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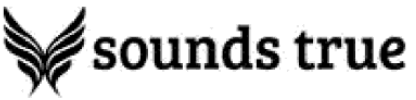
Wiser

The Scientific Roots of Wisdom, Compassion, and What Makes Us Good

Dilip Jeste, MD

with Scott LaFee



Boulder, CO

Praise for *Wiser*

"Wiser *is a brilliant contribution to the emerging science of wisdom—how we define it, research it, and how we can intentionally cultivate it in ourselves and our society. A timely and hope-giving book as our world faces challenges that require the deepening of our wisdom as a species."*

TARA BRACH author of *Radical Compassion*

"The new science of wisdom is transforming the way we understand human potential and showing that the ancients were right: wisdom is real, wisdom is precious, and we can all be, yes, wiser. Drawing on cutting-edge neuroscience and a lifetime of research, Dilip Jeste brings the attributes of wisdom—compassion, self-reflection, humor, curiosity, and spirituality—to every page. He shows that wisdom can be developed and strengthened, and he explains how. A lot of books have made me smarter. This one made me better."

JONATHAN RAUCH author of *The Happiness Curve*, senior fellow of Brookings Institution, and recipient of National Magazine Award

"Wiser *is the readable summation and thoughtful culmination of the thought and work by Dr. Jeste on wisdom over many years. No medical scientist, to my knowledge, has been willing to tackle the expansive complexities of practical wisdom, what some may label as 'wisdom that matters,' as thoroughly as the author. Jeste takes us on a journey through the neurobiological foundations as well as the psychological and social components of practical wisdom. He artfully integrates the unique perspectives of his cultural background and a stellar career of scientific inquiry using Western methodologies. He has collaborated with and supported conversations among many scholars and has distilled these conversations into a basic handbook that will be of immense value to all who read the material, more importantly to those who are willing to grapple with this ever-expanding horizon of inquiry. That horizon is informed by science, the humanities, and wisdom itself."*

DAN BLAZER, MD, PHD author of *The Age of Melancholy* and *Freud vs. God*, JP Gibbons professor emeritus of psychiatry and behavioral sciences, Duke University School of Medicine

"Much has been written about human tendencies to compete, with winner-take-all rewards. Yet none of us would survive alone. The true story about humankind involves cooperation, kindness, and compassion. This lesson appears to grow stronger with age. Dilip Jeste, with Scott LaFee, details the science behind the proclivities to be concerned for the welfare of others and the circumstances that enrich it. Read this definitive account of wisdom and be wiser for it."

LAURA L. CARSTENSEN, PHD author of *A Long Bright Future: An Action Plan for a Lifetime of Happiness, Health, and Financial Security*; founding director, Stanford Center on Longevity; Fairleigh S. Dickinson Jr. professor in public policy and professor of psychology, Stanford University

"In Wiser, *Jeste, with LaFee, has written a compelling new book about the scientific research that takes the notions of wisdom and morally grounded reasoning out of the realms of myth and philosophy and into the bright light of modern psychology and neuroscience. From defining wisdom as an aspect of human mind and brain to explaining its psychological components and how to become wiser, Jeste, with LaFee, has produced an important and exciting new book on the science of wisdom. This is a deeply engaging book that explains clearly the science of wisdom and provides practical suggestions for wiser reasoning grounded in solid research."*

HOWARD C. NUSBAUM, PHD founding director, Center for Practical Wisdom, and Stella M. Rowley professor of psychology, University of Chicago

"We have never needed this book more than we need it now. It is the right book, at the right time, and for all the right reasons. Professor Dilip Jeste, with Scott LaFee, traces the scientific and sociocultural roots of wisdom, its cultivation, and its deep links to compassion and to lives well led. Not only medical and social scientists but also health and social policy makers and general readers will find insight and comfort in this volume. We need wisdom and courage for the facing of this hour. Wiser *helps immensely."*

CHARLES F. REYNOLDS III, MD distinguished professor of psychiatry emeritus, University of Pittsburgh School of Medicine; recipient of Pardes Humanitarian Prize in Mental Health

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To three women—my wife, Sonali, and our daughters, Shafali and Neelum—and three boys—grandsons Nischal, Kiran, and Arjun—who have been doing their best to make me wiser faster.

—DILIP JESTE, MD

To Marlee J, marrying you is the wisest thing I have done.

—SCOTT LAFEE

Introduction
Seeking Wisdom of the Ages at All Ages

Wisdom is not intelligence.

It is more, much more.

TO BE SURE, we all want to be smart. We all know people who are intelligent, to whom the workings of the world come a bit more readily and easily. Smart people seem to understand complexities. They make connections, see patterns, and find solutions with efficiency and apparent ease. They are the classmates who got straight A's, the coworkers with the brilliant plan or best way to make the bottom line. They see the "next big thing" before others are even looking.

But many smart people are not happy. They appear perpetually stressed and under pressure. They may appear to care only about themselves, making you reluctant to seek their advice because you don't know whose priorities are first. You can't always predict how they will react to your request. They may smile and say, "Of course." They may become angry. They may be indifferent.

It's good (and often profitable) to be smart, but being wise is more interesting and more useful if our goal is to live a full and meaningful life. I'm not referring simply to the pursuit of happiness, which is distinctly subjective and frequently shifting. What makes you "happy" one moment or at one point in your life may not in another moment or as you age. Our notions of happiness change over time. And they are often different from others'.

Of course, happiness is a good goal. It typically accompanies becoming wiser, but wisdom is more about acquiring a deeper understanding about meaning in life, of being able to see how and where you fit into the grander scheme of things and how you can be a better person for yourself and for others. Searching for and finding meaning and purpose in life is not limited to philosophers. It is associated with better health, wellness, and perhaps longevity and definitely with wisdom. People who have a clear-eyed sense of the rational meaning in life—whatever that may be—are happier and healthier than those without it. They are also wiser.

We all know wise people. They're smart. Intelligence is an integral part of wisdom. But they are also warmhearted and compassionate. They are sophisticated, not simply

or only in terms of academics or business, but in the ways of the world and of people. They are open-minded. They listen and make others feel heard. They are reflective, unselfish, and problem focused. They are willing to act on their beliefs and convictions, to do what is right, first or alone. Wise people become trusted advisers because they possess characteristic sagacity, happiness, and a calm demeanor we can rely on. They seem to instinctively know how to handle the personal problems that others find overwhelming. Wise people stand still and resolute amid chaos and uncertainty. They are different. And the rest of us would like to be more like them.

Many of the wise people you know are probably old, or at least older. Wisdom and advanced age seem synonymous. Consider the great works of legend and literature: Moses, Helen Keller and Toni Morrison, Gandalf, Albus Dumbledore and Yoda (who undoubtedly picked up a few things over his 900-year life).

"Older and wiser."

"Older but wiser."

So go the adages. We all expect wisdom to bring the fruits of contentedness, happiness, and calm, with a corresponding decline in stress, anger, and despair. But as you will see, wisdom and age are not inextricably bound.

Personality certainly plays a role. Psychologists define personality as a set of characteristic and consistent patterns of thinking, feeling, and behaving that distinguish each of us from everyone else, such as individual variances in sociability or irritability. Why are you shy and introverted while your sibling is a life-of-the-party extrovert? Why do coworkers panic over missed deadlines while you do not? Why is your boss is always angry?

Wisdom is a personality trait. The complex components that comprise and characterize it are part of the even larger and more complex set of elements that describe and define your personality.

Becoming wiser is a personality plus. But why are some people wiser, more perceptive, and more content in their lives than others? Do we have to become old to become wise as well? Can people become wiser faster? These are questions I have pursued over a long and revelatory career.

As a teenager growing up in India, I became fascinated by Sigmund Freud's books for laypeople on interpreting dreams and everyday errors in life. Freud was a neuropsychiatrist. He believed that all behaviors had a biological basis in the brain. He asserted that psychology rode on the back of physiology. Though I didn't know if Freud's interpretations of dreams and slips of tongue were accurate, I was taken by his

strong sense that the ultimate answer lay within the physical brain.

So I decided to learn more about this mysterious organ and its primary product, the mind. I went to medical school to become a psychiatrist, which was a rather odd choice in India at that time.

When I completed medical school in Poona (now called Pune), India, at age 21, the total number of trained psychiatrists in all of India—a nation of more than 550 million people at the time—was probably fewer than one hundred. Although my family and close friends did not try to deter me, I am sure they were perplexed by my choice. Perhaps some secretly suspected my sanity.

My interest in psychiatry focused on studying the brain itself. My medical school in Poona did not have a research program in psychiatry, so I moved to Bombay (now Mumbai) and did my residency under the mentorship of two pioneers of academic psychiatry in India: N. S. Vahia and D. R. Doongaji. I learned how to properly conduct simpler types of clinical research; I published several papers. But soon I bumped up against the limits of brain research in India at the time. There simply weren't enough facilities, physicians, or resources to do the kind of work I wanted to do—and so I headed for the mecca of medical research, the United States and the National Institutes of Health (NIH). After completing another psychiatry residency that was required for a license in the US (at Cornell University), I would spend several years at the NIH working on a host of psychiatric issues and questions. In 1986, I moved again, joining the faculty of the University of California San Diego School of Medicine, then and now a place of invigorating, collaborative research. It is still my academic home.

My early work at UC San Diego focused on the nature and biology of schizophrenia, especially in older people. Throughout this period, I never quite got away from my youthful fascination about the fundamental workings of the brain and its connection to wisdom.

But for a long time, I wasn't comfortable pursuing such research as a scientist. When I finally broached the idea of formally studying wisdom a dozen years ago, others, including colleagues and close friends, reacted with varying combinations of amusement, dismissal, sympathy, and maybe sometimes pity and dismay.

They told me that wisdom was a religious and philosophical concept, not a scientific one. I was counseled to not speak about research on wisdom if I wanted to avoid whispered ridicule or to successfully garner project funding. If I had been a young researcher at the time, I likely would have been persuaded to retreat in the face of overwhelmingly negative conventional wisdom. But being older and already having an established academic career, I was willing and prepared to take up the challenge.

Most of my academic and professional life has been spent seeking to understand the human mind and its condition, principally in terms of cognition and brain function across the adult life span and especially in older age. During the last two decades I, as a geriatric neuropsychiatrist, have focused primarily on the idea of "aging successfully," and what that means in terms of happiness and satisfaction, which surely rate high among most people's goals.

We tend to think of aging, particularly after middle age, as a period of progressive decline in physical, cognitive, and psychosocial functioning. For many, the graying of America represents its number one public health problem—looming, unavoidable, and alarming.

Yet there are many older people who thrive in later life. We all know of artists, writers, judges, and politicians who are active, productive, creative, engaged, and contributing members of society in important ways. At age 61 and weighing just 99 pounds, for example, Gandhi led a 200-mile, three-week march to protest the British salt tax, a major step toward India's national independence. Benjamin Franklin was 70 when he signed the Declaration of Independence. Nelson Mandela became president of South Africa at age 76—and married Graca Machel four years later. Shigeaki Hinohara, a Japanese physician who lived to the age of 106, published multiple books after his 75th birthday. Anna Mary Robertson Moses, better known as Grandma Moses, took up painting at 76 and produced more than a thousand images before she died a quarter of a century later. Her works now sell for tens of thousands of dollars.

Older people are often happier than people half their age. In a study conducted in 2016, my colleagues and I found that the mental health of adults improved with age, even as their physical health declined. They enjoyed higher levels of life satisfaction, happiness, and well-being and lower levels of anxiety, depression, and subjective stress than those decades younger.

I believe—and it's the basis of this book—that wisdom, like consciousness or stress or resilience, is fundamentally grounded in biology. And like all other biological functions, wisdom too can be studied, measured, altered, and enhanced using modern, empirical methods of science and medicine. Saying so does not negate the role or importance of psychosocial factors in the development of wisdom. From the presence of loving parents and grandparents to attending safe schools to having a supporting network of family and friends, the world we experience shapes who we are and how we live with others within it.

Behavior and environment impact biology—and biology impacts behavior. That's a good thing. It means that each of us can increase our biologically based wisdom

through various means, including behavioral, environmental, biological, and technological interventions. We can, in effect, become wiser faster.

This is a big, bold idea. It turns traditional understanding about wisdom on its head. For most of us, and for most of human history, wisdom has been considered sublime and indescribable, an accumulation of lessons learned over a lifetime. People seek wisdom, but finding it takes time, frequently accompanied by blood, sweat, and tears. Wisdom was considered the ethereal fruit and reward of aging.

But with ever-accelerating advances in science, with our growing ability to literally watch our minds at work and identify the mental mechanisms involved—down to the patterns of electrical and chemical messages between neurons that form memories—we are increasingly able to deliberately and positively alter our minds and behaviors in a relatively short period. Indeed, scientists are already able to create—and then erase—memories in laboratory animals. If we can alter the very fabric of our minds, why can't we weave in new threads of wisdom as well?

I believe we can. As we progressively understand the biology of the human brain—how all its diverse parts work together to produce the human mind—we will be able to expand, minimize, repair, improve, and just generally modify its results.

Wiser is an unprecedented guide designed and intended to help you identify, understand, nurture, and promote the behaviors of wisdom that already exist within you, the biologically based traits that the new science of wisdom posits can increasingly be measured, modified, expanded, and enhanced.

The scientific term for the only surviving human species is *Homo sapiens*, Latin for "wise man." Humans need to be wise. Wisdom has evolutionary significance, which we will explore later in the book.

Despite occasional moments of serendipity, science is usually laborious and plodding. That's a strength. It helps assure that the eventual finding or conclusion will more likely be right than wrong due to painstaking effort. Wisdom is similar. No one goes to sleep a fool and wakes up wise. Becoming wiser is a process. This book, based on the relatively youthful science of wisdom, is about how readers might speed up that process.

Perhaps in reading this introduction, you remain skeptical. That's entirely understandable and the sign of a scientific mind. For so long, wisdom has seemed ephemeral, something cool to think about—but only to think about. Many people, scholars and scientists among them, are skeptical. I meet them regularly and routinely. They express surprise at this topic. They have doubts and questions. To them and to you, this book represents my answers and evidence. It is not the end of the discussion,

but the beginning.

We need the powers and benefits of wisdom now more than ever. The need is particularly acute in times of trouble, fear, and woe, in times of war and global pandemic. In such moments, we need wisdom both in ourselves and in our leaders, because it is our collective wisdom that will lead to the betterment of humanity.

In this book, you and I will take a journey together, one that I hope will offer ample persuasive proof, but more importantly, reveal new ideas, insights, encouragement, and hope that wisdom is not a vague aspiration but something we can grasp, modify, and enhance, that the emerging neuroscience of wisdom and the understanding of how wisdom can be consciously improved promises to change ourselves and our world. I believe it can be for the better. For each of us. For all of us.

PART I
WHAT IS WISDOM?

Here's the first rule of improvement, whether the matter at hand is installing a new sink, rebuilding a car engine, or becoming wiser: you need to know what you're working with, how it (the plumbing, car engine, or in this case, your brain) works, and how to know that what you've done is actually an improvement on the original.

Part I addresses these requirements and lays the groundwork for the chapters that follow. I recount the enduring constancy of the concept of wisdom, which surprisingly hasn't changed much in meaning over millennia, the neuroscience of wisdom (where in the brain its traits reside), and the emerging tools of science that have moved investigation and discussion beyond the salons of philosophy and into the lab.

I also discuss the intimate but not inevitable linkage of age with wisdom. Wisdom often comes with age but, to paraphrase Oscar Wilde, sometimes age comes alone. Likewise, wisdom is sometimes apparent in youth, although even in those lucky people it should increase with age and experience.

And I introduce a new, peer-reviewed measure of wisdom called the Jeste-Thomas Wisdom Index, which you can take online. It is the first measurement developed and based on the neurobiology of wisdom.

1
Defining Wisdom

Of all the pursuits open to men, the search for wisdom is more perfect, more sublime, more profitable, and more full of joy.

THOMAS AQUINAS

No man was ever wise by chance.

LUCIUS ANNAEUS SENECA

THE GREEK PHILOSOPHER SOCRATES, who lived twenty-five hundred years ago, is widely associated with the search for wisdom. He famously went looking for it among the citizens of ancient Athens, only to conclude that no one he met was any wiser than he (and often quite less so) and timelessly declared (purportedly according to Plato) that "the only true wisdom is in knowing you know nothing."

But Socrates was hardly alone in his penchant for pondering the nature of wisdom. In Proverbs 4:7 of the Bible, King Solomon, immortalized as an archetype of wisdom, declared it to be "the principal thing." Wisdom is a favorite subject of the Sebayt—recorded teachings dating to the Middle Kingdom of Egypt, 2000 BCE to 1700 BCE—and the Bhagavad Gita, a similarly venerable Hindu text of religious and philosophical scripture (written 400 BCE to 200 CE, but based on the Vedas, which are perhaps five thousand years old). Writers in ancient India and China ruminated on the question, from Confucius to Buddha. So too have philosophers, priests, poets, and pundits from long ago Babylonia and the Akkadian empire through the European Renaissance and Age of Reason and into modern times.

But while discussions and debates might vary somewhat over time and in different cultures and places, definitions of wisdom have tended, by and large, to be ethereal, a bit beyond our grasp. Wisdom seemed to exist on a different plane. It was thought to be rare and aspirational. You might find wisdom, live it, be fortified by it, and do wonders through it, said Hermann Hesse, who penned the 1922 novel about the spiritual journey of self-discovery of a man named Siddhartha, but "one cannot communicate and teach it."

I began my own quest to understand wisdom by asking myself: What is wisdom, really? How is it defined? How can it be measured? These sorts of hard metrics are how scientists think and assess their ideas and hypotheses, and for a long time, wisdom eluded such quantification. But that is changing as other intangible aspects of humanity—such as consciousness, stress, emotions, resilience, and grit—are beginning to be studied, calibrated, and described in deductive detail. As recently as a few decades ago, hard-core scientists dismissed these constructs as indefinable, immeasurable, and nonbiological.

"One could write a history of science in reverse by assembling the solemn pronouncements of highest authority about what could not be done and could never happen," the great American science fiction writer Robert A. Heinlein once said.

It also turns out scientists lacked the tools to say otherwise.

Today, with advances in neuroscience, brain imaging, neurochemistry, as well as improved methodology in behavioral sciences, serious researchers accept that *all* of these aspects of the human condition, from how we manage our emotions to our resilience and fortitude, have a biological basis that underlies or runs parallel to psychosocial factors. It's another example of the old nature versus nurture debate, except there really is no "versus" here. The development of wisdom is indisputably dependent on what happens to you in life, but there is also an equal and inextricable biological element that profoundly influences how you learn and respond to life's lessons and events.

Take, for example, resilience. Thanks to the work of investigators like Eric Nestler and Dennis Charney, both in the Icahn School of Medicine at Mount Sinai in New York, we now know a lot about the neurobiology, genetics, animal models, and molecular pathways of resilience. And what's more, we're starting to get at behavioral and biological ways to enhance this most useful of personal traits.

Swap "wisdom" for "resilience," and that's my message too.

Wisdom is a product, not only of age and experience, but also of distinct behaviors and traits, all associated with discrete but connected regions of the brain.

The Emerging Science of Wisdom

Wisdom is the result of neurons firing in specific patterns in specific parts of one or more relevant neural circuits in the brain to produce behaviors that we deem to be "wise." It is biology and behavior that make it possible to separate wisdom from platitudes.

A scientific movement to define and explain wisdom began in earnest during the 1970s when a few scientists in different countries working in disparate labs started asking what wisdom is and whether it could be measured. In Germany, a psychologist named Paul Baltes, with his wife, Margret, and other colleagues, began developing a theory of human development with respect to wisdom, one that examined and sought to explain how people changed biologically, cognitively, and psychosocially over the course of their lives. It was the first empirical attempt to parse the nature of human wisdom based on scientific principles and approaches, and to propose specific features that affect how we think and behave over time.

Baltes and his colleagues would compile a list of key characteristics, among them that development occurs throughout life, beginning to end; that it changes in all directions and dimensions; that it is a process of growth and decline, but is also fluid and plastic; and that social and environmental factors are powerful. Ultimately, their work would become the influential Berlin Wisdom Project, and their model of wisdom would define it essentially as proficiency in the conduct and meaning of life.

The Berlin model of wisdom placed great emphasis on knowledge and cognition. It was a good start, but more was needed because wisdom is clearly much more than simply cognition. It involves emotions too.

Halfway around the world from Baltes, a young University of California, Berkeley, graduate student named Vivian Clayton was asking similar questions. Her mentor, James E. Birren, one of the founders of gerontology, challenged her to conduct a scientific search for answers.

Clayton scoured the literature of wisdom, from ancient texts to contemporary treatises, for mentions, allusions, and evocations of wisdom, developing a crucial framework for thinking of wisdom as a psychological construct. Between 1976 and 1982, Clayton published several noteworthy papers establishing important markers for the scientific study of wisdom. She declared that wisdom fundamentally has three distinct components: cognition, reflection, and compassion. They could be defined and measured by scientists.

Others picked up and expanded on Baltes's and Clayton's groundbreaking work. Among them were inspired and inspiring scientists like George Vaillant at Harvard Medical School; Robert Sternberg at Cornell University; Judith Glück at University of Klagenfurt in Austria; Dan Blazer at Duke University School of Medicine; Monika Ardelt at University of Florida; Jeffrey Webster at Langara College in Vancouver; Howard Nusbaum at University of Chicago; Igor Grossmann at University of Waterloo in Ontario, Canada; and others.

These researchers deeply probed the nature of wisdom, primarily in terms of aging, intelligence, and happiness. But a wholly satisfying understanding of wisdom remained elusive. Ursula Staudinger, a Columbia University psychologist and a leading scholar in the field, once noted, perhaps wryly, that "most empirical research on wisdom in psychology has so far focused on further elaboration of the definition of wisdom."

From Schizophrenia to Wisdom

My interest in wisdom and its relationship with aging is more tangible. And it started with an unexpected finding during my research on, of all things, serious mental illnesses.

In the 1990s, while conducting studies at the University of California San Diego School of Medicine in older people with schizophrenia, I was struck by a surprising research result.

Schizophrenia is a devastating mental illness. In essence, schizophrenia is a breakdown in the relationships between thought, emotion, and behavior. It has been described as a "cancer of the mind." Unlike Alzheimer's disease, which typically develops in old age (it used to be called "senile dementia"), schizophrenia usually manifests in adolescence or young adulthood. From that point on, the disorder tends to spiral progressively downward. People diagnosed with schizophrenia develop physical diseases much earlier in life, and they generally die 15 to 20 years younger than the general population—sometimes by their own hand. Among people diagnosed with schizophrenia, an estimated 20 to 40 percent will attempt suicide, 5 to 10 percent successfully.

But while the onset of schizophrenia often occurs in adolescence or the early 20s, many patients live with this disease for decades. In my research, I was studying hundreds of middle-aged and older adults living with schizophrenia, following their lives over a long period of time. The expectation of my colleagues and myself was that most of these patients would develop dementia (Alzheimer's or another form) early, with associated decline in neurological and biological function. The conventional thinking was that life after a diagnosis of schizophrenia would be nothing but a descent into dysfunction, disease, and despair. Indeed, the original German name for schizophrenia meant "precocious dementia."

But our results were surprising. We discovered that many individuals with schizophrenia functioned *better* in later life. They were more adherent (compliant) with their medications because they had learned from hard experience that stopping treatment led to relapse and calamity. They were less prone to abuse illicit drugs. They

had fewer psychotic relapses, and they were less likely to require psychiatric hospitalization than younger individuals with the same illness. With aging and continued therapy, many seemed to have become, dare I say, *wiser* about how to manage their disease, and how to live their lives. When we initially reported our findings, there was skepticism among researchers even about the diagnosis of schizophrenia in our patients.

Around this time, the movie *A Beautiful Mind* debuted, based on the 1998 biography by Sylvia Nasar of the late Nobel laureate John Nash, a brilliant mathematician who proposed a revolutionary game theory in his youth. This work led to his Nobel Prize in 1994. Nash was among the most brilliant minds of his generation. He also had schizophrenia.

Nash was diagnosed in his early 20s and underwent multiple treatments, from electroconvulsive therapy and insulin coma to myriad medications and psychotherapy. He was often hospitalized. But these efforts seemed to have little sustained effect. Largely separated from family and colleagues, he would disappear at times, sending cryptic postcards, then return to Princeton, where he had once been an academic superstar, to wander the campus "a lonely figure scribbling unintelligible formulas on the same blackboards in Fine Hall on which he had once demonstrated startling mathematical feats."

But as Nash entered his 50s, the course of his illness changed. His symptoms eased; he began to improve, and he gained new insights into his illness. By the time he turned 60, he had ceased all treatment for schizophrenia. He returned to research and teaching, joining the faculty at Princeton. For the first time in many years, he published papers in journals. People who knew him from his young days remarked that "the John Nash we knew is back again."

He was not entirely free of symptoms. He still endured episodes of hallucinations and delusions, but he was now able to differentiate these from normal thinking. He developed new insights into his own mind. He learned how to catch himself when symptoms appeared, and instead of succumbing to the psychopathology, he would consciously seek to normalize his thinking and behavior. "I emerged from irrational thinking, ultimately without medicine other than the natural hormonal changes of aging," Nash wrote in 1996 to Harold W. Kuhn, a Princeton professor and longtime friend.

Nash's story mirrored some of our own findings in aging patients with schizophrenia. Many of these people who had suffered so badly at the hands of this insidious disease in their youth were slowly able to reclaim their mental health in later

years. Even as their bodies began to decline with age, their minds were becoming clearer than they had been for decades. Was the reason the emergence of wisdom? Years later, we published a paper showing that in people with schizophrenia, the level of wisdom was associated with the level of their well-being and functioning.

If people with a serious mental illness like schizophrenia could enjoy greater wisdom and improved mental function with age, despite worsening physical health, could the same thing also occur in the general population?

By this time, I had been appointed director of the Stein Institute for Research on Aging at UC San Diego School of Medicine. With colleagues, I began studying a cohort of several thousand older adults in the San Diego community. We sent out surveys. Some study participants visited our labs; some we visited in their homes, in senior housing communities, and elsewhere. Our findings among this general population echoed the earlier "paradox of aging" we'd seen among individuals with schizophrenia: as people get older, their physical health declines, but their mental well-being and satisfaction with life *increase*. It doesn't happen with everybody, but many older adults—particularly those who take positive actions to manage their lives—become happier.

In a comprehensive 2016 published study of approximately fifteen hundred adults between the ages of 21 and 100 years, participants who felt they were aging successfully described higher levels of happiness, resilience, optimism, and well-being, even if their physical functioning was impaired by advancing age. The findings held true even after accounting for variables like income, education, and marriage. Like wine and good leather shoes, they improved with age.

A caveat: This was a cross-sectional study—a part of a multiyear investigation called the Successful AGing Evaluation, or SAGE—of a somewhat randomly selected group of adults from the community. All participants were residents of San Diego County in California. The cohort was almost evenly split between genders, with a mean age of 66. Twenty percent had high school or less education, 60 percent had at least some college education, and 20 percent had postgraduate education. Seventy-six percent identified as non-Latino white, 14 percent Hispanic/Latino, 7 percent Asian American, 1 percent African American, and 2 percent other ethnic or racial backgrounds. Cross-sectional studies are observational. They do not differentiate cause and effect. And they reflect only insights gleaned from the targeted study group.

The counterintuitive increase in well-being with aging was heartening, but also mystifying. How can one be happy getting up in the morning if getting up in the morning also involves a host of physical hurdles, from the aches and pains of arthritis

to the annoyances of an enlarged prostate to the gut-wrenching reminders that the coming day will not be occupied by family or friends who are no longer alive?

Other questions arose: Was this phenomenon merely the result of older people accepting the inevitability of age-associated losses? Or did it indicate some enhancement of brain function associated with aging? Were they, in fact, getting wiser as they grew older?

This brought me to the first and most pressing question: What is wisdom?

What Do Scientists Know about Wisdom?

The first step in starting research on a new topic is to review the existing literature so that you don't end up reinventing the wheel or retracing known ground, so that's what I did. Thomas "Trey" Meeks, who was my research fellow at the time, and I combed through the literature—specifically the voluminous PubMed and PsycINFO databases—to review all the papers that had sought to define wisdom in an empirical, but not religious or philosophical, fashion. We found Baltes in Germany and subsequent work by other gerontologists, sociologists, and psychologists, mostly in Europe and the United States. There seemed to be a general sense that wisdom is a complex trait comprising several components.

But what components, exactly? Here, there was uncertainty amid unclear definitions. How could the scientific community understand wisdom without a common, accepted definition? So Trey and I set out to provide just that. We created a table listing all the individual components proposed by different researchers. We found that a handful of components topped the list of many of these definitions: prosocial behaviors like empathy and compassion, emotional regulation, decisiveness while recognizing the uncertainty of life, insight and self-reflection, general knowledge of life, and social decision-making.

But even as we discovered these commonalities among wisdom researchers, new questions arose. Most of these papers were written by Western scientists, working in Western labs, studying a fairly homogenous population. But isn't wisdom a cultural concept? Was wisdom defined differently in different places around the world? What about scientists in other parts of the globe whose definitions had not been published in the journals we studied? We realized that for our study to truly have value, we had to widen the scope of our inquiry. So we began searching for international experts in wisdom who had published papers or book chapters on this topic.

The process was complex and laborious, but basically consisted of rounds of surveys with experts anonymously parsing and paring statements about wisdom. It is called

the Delphi method and seeks to determine an overall consensus.

Eventually, our diverse experts arrived at some conclusions: Wisdom is a form of advanced cognitive and emotional development driven by experience. It can be measured, learned, and observed. We all know people who epitomize wisdom.

Our experts concurred that wisdom does increase with age, that it is uniquely human and distinctly personal. But it isn't likely to be enhanced by taking medication (at least not at present).

Not every expert concurred on every item defining wisdom, but there was consensus on several, which proved to be quite similar to the components that Trey Meeks and I had found in our earlier literature review:

PROSOCIAL ATTITUDES AND BEHAVIORS. These include empathy, compassion, and altruism. What exactly do these terms mean? Empathy is the ability to understand and share the feelings and thoughts of another. Compassion involves translating empathy into helpful behavior. Altruism is opposite of egoism and refers to actions to help another person without expecting any external rewards. Can you put yourself in others' shoes and do you want to help those in need? In psychology, there is a concept called "theory of mind," which describes the ability to attribute mental states—beliefs, desires, emotions, knowledge—to both yourself and others. Theory of mind is essential to behaviors like compassion, where we often act out of a recognized connectedness with others.

EMOTIONAL STABILITY WITH HAPPINESS. This is the ability to maintain self-control, while preferring positive feelings to negative ones. "Anger is a brief madness," observed the ancient Roman poet Horace. Few acts are done well when driven by unthinking passions.

BALANCING DECISIVENESS WITH ACCEPTANCE OF UNCERTAINTY. The latter involves acknowledging that different but equally valid perspectives exist and that things can change, including one's deeply held thoughts and beliefs, over time and with new knowledge, experience, and insights. It means recognizing that other people may have different beliefs, desires, intentions, and perspectives and that people with different belief systems need not be considered evil or unintelligent. But while we accept uncertainties in life and diversity of perspectives, one cannot sit on the fence too long or too often. One

must act when action is called for, based on the information at hand, knowing that the decision could later prove to be the wrong choice. Deciding not to act is also a decision.

REFLECTION AND SELF-UNDERSTANDING. These include insight, intuition, and self-awareness. Are you able to analyze yourself and your motivations, your strengths and weaknesses? Understanding oneself is much more difficult than people think.

SOCIAL DECISION-MAKING AND PRAGMATIC KNOWLEDGE OF LIFE. These relate to social reasoning and the ability to give good advice, as well as share life knowledge and life skills. Wisdom not shared is wisdom not gained but lost.

These, we concluded, are the bases of wisdom. However, they do not stand alone and apart from one another. Quite the contrary. They all share commonalities and sometimes overlap in surprising ways. And yet, like pillars, they are distinctly foundational to wisdom. You need all of them, albeit the levels of individual components in a person may vary.

A few years after our first wisdom survey, a fellow in my group named Katherine Bangen joined Meeks and me for a second review of the scientific literature to further refine the empirical definition of wisdom, based on novel and emerging types of assessments. The new findings largely confirmed the old. The basic components were those we had previously described, with the addition of an important new element, spirituality, and two less common components: openness to new experiences and a sense of humor.

The "science of wisdom" was maturing.

SPIRITUALITY. It should be noted that spirituality is not the same as religiosity. The latter typically refers to organized or cultural systems of belief. Religion can be and often is spiritual in nature, but its practices vary considerably in societies and around the world. Spirituality is a more universal constant, a core human belief in something larger than the individual and the society. It leads to a feeling of humility as well as comfort in going beyond the stresses of everyday life. Spirituality can include religion, but it can mean and embrace much, much more.

There was criticism of our definition from a particular perspective. Since wisdom is a cultural concept, perhaps it was viewed differently in ancient times. Maybe the Wisdom of Solomon is not the same thing as wisdom today. Our task was to become

better versed with how wisdom was defined in the distant past. Growing up in India, I had learned about the Bhagavad Gita, or Gita, a 700-verse poem written 500–200 BCE and based on Yogas (practices or disciplines) that date back at least a few thousand years. With advice from a medical anthropologist at UC San Diego, my research fellow Ipsit Vahia and I conducted a study of English online translations of the Gita, searching for the words *wisdom* or *sagacity* and their antonyms, *foolishness* or *folly*. We looked at the context in which these words were commonly used, which helped us identify components of wisdom in the scripture.

For example, there is a verse in the Gita: "[Anger, desire] the Wise man's eternal foe; by this is wisdom overcast" (chapter 3, verse 39). Thus, the Gita considers equanimity to be an essential virtue. Wise people are characterized by balance: no extreme emotions, negative or positive. Wisdom implies that events of joy or sadness are treated similarly. We deemed this to be emotional regulation.

A number of verses in the Gita relate to compassion and altruism. For example, "steadfast in the yoga of wisdom, restrained and open-handed, performing sacrifice" (chapter 16, verse 1). A wise person is compassionate, says the Gita. Sacrifice for the sake of sacrifice and not for its material rewards is also an element of wisdom. We labeled this as prosocial behavior.

In a paper we published in the journal *Psychiatry*, we reported that, by and large, the components of wisdom in our literature review and international expert consensus were strikingly similar to what we uncovered in the Gita.

To be sure, there were a few differences. Love of God and lack of materialistic pursuits are stressed in the Gita, but not so much in modern Western conceptualizations of wisdom. But such differences paled in significance compared to the similarities. That was a big surprise. It suggested that the basic concept of wisdom had not radically changed across millennia or cultures. To me, this further suggested that wisdom is biologically based.

I was getting excited. We had an accepted definition of wisdom. We'd determined that this definition had remained largely consistent over time—for millennia, in fact. But the next step was going to take us even further, into the leading edge of what current science has made possible. I needed to probe the brain itself to begin to understand the neurobiology of wisdom—where these specific components live in specific regions of the brain—if I hoped to help people become wiser.

In chapter 2, we delve into the neuroscience of wisdom.

2
The Neuroscience of Wisdom

The supposedly immaterial soul, we now know, can be bisected with a knife, altered by chemicals, started or stopped by electricity, and extinguished by a sharp blow or by insufficient oxygen.

STEVEN PINKER, *How the Mind Works*

If the human brain were so simple that we could understand it, we would be so simple that we couldn't.

EMERSON W. PUGH, researcher, Carnegie Institute of Technology

AS I MENTIONED IN the introduction, in my teenage years, I loved reading Sigmund Freud's popular books on interpreting dreams and everyday errors in life. Freud would begin a story with a description of a dream or a ("Freudian") slip of the tongue, then proceed to decipher its latent meaning (consistent with his psychoanalytic theories), using clues from the person's behaviors, past and present.

Thus, a bit of blundered speech purportedly revealed an unconscious thought. Someone might intend to say, "I'm glad you're here," but actually utter, "I'm mad you're here." The latter supposedly signified the speaker's true sentiment. Freud imparted a great deal of hidden meaning to these errors, and to me, his books were like reading Agatha Christie mysteries, which characteristically began with a murder from which Christie's protagonist detective would employ various behavioral and environmental clues to identify the culprit and solve the case.

But here we're talking about something beyond mere mind over murder. Freud believed that all behaviors had a biological basis in the brain. Dreams were an unconscious process to resolve some sort of conflict, usually deep within the past but precipitated by a recent event. The behavior signified stressful, competing demands of the desires of the id, driven by primal impulses, instinctive urges, and unrestrained wish fulfillment, versus the rational ego or the severe, punishing superego, shaped by society's values, morals, and expectations.

I didn't know how accurate Freud's interpretations of dreams and slips of the tongue

were, but I came to conclude that the ultimate answer lay within the physical brain. My fascination with mind and brain has only increased with time.

Most of us use the words *brain* and *mind* interchangeably and in some ways, justifiably so: they cannot be separated. But the brain and mind are obviously different things. The brain is a physical object; the mind is not. The brain is composed of nerve cells, blood vessels, and tangible tissues. It has a definite shape, weight, and mass. It possesses a distinctive look and has the squishy consistency of Jell-O.

The mind is a function of the brain, the resulting thoughts, emotions, behaviors, and acts prompted by the interactions of all of those brain cells with each other and with other cells in the body—and with every sort of stimulus beyond. The mind has no shape, weight, or mass. It cannot be seen or felt by our physical senses. It is detected only by another mind.

If there is a timeless, universal understanding of wisdom—we all know it when we see it, and have through the centuries—then it makes sense that wisdom must be, in some way, hardwired into our brains. It's a basic rule of evolution: nature conserves what works. But where was the actual wiring? And how does one go about finding it?

This Is Your Brain on Paper

Every organ of your body possesses a singularity of form, but none is more distinctive than your brain, with its hemispherical halves, ellipsoid shape, and iconic, twisting bumps and grooves called gyri and sulci. Alive, our brain isn't even one color. It's pink, red, white, black, and 50 shades of gray.

The human brain is instantly recognizable, the tireless subject (and originator) of our thoughts and ruminations. And yet, it remains among science's greatest and most enduring mysteries—a riddle and enigma wrapped inside a wrinkly cortex, to paraphrase Winston Churchill. We probably know more about how stars are born than we do about the electrochemical, cellular, and molecular workings of that three-pound lump of variegated tissue perched atop our spines, most of which is water.

So how do you solve the problem of finding where things like empathy, self-understanding, and emotional control—all elements of wisdom—reside within the brain?

In a 2009 paper, Trey Meeks and I began with a simple idea. We Googled two terms: *wisdom* and *neurobiology*, which is the study of the anatomy, physiology, and pathology of the nervous system (that is, the brain and spinal cord). Our search did not turn up much that was relevant, mostly science papers published by authors named Wisdom or treatises on wisdom teeth.

It was funny, but frustrating. There was not a single article that contained both *wisdom* and *neurobiology* in the title or in its key words. We would need to try something else. So we expanded our search to include numerous terms beyond *wisdom* and *neurobiology*, adding individual components of wisdom, such as compassion, and conditions or diseases associated with a loss or the absence of wisdom's components, such as antisocial personality disorder, a condition characterized by a lack of compassion. We also added relevant scientific terms like *neuroanatomy*, *neurocircuitry*, *neurochemistry*, *genetics*, and other facets of neurobiology.

The revealed papers began to stack up quickly. When we looked at reports of brain imaging, neurophysiology, and other neurobiological measures that associated individual components of wisdom with specific parts of the brain, we made a surprising discovery. Again and again, the same parts of the brain showed up, most notably the prefrontal cortex and the amygdala. This suggested that these brain areas might have something to do with where wisdom lies within the brain.

But a major problem remained. While we learned more about the neurobiology of wisdom's individual components, it didn't necessarily tell us much about wisdom as a whole. How did the different components of wisdom relate to one another and how did they combine to produce this single, complex trait? Different areas of the brain have different functions, but they connect to one another in a meaningful way to create specific neurocircuits.

To better grapple with this complex topic as it relates to wisdom, we need to first get a lay of the land and a common vocabulary.

Mapping the Brain

There are a few things to keep in mind as we discuss this amazing organ. First, this guide to the brain is highly simplified. It's a primer, not a textbook. Second, though we delve into very specific regions of the brain and highlight very specific functions that occur within them, it's important to remember that the brain operates continuously in its entirety. Finally, this is a tour of a so-called normal brain: healthy and fully developed, unaffected by major disease, congenital deformity, physical trauma, poor diet or lifestyle, or old age.

The human brain consists of three main regions: cerebrum, cerebellum, and brain stem. The cerebrum has two hemispheres—right and left—each of which includes four lobes: frontal in the front, occipital at the back, with parietal and temporal in between.

The outer layer of the cerebrum is composed of gray matter—neurons and their connections, known as synapses. This is called the cerebral cortex. From the

perspective of wisdom researchers, the most important parts of the brain are the front portion of the frontal cortex, or prefrontal cortex (PFC), and the amygdala. In the evolutionary history of the brain across animal species, the PFC is the most recently formed and newest region. Humans possess relatively large PFCs relevant to other species. It's basically the front third of our brains, located right behind our foreheads. Conversely, the amygdalae, a pair of small, almond-shaped organs, are found deep within the oldest part of the human brain, the limbic system, which sits atop the brain stem and is almost universally found to some degree in every animal species with a brain.

To locate where exactly the limbic system is, think about the evolutionary development of the brain as a sort of progression of balls growing ever larger as new layers and sections are added and enlarged. More primitive species have brains that consist primarily of the limbic system. There isn't much tissue, if any, devoted to higher-level functions like conscious thought. The human brain, on the other hand, is the product of millions of years of evolution and natural selection, layer upon addition upon modification and improvement made in furtherance of survival. The limbic system is still there, of course, regulating breathing and blood flow. It supports a variety of other fundamental functions, such as emotion, memory, and olfaction. But now it is surrounded by the more massive cerebrum, home to higher-level thinking, with the smaller cerebellum and hindbrain managing motor control tucked behind and underneath.

Imagine spreading a human brain flat on a table like a foldout map, smoothing all of those cortical wrinkles our brains have developed to provide more surface area and shorten distances between points. Your flattened brain would be roughly 2,500 square centimeters, about the same size as a small tablecloth. This metropolis of the mind would comprise distinct districts, a few of them housing components of wisdom.

First stop on our mind-knowing tour is, naturally, the PFC. It's an indisputably upscale and sophisticated area where prosocial attitudes and behaviors reside. These attitudes and behaviors represent the innate belief and understanding that we all strive for the common good; that when we help others, we help ourselves; that we all seek something bigger and better. Empathy and altruism are prosocial attitudes. They have deep biological roots. When we watch, smiling, as a child joyously blows out candles on a birthday cake, or choke back a sob during a poignant scene in a movie, mirror neurons in our PFC are firing in the same patterns as those in the person we are watching. People with greater unconscious somatic mimicry have higher ratings of self-reported altruism. When they say they feel your pain, they really do—at least in

their head.

Obviously, human empathy and altruism are more complex than just neurons in one person's brain firing in unison with those in another person's. With some exceptions, we are all governed by our ability to understand the emotions, intentions, beliefs, and desires of others, especially when they are not the same as our own. I intuit what you're thinking because I assume your mind works similarly to mine, though we may come to different conclusions. It enables me to understand, explain, and predict others' mental states and behaviors. Without it, there is no social connection, no chance to be wise.

Also located in the PFC and in the nearby neighborhoods of the anterior cingulate cortex, posterior superior temporal sulcus, and temporoparietal junction is our second stop: the homes of social decision-making and pragmatic knowledge of life. These admittedly wonky phrases fundamentally describe what each of us knows about ourselves, about others, and about how to deal with life's ever-changing conditions and problems. These are the "facts" we use to get along while getting ahead, like understanding implicitly that a crying child or grieving widow need comfort and consolation, not a sharp rebuke or disdainful snort.

In the PFC and nearby in the dorsal anterior cingulate cortex lives the third major component of wisdom: emotional regulation or homeostasis. The latter word is another way to say balance. Our bodies—indeed every aspect of the universe—seek homeostasis, a relentless drive toward stability. Our physical bodies do this constantly, every moment, tweaking internal conditions to achieve a desired equilibrium: sweating when we're too hot, shivering when we're too cold, signaling thirst or hunger when we need water or food.

It's no different psychologically. There is no wisdom in instability. If you're always angry or consumed by negative emotions, you cannot behave wisely. Buddhaghosa, a fifth-century commentator, once wrote that holding on to anger is like grabbing a hot coal with the notion of throwing it at someone else. You're the one who's going to get burned. The yin and yang of emotion and cognition, of feeling and thinking, must be balanced. There are good reasons and occasional value in being angry or envious, but such emotions must be skillfully managed to a wise purpose and end. Likewise, it's nonsensical to be perpetually giddy or blindly optimistic.

Let's linger for a moment in a specific section of the PFC called the medial prefrontal cortex, with side trips to the posterior cingulate, precuneus, and inferior parietal lobule. These are the regions of the brain where we find the fourth major component of wisdom: reflection and self-understanding.

The ancient Greeks had a saying: *Gnothi seauton*. Know thyself. Perhaps no other element of wisdom is more universally recognized. Reflection—the fixing of thoughts on a particular topic with careful consideration—is foundational to wisdom. It's hard to imagine our popular archetypes of wisdom, people like King Solomon, Abraham Lincoln, Elizabeth I, or Martin Luther King Jr., acting without thinking, without weighing consequences. No one knows what Solomon looked like, but you can see the ravages of hard thought and harder decisions in the face of Lincoln and hear them in the emotionally charged but reasoned language and exhortations of King. Rash wisdom is an oxymoron.

In the PFC and tucked just beneath in the anterior cingulate cortex is the place where awareness of life's uncertainties resides, where we learn and accept new thoughts and beliefs based on new knowledge, experience, and insights, where we hone our tolerance and acceptance of others. There can be no empathy, compassion, connection, or bonding without tolerance. Tolerance of diverse or even contrarian views is no less important to wisdom than self-reflection or prosocial attitudes. It is the ability and the willingness to look at life, people, and situations from multiple perspectives without disdain or immediate condemnation. The world is not black and white, but multihued, like your brain. There may be a right way to go and a wrong way to go, but you won't necessarily know which path is correct if you haven't considered all the options.

Also in the PFC, along with the anterior cingulate cortex and orbitofrontal cortex (which gets its name from its location immediately above the orbits in which the eyes are located) lies our last stop: the ability to behave and act despite acknowledgment that life is uncertain and ambiguous.

Sometimes there is no right way to go. There are always limits to knowledge. "Everybody is ignorant," said Will Rogers, "only on different subjects." The fact that we cannot know everything, that we cannot foretell our futures, can be profoundly unsettling. For every door that closes, another may open, but what if it's an elevator shaft? Sometimes we choose not to look before we leap or hope we'll grow wings on the way down.

My UC San Diego colleague Ajit Varki and his coauthor, the late Danny Brower, made that point quite compellingly in their 2013 book *Denial: Self-Deception, False Beliefs, and the Origins of the Human Mind*. They explained that approximately one hundred thousand years ago, something changed in the human mind. As we developed new cognitive skills and behaviors that set us apart from other animals, we began to reflect more deeply on the meaning of life, which very quickly developed into a frightening

awareness of our own mortality. To assuage those fears, humans evolved the unique ability to deny reality. We became the ultimate risk-takers, choosing to ignore even science-based facts if it allowed us to more blithely pursue life, liberty, and happiness. Even death was irrelevant—or at least ignored.

Wisdom helps us cope. Wisdom means being aware that nothing in life is guaranteed (except that life is finite), and that means we must use what time we have as wisely as we can.

There are two other parts of the brain that don't directly relate to our discussion, but that still have a profound influence. In each hemisphere of the brain, folded within the lateral sulcus (that deep crease visible on the sides of the brain where the frontal lobe seems to flop over the parietal lobe) is a portion of the cerebral cortex called the insula. You have two insulae (plural form), one in each hemisphere. They are involved in consciousness and diverse functions linked to emotional homeostasis.

The other part of the brain is the hippocampus—a pair of small, seahorse-shaped structures located in the medial temporal lobe, deep within the brain. The hippocampi are primarily known for their roles in consolidating information from short-term memory to long-term memory and for spatial navigation, but in reality, their influence is much greater.

When you get a whiff of perfume worn by a former crush or experience déjà vu in a place you've never been before, it's your hippocampus at work pulling out or pulling together distant or disparate memories. The hippocampus is not really a part of the wisdom neurocircuitry, but its functioning (that is, normal memory) is indispensable to wise thinking and wise behavior.

Bumpy Skulls and What Lies Within

Today, we understand and have broadly localized different components of wisdom to different areas of the brain, keeping in mind the caveat that various parts of the brain tend to work in concert, but the road to this moment was long and winding, marked by wrong turns and dead-ends.

Two names stand out in that journey: Gall and Brodmann.

One was a fraud; the other a pioneer.

Franz Joseph Gall was born to Roman Catholic parents in Germany. He was intended for the priesthood, but as the medical historian Erwin Ackerknecht would later write, Gall's primary passions in life were "science, gardening, and women."

So, in the year 1777, the 19-year-old Gall could be found not in a seminary but in

medical school, studying under the tutelage of Johann Hermann, a comparative anatomist who believed that men and apes were closely related. It was not a widely held view at the time. Charles Darwin's evolutionary masterpiece *On the Origin of Species* would not be published until 1859.

Gall was an intent observer. In his medical studies, he noticed that many of the brightest students had prominent eyeballs and concluded that this could not be purely coincidental. Hermann and other mentors had emphasized the importance of natural observation, and in his first job at a lunatic asylum in Vienna, Gall took keenly to the task, scrutinizing the "insane," most notably their skull sizes and facial features.

A notion formed in Gall's head. He began collecting human and animal skulls and wax molds of brains in order to study their cranial contours in comparison to characteristic behaviors associated with animal species or with a deceased person. For example, he looked for telltale indicators—shape or weight—that might reveal the carnivorous compulsions of a feral cat. Or the larcenous tendencies of a well-known robber, recently executed. By 1802, Gall had managed to collect, by hook or crook, approximately 300 human skulls and 120 plaster casts.

Gall concluded that different and localized regions of the cerebral cortex—the outer surface of the brain that Gall referred to as the "rind"—seemed to coincide with 27 innate psychological characteristics he dubbed "fundamental faculties."

Nineteen of these traits, like the instinct to reproduce, to feel affection, defend oneself, or possess a sense of time and space, were shared with other species. Eight were uniquely human; among them: poetic talent, religion, wit, and wisdom.

Gall thought each of these 27 faculties reposed within a specific place in the brain. "Firmness of purpose," for example, could be found near the crown of the head. "Murderous tendencies" lurked just above the ears. "Language" was located below the eyes.

Gall determined that his 27 fundamental faculties affected the shape and topography of the skull, not unlike a comforter reflecting the underlying lumpiness of a mattress and bedding. Bony irregularities of the skull corresponded to distinct faculties pressing or pulling from below. Gall created a method called "cranioscopy" to detect and measure the uneven topography of the human head and, from these measurements, determine a person's nature and the development of his or her mental and moral abilities. The practice eventually acquired a name: *phrenology*, a Greek combination of the words for "mind" and "knowledge."

Phrenology quickly captured the lay public's imagination. It seemed fantastical, but it was also easy to comprehend and became, for a while, wildly popular. Phrenology

arrived at a time when scientific procedures and standards for acceptable evidence were still being codified. It fed into certain social conventions of the time, but also *seemed* scientific. It quickly became fodder for books, pamphlets, and the lecture circuit.

It was misguided folly. By the 1840s, phrenology had largely been dismissed or discredited, victimized by the fact that even its advocates couldn't settle on a number of basic mental organs, and even more by the reality that nobody could actually, definitively locate them or prove their functions.

"Phrenology has been psychology's great faux pas," noted the British experimental psychologist John Carl Flugel ruefully in 1933.

But Gall can lay some claim to an important scientific concept: "localization of function," the idea that different areas in the brain are specialized to perform different and specific functions. His work was among the first conceptual efforts to map the human brain. His work was based not on scientific data, but on pseudoscience. By happenstance, he correctly placed "sagacity" near the frontal cortex, but also determined that "friendship and affection" were in the back of the head.

Born 40 years after Gall's death in 1828, a German neurologist named Korbinian Brodmann began creating maps of the cerebral cortex based on both gross anatomical features and cytoarchitecture, or how cells are functionally organized.

After earning his medical degree, Brodmann went to work at the University of Jena psychiatric clinic in Germany, eventually meeting Alois Alzheimer, who persuaded Brodmann to devote himself to basic neuroscience research.

Brodmann's investigations were wide-ranging, combining clinical observations with basic research of mammalian brains. He compared anatomical structures in human brains with those in primates, rodents, and marsupials. To discern the different functions of different parts of the cerebral cortex, Brodmann (and others) relied on the techniques of stimulation and lesions. Using both animal and human models, he would precisely stimulate a part of a living brain to see what happened next: Did the animal's right leg move? Did its nose twitch? Conversely, he would observe how specific areas of damage in the brain (a lesion, for example) correlated with observed physical results.

It was intense and productive work. It provided Brodmann—and science—with a remarkable first map of the functional brain. Unfortunately, it was also abbreviated. Brodmann died suddenly of a septic infection following pneumonia at age 49.

Nonetheless, Brodmann made a long-lasting contribution to neuroscience. He divided the cerebral cortex into 52 regions—now called Brodmann areas—grouped into

11 histological, or tissue-based, categories. He postulated that these areas, with different physiological characteristics and structures, performed different functions. For example, Brodmann areas 41 and 42 in the temporal lobe were related to hearing. Brodmann areas 17 and 18 in the occipital lobe were engaged in primary vision. Unlike Gall's passing fancy, Brodmann's work was both prescient and enduring. His system, with refinements, is still used by modern scientists to describe and discuss the architecture and organization of the brain, its cells, and different functions. Brodmann, along with many others, helped firmly establish that the brain encompasses a diverse world of distinct, interconnected neurobiological regions.

The Telling Tragedy of Phineas Gage

When Brodmann stimulated area 4—the primary motor area—a test animal moved its limb. That's interesting, but not obviously relevant to determining how brain function makes an animal or person wise.

But when Brodmann damaged area 4 in the brain of a rat, it produced paralysis in the opposite limb. In humans, of course, you never impose harm for experimental reasons. It violates every code of scientific conduct. Instead, you search for answers in what might be called experiments or accidents of nature. When you examine people who have suffered a head injury or stroke and whose limbs are now paralyzed, an MRI reveals a similar story: damage to area 4 in their brains.

Which got me thinking: Could a wise person become unwise as the result of a head injury or disease? I scoured the literature for experiments of a nature that provide an answer. Once again, a Google search came up empty. The query was too broad. So my colleagues and I turned to searching for cases of individuals losing distinct components of wisdom. We found more than a dozen cases of a "modern day Phineas Gage," though none of the reporting scientists had used the term *wisdom* to describe their cases.

The story of Phineas Gage makes this point most famously. In the afternoon of September 13, 1848, Gage and a construction crew working for the Rutland and Burlington Railroad were clearing away some obstructing rock near the town of Cavendish, Vermont. Gage was a foreman and generally considered among the best around.

His job that day was the most skilled and dangerous: to sprinkle gunpowder into blasting holes drilled in the rock and tamp the powder down (gently) with an iron rod, after which an assistant would pour in sand or clay to further compress the mix and focus the explosion into the rock, breaking it.

Gage had a specially commissioned tamping iron for the job: it was 3 feet, 7 inches

long, weighed 13.25 pounds, and resembled a javelin, tapering to a point at the business end that Gage used to poke and press powder in the hole.

Accounts differ about what exactly happened that fateful day, but Gage reportedly became distracted by his crew working some distance away loading broken rock onto a cart. He might have looked up from the work at hand, his iron rod scraping and sparking against rock, or as one witness speculated, he simply mashed the rod down too hard. Whatever the reason, the gunpowder ignited, expelling Gage's tamping iron upward like a ballistic missile.

The rod penetrated Gage's head just below his left cheekbone. It passed behind his left eye, ripped through the lower portion of his brain's left frontal lobe, and exited out of the top of his skull slightly behind his hairline. It landed 25 yards away, stuck upright in the ground like a knife in a game of mumblety-peg. Witnesses describe the rod as "streaked with red and greasy to the touch from fatty brain tissue."

Amazingly, Gage was not killed by the explosion or penetrating missile. Indeed, he reportedly never lost consciousness. Within minutes of the accident, he was walking and talking. He rode in an ox cart, upright, while coworkers raced him to town. He sat in a chair on a hotel porch while a doctor was fetched.

When the physician arrived, no doubt appalled by the vision before him—described as "a volcano of upturned bone jutting out of Gage's scalp"—the injured railroad foreman drolly observed, "Here's business enough for you."

Business indeed. Not just for the unsuspecting Cavendish doctor that day, but for generations of neuroscientists to follow.

Before the accident, Gage had been generally regarded as a clean-cut, virtuous fellow. His physician, Dr. John M. Harlow, considered him a fine example of industrious manhood, writing about Gage: "although untrained in the schools, he possessed a well-balanced mind, and was looked on by those who knew him as a shrewd, smart businessman, very energetic and persistent in executing all his plans of operation."

After the railroad accident, Harlow would later write with poignant brevity: "Gage was no longer Gage."

"He is fitful," bemoaned Harlow, "irreverent, indulging at times in the grossest profanity (which was not previously his custom), manifesting but little deference for his fellows, impatient of restraint or advice when it conflicts with his desires." After a period of physical recovery, Gage returned to his parents' home in Lebanon, New Hampshire, where he turned to farming. It didn't last. Later, he traveled to Chile to work as a long-distance stagecoach driver. Bouts of ill health plagued him. In his last

years of life, Gage suffered from seizures. He died in his mother's home in San Francisco on May 21, 1860. He was 37.

Clearly, Gage was not the same man after his injury. The tamping rod that explosively plowed through his brain irrevocably destroyed some of the parts that made him the man he had been.

But what areas of Gage's brain were damaged by the injury? We know the answer thanks to the excellent and creative work of Antonio Damasio and colleagues who, in 1994, published a paper in the journal *Science* titled "The Return of Phineas Gage: Clues About the Brain from the Skull of a Famous Patient." The paper recounted their exhumation of Gage's skull and tamping iron (both were buried together) and the use of X-rays and magnetic resonance imaging (MRI) to recreate Gage's long-gone brain in three dimensions. The scientists determined the likely trajectory of the tamping iron and then identified the parts of Gage's brain that would have been damaged. Eighteen years later, John Darrell Van Horn at the David Geffen School of Medicine at UCLA used MRI and other imaging technologies to model Gage's damaged skull and brain. Gage's left frontal lobe—one-half of the repository of our most complex cognitive powers, in many ways the essence of our humanity—had been destroyed.

The tragic tale of Phineas Gage arguably represents a starting point when neurologists first began to understand the relationship between structural damage to the brain and specific changes in behavior, but it is far from unique.

In 2004, for example, almost a century and a half after Gage's death, Margaret Allison Cato (who was previously a research fellow with me) at the San Diego Veterans Affairs Healthcare System and the UC San Diego School of Medicine and colleagues published the case study of a "modern-day Phineas Gage" in the *Journal of the International Neuropsychological Society.*

Patient CD (initials used to preserve anonymity) was a 26-year-old soldier in 1962 when the jeep he was riding in passed over a land mine. The explosion caused him to violently smash his forehead against the metal upright on the rim of the jeep's windshield. Like Gage, CD did not immediately lose consciousness from the blow. He recalled the explosion and someone asking him questions immediately afterward. The driver of the jeep was killed.

CD survived, but he suffered significant damage to the ventromedial prefrontal cortex of the brain, particularly on the left side. Before the injury, CD had been a man of exemplary academic and professional record, with nearly straight A's in school and accelerated promotions in the military.

The trauma caused a precipitous decline in his social and behavioral functioning.

Despite average to superior scores on most subsequent neurocognitive tests—he had a verbal IQ of 119, considered "high average"—he could not maintain regular employment. He was discharged from the military against his wishes and could manage only a series of lesser jobs, such as delivering newspapers, in the aftermath. He went through four marriages. His children became estranged.

Trey Meeks and I found a dozen such cases of a "modern day Phineas Gage" described in the literature. Mind you, these papers never used the word *wisdom*, but their descriptions clearly fit with our definition of wisdom (or loss of it). Where were the brain injuries in these different individuals? In most of them, the damage occurred in the prefrontal cortex, and in some, in the amygdala too.

Surely no coincidence—the PFC and the amygdala are central to the biology of wisdom—and they further emboldened our premise. If wisdom can be weakened or lost by injury to key parts of the brain, then the reverse must be true as well: it can be strengthened or found by cultivating and empowering those same parts of the brain. We will revisit this angle later in the book.

How Disease Reveals Wisdom by Its Absence

Damage to the prefrontal cortex of the brain—and its observable effects on wisdom—can occur in less violent ways as well. One disease of particular interest for studying the neurobiology of wisdom is a type of dementia. Once called Pick's disease after the 19th-century physician who first described it, frontotemporal dementia (FTD) is the third most common neurodegenerative disorder after Alzheimer's disease and Lewy body dementia.

The only identified risk factor for FTD is a family history of the disease. The disease typically appears in the 50s—unlike Alzheimer's, which is most common in the 80s. Much of the knowledge about FTD comes from the ongoing work of Bruce Miller, a distinguished professor of neurology at the University of California San Francisco and director of its Memory and Aging Center. He has literally written the book on FTD.

FTD wreaks its damage over time. Subtly at first, patients with some "behavioral variants" of FTD become less like themselves. Similar to Phineas Gage, they assume an unhappier, more pessimistic demeanor. Often their behavior is initially mistaken as depression or plain old age-related grumpiness, but other symptoms eventually emerge, such as a loss of inhibition. FTD patients may begin speaking and acting without filter, exhibiting a striking loss of restraint in their personal relations and social life that can have calamitous consequences. Symptoms of the behavioral variant of FTD read like the antithesis of the criteria for wisdom. FTD selectively affects the

front half of the cerebral cortex, mainly the prefrontal cortex (PFC).

The PFC is associated with cognitive capacities related to human uniqueness, from language and our ability to process complex social information to self-reflection and purposefully striving toward higher-level goals. Tumors in the PFC can also produce personality changes, including loss of wisdom.

Damage to the amygdala can do the same, but in a strikingly different way.

Consider the case of patient SM, first described in a 1994 paper published in *Nature* by Damasio and colleagues. At the time, SM (her identity is kept secret by researchers) was a 49-year-old Kentucky woman with a rare genetic condition known as Urbach-Wiethe disease, which had caused her amygdalae to wither away in late childhood. As a result, she had little or no capacity to feel anxiety or fear. There was no emotional response to handling snakes or spiders, walking through Halloween horror attractions or watching scary movies. She was studied extensively by scientists. Media dubbed her "the woman with no fear."

In ordinary life, SM was described as outgoing and extremely friendly, disinhibited and playfully flirtatious. Not bad traits, to be sure, but with no functional amygdalae, SM also did not recognize the negative social cues that might alert her to danger and harm, such as overt aggression or fear in the faces of others. As a result, she had been the victim of numerous acts of crime and traumatic encounters, such as being held up at both knife- and gunpoint and was almost killed in an incident of domestic violence. In none of these cases did SM display the typical or expected signs of desperation, urgency, or fear. Many of these traumatic events can be attributed to her living in dangerous neighborhoods marked by poverty, crime, and drugs, but they were exacerbated by the fact that SM did not recognize or respond to the threat of looming harm.

While SM managed to make a life for herself—she married and became an independent mother of three healthy children—she did not have the necessary brain infrastructure to regulate emotional aspects of her behavior that are an essential part of wisdom.

Whither Wisdom?

No matter what our challenges in life—or perhaps because of them—we tend to believe that wisdom comes with age. There's good reason to think so: experience is a great teacher, and experience generally requires time.

In 2019, colleagues and I looked at data from more than one thousand adults, aged 21 to over 100, to find out whether they had found the meaning of life—based on their

own definition. Finding meaning in life is a marker for wisdom. That much seems obvious, though our published findings were, in fact, surprisingly complicated.

Based on our research, the search for meaning in life follows a U shape, while the presence of meaning is the opposite. When you are young, in your 20s for example, you are likely unsure about your career, possible life partner, and who you are as a person. You are searching for meaning in life.

But as you age into your 30s, 40s, and 50s, you establish relationships, maybe get married and have a family, and become settled in a career and identity. The search decreases as the presence of meaning in life increases.

But after age 60, things begin to change. You retire and perhaps lose some of your identity. You're no longer a plumber, banker, or professor. There is no job to help define you. You develop recurring or chronic health issues, and friends and family begin to pass away. In your old age, you restart searching for meaning in life because the meaning you once knew has apparently disappeared.

You are, hopefully, wiser with age because wisdom acquired over a lifetime helps compensate for the consequences of stresses over a lifetime. But there is increasing evidence that you don't need to wait a lifetime to become wiser than your chronological age.

3
Wisdom and Aging

Let no one be slow to seek wisdom when he is young nor weary in the search of it when he has grown old. For no age is too early or too late for the health of the soul.

EPICURUS

The great thing about getting older is that you don't lose all the other ages you've been.

MADELEINE L'ENGLE, American author

AS A GERIATRIC NEUROPSYCHIATRIST (a medical doctor specializing in the diagnosis and treatment of mental disorders in older adults), I have seen and heard just about everything that can and does go wrong with aging: physical ailments like hypertension, diabetes, arthritis, heart disease, cancers, stroke, and so on; and cognitive disorders such as Alzheimer's disease and other dementias, and mental illnesses like depression.

Even outside of these illnesses, normal aging is associated with slowing down physically and mentally, with difficulty remembering names and faces, with problems learning new things, with feelings of loneliness, and on and on.

Indeed, there's a kind of general foreboding that life is getting away from you as you age, that you have less and less control over not just your body, but your mind and destiny too.

Old humans are neither strong nor fast. Maximum physical capacity for our species peaks somewhere between ages 20 and 30, and then begins to decline, accelerating around age 50.

In evolutionary terms, prolonged longevity seems nonsensical. Older people cannot reproduce, so they are not promoting species survival. Darwin's theory of evolution was predicated on survival of the fittest and the ability to successfully procreate. Most large animals don't live long after becoming infertile with age, unless they reside in zoos, research labs, or other protective environments. Among primates, humans are unique in that we regularly outlive our reproductive period by decades. If a woman

undergoes menopause (or a man, its biological male equivalent, andropause) at age 45 and lives to age 90, she has spent the entire second half of her life without contributing directly to the human species' repopulation.

And yet, old age is getting older. The average life span is increasing. In 1900, average life expectancy was about 47 years in the United States. Today, it's around 80 years, being slightly higher for women than for men. By 2050, average life expectancy is projected to approach 90 years. If life span is increasing, are our fertility and health spans increasing too?

The answer is no. The average age at menopause or andropause has changed little over millennia. And people are still developing the myriad illnesses of old age. So how can we explain exceptional human longevity despite loss of fertility and physical health?

The only likely explanation is that some things must improve with age to make up for its deficiencies, both personal and societal. Over the years, I have become increasingly determined to discover which aspects of ourselves *do* get better with aging—and how they compensate for the loss of fertility and of physical health. This chapter lays out my thinking: increased wisdom with age benefits both seniors and society. Nature supports our becoming wiser with age, but *only* if we help ourselves by being active and positive. And by learning how wisdom increases with older age, we enable younger people to become wiser as well.

One of the first psychologists to formally link wisdom with aging was Erik H. Erikson. In a 1988 *New York Times* interview with psychologist Daniel Goleman, Erikson, a developmental psychologist, and his wife, Joan, expounded on the nature of old age. The topic, as Goleman wryly noted, had been on their minds: Erik was 86; Joan was 85.

No couple was better suited to the discourse. In the 1950s, the Eriksons had created a novel chart of life, breaking down human psychological development into distinct, chronological periods that contributed to and defined our personalities. Initially, there were eight stages.

In the first stage of life, infancy (birth to 18 months), trust and mistrust push and pull against each other. Babies seek stability and consistency of care from their parents. If they receive it, they develop a sense of trust and hope that will permeate their lives. They will be able to feel secure even when feeling threatened.

Conversely, if an infant's early care has been harsh or inconsistent, unpredictable and unreliable, the Eriksons concluded that mistrust takes root. Fear, apprehension, and doubt will color their view of the world, their life, and their relationships with others.


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