, and evolutionary psychologists) have insisted that genes influence behavior. But these so-called 'genetic determinists' have long acknowledged the importance of the environment, and that genes interact with the environment to determine behavior. They simply emphasized the importance of genetics and instincts against the prevailing view of the social sciences that genes are *irrelevant* for human behavior. And when it comes to understanding evolution, genetics has particular importance because natural selection works on *genetic* differences among individuals. In contrast, the establishment preferred to continue to pretend that genes have no influence (or a minor influence) on human behavior. Thus, the actual debate has not been "nature versus nurture," but rather "nature versus *no nature*" ("genetics versus no genetics" and "instincts versus no instincts")! The only thing

that is really new is that we have better evidence that genes influence human behavior, and how they do it.

Again, like Pinker, Ridley tries to call a truce on both sides of the debate. He concludes that both sides have made important contributions to understanding how human behavior develops by genes and the environment. I agree, but I felt that Ridley goes too far to appease the nurturists, and he downplays the constraints that genes place on the human possibilities. Ridley recognizes that "There are limits to the power of culture to change human behavior" (p. 230), and yet, he contradicts himself when he claims that genes are puppets at the mercy of your behavior (p. 4), and that genes do not constrain our behavior (p. 64).

My main complaint is that Ridley dropped the ball at a crucial point towards the end when he had the opportunity to demolish the closely related freewill/determinism dichotomy. After showing just how little light philosophers have shone on this topic, he casts his vote for freewill. The general assumption is that we humans have some mysterious ability to make choices that frees us from our genes. The alternative, it is assumed, is that our destiny is predetermined by our genes (or God). But if only humans have freewill, then it must be due to some genetic difference between us and other primates—which would mean that freewill is genetically determined! The freewill versus determinism debate is another erroneous dichotomy, and it is better to drop the entire notion. We make choices, but our choices are still determined by causal mechanisms in our minds. The question is not whether we make choices; the question is why do we make the choices we do. This requires taking an evolutionary approach, but Ridley chose to ignore evolution. For simplicity, he attributes the design of genes and behavior to the 'Genomic Organizing Device' or 'GOD,' which is his shorthand for natural selection. We need a new book called "Freewill Via Determinism;" and I am anxious to have a look at Dan Dennett's recent one on

the topic, *Freedom Evolves*, in which he apparently attempts to reconcile freewill with evolutionary biology [7].

Ridley may not change your mind about freewill or GOD, but if given a chance, he will change many people's minds about the role of genes and human behavior. The main problem is that the nature/nurture debate has had more to do with politics and religion than science. The main resistance to the idea that humans have a nature has been Marxists and other political leftists whose ideology requires that humans are blank slates (see critics of sociobiology). While attacking Galton's eugenics, they demonized genetic-determinism. They failed to recognize that genes *enable* as well as constrain the human possibilities. As Ridley has pointed out elsewhere, it is time to recognize that the atrocities committed by the radical genetic-determinists that ruled Germany during the 1930-40's were matched by those committed by radical environmental-determinists that ruled Russia during that time. The moral of the story is that we must be on guard against efforts to distort and misuse the science of human behavior to support political ideologies by the radical left or the right. This is a lesson about human

nature that we should nurture.

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