

Understanding the Nature–Nurture Debate

There are arguably few areas of science more fiercely contested than the question of what makes us who we are. Are we products of our environments or our genes? Is nature the governing force behind our behavior, or is it nurture? While it is now widely agreed that it is a mixture of both, discussions continue as to which is the dominant influence. This unique volume presents a clear explanation of heritability, the ongoing nature versus nurture debate, and the evidence that is currently available. Starting at the beginning of the modern nature–nurture debate, with Darwin and Galton, this book describes how evolution posed a challenge to humanity by demonstrating that humans are animals, and how modern social science was necessitated when humans became an object of natural science. It clearly sets out the most common misconceptions such as the idea that heritability means that a trait is “genetic” or that it is a justification for eugenics.

Eric Turkheimer is a clinical psychologist and the Hugh Scott Hamilton Professor of Psychology at the University of Virginia, Charlottesville, and a Fellow of the American Academy of Arts and Sciences, Cambridge, USA. Eric studies how interactions between genes and environments shape the development of human behavior and has explored the scientific and philosophical basis of the nature–nurture debate for 38 years. He is a past president of the Behavior Genetics Association (2012), a winner of the James Shields Award for Twin Research (2009), and a winner of the Dobzhansky Founders Lifetime Achievement Award from the Behavior Genetics Association (2024).

The ***Understanding Life*** series is for anyone wanting an engaging and concise way into a key biological topic. Offering a multidisciplinary perspective, these accessible guides address common misconceptions and misunderstandings in a thoughtful way to help stimulate debate and encourage a more in-depth understanding. Written by leading thinkers in each field, these books are for anyone wanting an expert overview that will enable clearer thinking on each topic.

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Understanding the Nature— Nurture Debate

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“Eric Turkheimer has long been a Socratic figure in the field of behavioral genetics – asking incisive and often uncomfortable questions. He continues this tradition in the present volume which, in particular, challenges the common triumphalist zeitgeist about the degree of progress observed with the ‘molecular genetic revolution.’ After pondering this volume, which should serve as an antidote to the excessive exuberance of some investigators, readers should have a healthy skepticism, appreciating both the strengths and some important limitations of this challenging field.”

Kenneth S. Kendler MD, Virginia Commonwealth University

“In this must-read book, Eric Turkheimer provides invaluable insights into the workings of a wide range of the social sciences. The book contains lucid explanations of key statistical concepts underlying work on differentiating nature and nurture, clear introductions to and explanations of contemporary genetics of human behavior, and very helpful historical accounts of the origins and development of this work. Look no further if you want to understand debates over IQ and race, how genomics is used by social scientists, the concept of heritability, and the power and limitations of statistical inference. This book is a history and philosophy of social science tour de force.”

Stephen M. Downes, University of Utah

“A lively summation of a lifetime of scholarship by an internationally acclaimed expert in behavioral genetics ... *Understanding the Nature–Nurture Debate* is wide-ranging, accessible, spirited, and nuanced. Novices and experts alike will learn from Turkheimer’s inimitable voice.”

**Kathryn Paige Harden, University of Texas at Austin,
and author of *The Genetic Lottery:
Why DNA Matters for Social Equality***

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“Eric Turkheimer predicted the daunting genetic complexity of human behavior before the Human Genome Project had even been completed, a challenge the field is still grappling with two decades later. In this cogent book, he shares an insider’s perspective on the history of behavioral genetics, from analyses of twins to cutting-edge association studies of millions of genomes. Along the way, he offers insights into the universal desire to understand our own humanity and the fundamental inability of genetic variation to provide us with easy answers.”

Alexander (Sasha) Gusev, Harvard Medical School and The Dana-Farber Cancer Institute

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Foreword

It is a perennial question: which of our behaviors are due to heredity and which are due to our upbringing? Whoever has two or more children has certainly been asking such questions, seeing them exhibiting different behaviors despite being brought up by the same parents in the same broader social environment. The conclusion is then easy and tempting: it must be the genes (or DNA) that make the difference. If one of the siblings is taller than the average and the other shorter than the average, what else could explain this difference besides genes? Same for their differences in character, talents, and temperament. Even today, behavior genetics studies are presented to conclusively show that some behavioral traits are due more to nature (genes) than to nurture (environment), and such conclusions usually end up being represented in the media as the big impact of heredity and genes. It makes sense, no? Well, no! As Eric Turkheimer shows in this marvelous book, we have been misinterpreting the causes of behavioral differences for more than a century now. Worse than that, we have been advancing supposedly scientific explanations of how much of who we are and what we do is genetic or environmental. But as Turkheimer explains, such a question is pointless, as we cannot really separate the influences of heredity from those of environment. Most importantly, his foray into the history of the discipline of behavioral genetics offers a clear account not only of what its main concepts really are, but also of why and how we got things wrong – both in the past and today. Turkheimer has produced a gem: a book that serves both as an accurate account of the nature–nurture question, and as an antidote to inaccurate hereditarian accounts of human behavior that are still with us.

Kostas Kampourakis, Series Editor

Preface

What if heredity, instead of linear, is branching?

David Foster Wallace, *Infinite Jest*

Some questions are a continuous source of fascination and disagreement, precisely because we can never answer them. The free-will problem, for example: most modern people accept that humans are part of the physical universe subject to the laws of physics as any other object, yet at the same time we can't escape the feeling that we are also somehow outside of the physical world, capable of initiating events with a mysterious force of will. Or the mind-body problem: although many people no longer believe in a literal way that we are inhabited by some extra-physical entity like a soul, there it is up there between our ears, an ephemeral but undeniable feeling of consciousness.

Questions like these have certain characteristics in common. They fascinate us in a particularly insistent way, like a loose tooth. They affect us like a cat contemplating an open box, with a cat's rudimentary sense of inside and outside that is insufficient to explain the change in point of view as she climbs in, sits there for a second, and then climbs back out. These are not unfathomable mysteries like where the universe came from or what happens after we die; we have plausible intuitions about them, so if we are the kind of person who cares about such things, we can kick them back and forth endlessly in a dorm room or a bar.

Such questions have a characteristically difficult relationship to science. Once again, although modern people may not believe that we are literally embodied

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souls created in the image of God, the science that has replaced those beliefs is utterly insufficient to answer questions about will or mind. No amount of physics convinces us that we are unable to freely decide to lift our arm; no amount of neuroscience overcomes our feeling that consciousness is something that we can't see in a brain scan. We are inextricably triangulated by old supernatural beliefs, subjective intuitions, and the claims of modern science. We climb into the box and then back out again, nonplussed.

Nature versus nurture is one of those problems. How do we come to be the way we are? Are we born that way, the result of something universal called "human nature," or the particular product of our genes? Alternatively, are we shaped by parents or culture, or by ourselves and our presumably free will? We have a paradoxical sense that all of these possibilities are true, all at the same time. It seems clear that our eventual height is programmed somehow on the day we are born – conceived, actually – yet it is just as obvious that famine and illness affect height. We have a similar sense that we are born with some kind of biological tendency to assume a body shape, yet food intake plays an obvious role for everyone, and many of us spend the better part of our lives trying to exert our will to control our weight.

It is even more confusing for psychology. Where does personality come from, or capacity for success or happiness, or sexual orientation? Why do some people seem to coast from success to success, while others become mired in mental illness, substance abuse, or crime? No one believes that we come into the world fully formed, with all eventual characteristics fixed, but at the same time, experience suggests that we can't just decide to be more extroverted, any more than we can decide to be taller. Somehow it is both. We climb into the box, look around, then climb back out again.

Like the free-will and mind–body problems, questions about nature and nurture have a complex relationship with science. This book takes for granted that the theory of evolution and modern ideas about genetics are true, as true for humans as for any other animal. Yet science is much more difficult to conduct on human beings than it is on animals, for a variety of very interesting reasons. We know a great deal about animal genetics from breeding experiments: what kind of puppies do you get if you breed an aggressive dog with a submissive one? We also learn a lot about animals by taking experimental

control of their environment. What is the effect of raising mice under deprived versus enriched conditions? It is not possible to conduct such experiments on people, for obvious ethical reasons. In human families, it is almost always the case that the same parents who pass their genes to their children also provide the family environment, so the two most basic hypotheses – nature and nurture – are irredeemably confounded.

Had that been the end of it – unfortunately, it's not possible to conduct scientific genetics on human beings – the world would be a simpler place. But as has often been the case in the human sciences, it turns out that there is a domain of methodological workarounds that allow scientists to approximate the rigor of animal genetics without violating fundamental human rights. We can't breed people intentionally, but we can study people when they choose to reproduce: in the normal course of events, occasionally one aggressive and one passive parent will have a child, and we can check on the personality of their kids. Even more interesting are adoptive families, which separate the confounding of genetic and environmental parenting. Most famously there are twin studies, which make use of the remarkable occurrence of identical twins – genetic clones! – a biological miracle that can be usefully compared with fraternal twins, genetically distinct siblings who happen to share a womb. Nowadays we can cheaply and easily obtain DNA from enormous samples of people, and that allows a whole new domain of human genetic research.

These methods are fascinating; I have spent the better part of my scientific career developing them, applying them, and thinking about what they mean. But they are all scientifically imperfect in crucial ways, always a step removed from the relative certainty that can be achieved by a bench scientist studying yeast cells or a biologist working with farm animals instead of free-ranging humans. The imperfection of human science sets up an implacable tension between the importance of the issues at stake and the always-shaky scientific inferences that can be drawn about them. Are people poor because they are victims of an unjust society, or because they are born with characteristics that make them poor? There is no question of greater import to society at large, but science is at once crucial and indeterminate for its resolution. Most people have extra-scientific intuitions about questions like that, arising from culture, philosophy, politics, or religion. Everyone can then turn to science to support their position, and just as easily point to the deficiencies in the other side's

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science to dismiss theirs. That is why the nature–nurture debate has raged unchecked for more than a century.

Making the whole intellectual cage fight even worse, underlying all the science is a number, something called a heritability coefficient, that varies between zero and one and purports to be a quantitative answer to the nature–nurture problem. Heritability coefficients of zero denote, more or less, a trait that is all nurture; values of one describe a trait that is all nature; values in between zero and one are, one way or another, in between nurture and nature. At least, that's the way it's supposed to work. Human beings, scientists no exception, are drawn to simple numerical answers to overwhelmingly complex questions, even if they know in their hearts that the simple answer is incorrect. Much of this book will consist of an attempt to figure out what, if anything, heritability coefficients mean.

I contend that nature–nurture is the most important of the classic problems of human nature because it has the greatest effect on our day-to-day lives. Whatever our philosophical inclinations about free will or mind–body, most of the time we have no choice but to act as though we are conscious and free. In contrast, our views on nature and nurture affect everything.

- Consider parenting. A famous aphorism from psychologist Marvin Zuckerman is that every parent is an environmentalist until they have their second child. Children are individuals from the day they are born, from *before* the day they are born. No realistic parent would contend that they can completely shape their children's behavior. Yet parents apply themselves to exactly that task every day, attempting to train children to be polite, hard-working, and respectful. Moreover, decisions have to be made. Should children be spanked? Will spanking children help them understand right and wrong, or will it make them fearful and violent? Some genetically oriented family theorists look at the data and decide that how parents raise children doesn't matter very much. Could that possibly be true?
- Views on nature and nurture have deep consequences for ideas about morality and freedom. This has played out recently for attitudes about sexual orientation, which has been shown (in very complex ways that will be examined in Chapter 10) to be related to genetics. It is said that

a genetic basis for sexual orientation suggests that people “don’t have a choice” about it, so it is wrong to discriminate based on orientation. But of course, people are discriminated against based on inborn characteristics all the time. Is a genetic basis of sexual orientation the best justification for sexual freedom?

- Nature–nurture also plays an important role in thinking about mental illness, which also turns out to be related to genetics in complex ways. It has become commonplace to use the genetics of mental illness to support the idea that mental illnesses are “real,” as worthy of treatment and research funding as any other organic illness.
- The United States was founded on the idea that all people are created equal; inequality is now the great economic issue of our time, and genetics is ultimately about differences among organisms. A notorious line of thought, dating from the nineteenth century and galvanized by Richard Herrnstein and Charles Murray’s 1994 book *The Bell Curve* (discussed in Chapter 8), suggests that socioeconomic inequality is largely the result of genetic differences among people. Are social attempts to foster equality scientifically unrealistic?
- Nature and nurture figure in our thinking about criminal responsibility. Genetic evidence is now commonly cited in sentencing hearings in murder cases. If you were told as a juror that a murderer carried genes that made him more prone to violence, would that information make you consider a more lenient sentence, or a more severe one?
- Ideas about genetics have formed the alleged scientific basis for some of the most horrific social movements of the past 150 years. Slavery and Jim Crow, the American eugenics movement, and the Nazi Holocaust (which was inspired to a disturbing degree by American eugenics) were all founded on misuses of genetic ideas.
- Those horrors are reminders of the great American obsession, race. Socially defined notions of race have the same kind of ambiguous, hard to understand relations to scientific genetics as do complex human behaviors such as parenting and sexual orientation. What we commonly think of as race is not an evolutionary genetic concept, but neither is it completely unrelated. Someone once observed that every time there is a technological advance in publishing, from cave paintings to the Internet, the first thing someone does is figure out how to use it for

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pornography. In the same way, every time a new genomic technology is developed, someone immediately tries to put it to work in the service of racism.

Journalist and cultural critic H. L. Mencken observed, “There is always a well-known solution to every human problem – neat, plausible, and wrong.” I would contend that there are usually *two* simple and wrong answers, opposed to each other, which in addition to their misleading simplicity have the unfortunate advantage of providing people with something to argue about on Twitter (now X; imagine Mencken’s feed!). As a result, most books about genetics and human behavior fall into one of two predictable categories. First are the “miracles of modern genomics” books, which in their more cheerful form tout a new scientific revolution that is about to produce a deep understanding of how genes build people, and put that new knowledge to work to cure mental illness and produce healthier, happier humans. The darker version of the same scientific enthusiasm envisions a world in which racism has been scientifically validated, and a society riven by genetic differences ranging from irredeemably unintelligent lower classes to a genetically gifted elite. In opposition, some books belittle the genomic revolution, mock its scientific shortcomings, and point out that poorly understood genetic science has always been used as a platform for economic inequality, racism, and even slavery and the Holocaust. These books denounce the scientific basis of all genetics of behavior, holding that twin studies are flawed, heritability statistics meaningless, intelligence a myth, and race a mere “social construct.”

The reader looking for one of those simple answers will not be satisfied by what follows. Questions about nature and nurture, as a matter of both empirical science and social philosophy, are complicated. Understanding nature and nurture, I hope to convince you, entails holding two paradoxical ideas in your head at the same time. Genetics plays a role in all human development, but for most of the behavioral outcomes that interest us, it doesn’t determine any of it. As Mordecai Kaplan said about the role of the past in Jewish theology, genetics gets a vote, not a veto, in the genesis of human behavior.

Acknowledgments

The first sentence of the Acknowledgments in my dissertation noted that my strongest impression was of people being patient with me. Nothing has changed as I finish this book.

When Cambridge University Press and the Editor of this series, Kostas Kampourakis, contacted me about contributing a volume, I had mostly given up on writing a book. I knew a writer once, a nonfaculty author of weighty nonfiction, who described himself as “a marathoner, not a sprinter.” I had accepted by then that I was a sprinter, competent enough at journal articles but too slow over the long haul of a book manuscript. But the University Press, especially in the person of Kostas, was so open about what I wanted to write, so supportive and eventually so patient as I wrote it, that I couldn’t say no. Much of the series has been published while I worked, and its excellence under Kostas’ authorship and editing leaves me proud to be a part of it.

The history of people’s patience with me is by now too long to write. The late Irving I. Gottesman was single-handedly responsible for my career, putting his reputation on the line to fight for my tenure at a time when I barely deserved it. I hope his voice can still be heard in this book. Many other people in the Department of Psychology at the University of Virginia have supported me through the ups and downs of a long career. The membership of the Behavior Genetics Association has welcomed me even as I have criticized many of its methods and assumptions. In recent years I have had the good fortune to build relationships with colleagues in philosophy (especially Steve Downes), psychiatry (especially Ken Kendler), and genetics (especially Molly Przeworski).

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No one has been more patient with me than my family. My wife Carol Manning and my children Eden, Lena, and Manning have tolerated a husband and father with his head in the clouds since long before this book was imagined. I owe them everything.