



PREVIOUSLY PUBLISHED IN HARDCOVER AS *NEURODIVERSITY*



THE POWER OF

NEURODIVERSITY

UNLEASHING THE ADVANTAGES OF YOUR DIFFERENTLY WIRED BRAIN

THOMAS ARMSTRONG, PhD

Author of 7 Kinds of Smart



PRAISE FOR

The Power of Neurodiversity

“This quietly spoken book is at its strongest when examining the ideology itself and outlining the arguments in its favor. It is sensible in examining how other cultures, past and present, have accepted forms of neurodiversity, and it is wise in its critique of the use of normative standardizations to identify objectives in education and society in general.”

—*Times Higher Education Supplement*

“Armstrong uses *neurodiversity* to encompass a new way of thinking about a variety of disabilities . . . by focusing on their potential benefits, rather than their problems . . . useful and uplifting.”

—*Library Journal*

“Armstrong argues that there is no ‘normal’ brain or ‘normal’ mental capability and that we are making a serious mistake in assuming that the kinds of differences we see in people with conditions like autism or dyslexia involve only deficits. People with these conditions also have strengths, he emphasizes, and by focusing on these, rather than on the ‘labels,’ we can find the modes of learning and living that can help them thrive.”

—*Publishers Weekly*

“In this engaging, accessible book, Armstrong offers a thoughtful consideration of cognitive diversity, and many practical suggestions for maximizing the potential of, and increasing respect for, those who are ‘differently brained.’”

—Kathleen Seidel, creator of Neurodiversity.com

“An engaging and provocative look into the emerging societal conversation about neurological diversity. Our country has adapted to many new ideas over the last century; acceptance of the broad scope of neurodiversity represents the next step forward.”

—Ari Ne’eman, president of
The Autism Self Advocacy Network

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The Myth of the A.D.D. Child

Multiple Intelligences in the Classroom

**THE POWER OF
NEURODIVERSITY**

*Unleashing the Advantages of
Your Differently Wired Brain*



Thomas Armstrong, PhD



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[Foreword to the Paperback Edition](#)

As the paperback edition of *The Power of Neurodiversity* goes to press, we are witnessing the expansion of what I've called in the book our "culture of disabilities." Currently, the newest version of the psychiatrist's bible, the *Diagnostic and Statistical Manual* (DSM 5) is being prepared for publication in 2013. This manual, which influences not only psychiatrists, but also mental health professionals, the legal profession, and the field of education, threatens to add new categories of disorder to its already long list of mental disorders. Among the manual's sharpest critics is Dr. Allen Frances who chaired the Task Force that prepared the previous version, the DSM IV. Frances contends that "normality is an endangered species" with this new version, and that the DSM 5 will probably create millions of new diagnoses by including such proposed disorders as Psychosis Risk Syndrome, Minor Neurocognitive Disorder, Binge Eating Disorder, and Temper Dysfunctional Disorder with Dysphoria. Allen contends that pharmaceutical companies are likely to welcome these new illnesses into its fold. In *Psychiatric Times*, he writes: "There would be massive overtreatment with medications that are unnecessary, expensive, and often quite harmful."

At the same time, however, there are positive developments in the emerging field of neurodiversity that can hopefully counter at least some of the negative influences of our disability culture. Politically, we've seen the appointment by President Obama of a key neurodiversity advocate, Ari Ne'eman, to the National Council on Disability, which advises the president and Congress on matters concerning disability. Ne'eman, who himself has Asperger's syndrome, is an autism rights activist who believes that autism is a neurological difference that should be respected, not a disease to be cured.

On the technological front, there has been a vast expansion in the past two years of new applications for such devices as the iPhone and

the iPad; “apps” that can assist neurodiverse individuals in creating positive niches for themselves. One mother of a thirteen-year-old with Down syndrome was interviewed in *Great Schools*, and observed that “as much as he struggles with reading, Aidan’s a wizard with the iPhone. He picked up his uncle’s iPhone one day, and without anyone telling him how to do it, he found and figured out every game app on it (and there were a lot). The touch screen and the apps are intuitive to him in a way that a keyboard is not.”

Finally, there is an aesthetic dimension to neurodiversity that is being explored by such artists as Ali Hossaini, a renowned artist, philosopher, and media expert, who is developing a video installation entitled “Neurodiversity: The Autism Project,” which will seek to simulate many of the sensory experiences of autism, so that neurotypical individuals can begin to understand the world in which the neurodiverse lives. In these positive developments, we can begin to make out a subtle but significant shift in how mental disabilities are viewed, and there is room for optimism that neurodiversity will continue to grow as a concept, change attitudes concerning mental illness, and ultimately improve the lives of those who are “differently wired.”

Preface

While working as an educational consultant, I used to go into schools and meet with parents, teachers, and specialists at Individual Educational Plan (IEP) meetings concerning specific “difficult” students. Before each meeting, I would ask to have a copy made of the child’s “cumulative file,” consisting of grades, reports, tests, and other official papers extending back into kindergarten. I’d take a yellow marker as I read through the file and highlight anything positive about the student including comments (e.g., a kindergarten teacher’s note: “Loves to finger paint”), high grades or test scores (e.g., high score on the Object Assembly subtest of the Wechsler Intelligence Scale for Children), and anything else that seemed promising. Then I’d type all the positive material together on two or three pages (often distilled from one hundred or more pages) and hand it out at the meeting. First, I’d notice that many adults at the meeting would express surprise at the number of positive things said about a student who was so troubled and/or troubling to others. Second, I’d start hearing comments like “Now that you mention it, he does have a flair for drawing,” or “It’s true, he really is a hands-on learner.” Typically, IEP meetings would tend to dwell on the child’s negative attributes, and a dark cloud would hover over the group. However, I discovered that when the meeting started with people talking about the students’ positive assets, this often opened things up to a broader discussion of the children’s true potentials, and often some real solutions to helping them would be generated in the course of the meeting.

This little exercise of mine points to something more significant about the true nature of people who struggle with labels like ADHD, autism, and dyslexia both inside and outside of school. Too often, the seven labels that I take up in the course of this book (“autism,” “ADHD,” “dyslexia,” “mood disorders,” “anxiety disorders,” “intellectual disabilities,” and “schizophrenia”) attract negative

thoughts and attributions from professionals, family, and others, and these individuals go through their lives saddled with low expectations. However, once we start to look more deeply into their lives, we begin to see strengths, talents, abilities, and intelligences shine through. This process of investigating the positive dimensions of people with negative labels can make a world of difference in helping them achieve success in life. It's because this work is so important that I am convinced we need to reject the "disease-based" thinking that too often dogs the lives of labeled individuals and embrace a more positive vision of who they are, and who they can become. The word "neurodiversity" conveys this sense of affirmation. Just as we use the terms "cultural diversity" and "biodiversity" to refer to the rich variety of social heritage or biological life, we need a term that conveys a sense of the richness of different kinds of brains. Coined by autism advocate Judy Singer, "neurodiversity" is just the right word at the right time to account for recent evidence from brain science, evolutionary psychology, and other fields that suggests that amid the damage and dysfunction appearing in the brains of people with mental health labels, there are bright, shining spots of promise and possibility. Rather than viewing people with dyslexia, mood disorders, ADHD, or autism as having "broken brains," as some have done, I present strong evidence in this book for extraordinary gifts in those individuals who might to many people seem least likely to possess them. I hope that in the course of this book you begin to experience a kind of pleasant surprise at the number of positive things that can be said about people possessing each of these seven conditions. I'd also like this book to encourage dialogue about the "hidden strengths" of people in our own lives who have one or more of these seven conditions (e.g., "Now that you mention it, my uncle has autism, but is a mechanical genius"). Finally, I'd like to open up a broader discussion about the meaning of human diversity as it relates to the brain. Up until now we've tended to use heavily negative medicalized language to speak of brain diversity but generally positive naturalistic language to talk about cultural diversity and biodiversity. For the sake of our well-being and health as a society and culture as a whole, it's essential that we start using more positive language to talk about the brain in its many variations. This relatively new term "neurodiversity" (in use for only the past ten years) gives us a means of doing that. To be sure, I don't want to slide into Pollyannaism and have us simply extolling as marvelous anything that

the brain conjures up. It is an under-statement to say that these seven conditions bring with them untold suffering for those who have them and for those who are caretakers and loved ones. But we've become one-sided in our disease-based orientation to brain differences and need to spend time exploring the positive side to correct this imbalance. If this process results in some positive solutions being generated to help individuals with these brain differences, then the time spent in writing this book will have been well worth it.

The book begins with a chapter that summarizes eight basic principles about neurodiversity, including the idea of “niche construction,” which, like a beaver building a dam, provides opportunities for neurodiverse individuals to create suitable lifestyles for themselves that seek not so much to fit into the world around them as to make the world accommodate itself to their needs, styles, and assets. The next seven chapters take each of the brain conditions listed above in turn and focus on the strengths that I've observed in the literature. Especially interesting to me is the way in which these conditions are regarded in other cultures, or might have proved useful in times past (including prehistoric times). This serves to highlight another of my central principles from [chapter 1](#): *whether you are regarded as disabled or gifted depends largely on when and where you were born*. I am convinced that not enough attention has been given to the cultural relativity of disability labels and that there are good reasons why these conditions are still in the gene pool. In each of the seven chapters, I also examine how to construct niches using assistive technologies (e.g., spell checkers and text-to-speech software for dyslexics), good career choices (e.g., the computer field for people with autism), human resources (e.g., a life coach for people with ADHD), and specific strategies (e.g., mindfulness meditation for people with anxiety disorders). In [chapter 9](#), I look at neurodiversity applied to children and education, noting that special education programs up until now have been isolating, stigmatizing experiences for many kids and that a new type of inclusive neurodiverse classroom, consisting of kids with and without labels, is a more suitable learning environment for all children. Finally, in [chapter 10](#), I write about the future of neurodiversity, examining a business, for example, that hires people with Asperger's syndrome to test computer software because they do a better job than so-called neurotypicals. I also look at the increasing threat that genetic engineering and prenatal screening pose in

potentially eliminating neurodiverse people from the planet. An appendix provides a list of helpful books, videos, organizations, and assistive technologies for each of the seven brain differences covered in this book.

I'd like to thank a number of people for helping me with this project. First, my literary agent, Joelle Delbourgo, who is a dream agent, pure and simple. Also my editor, Renee Sedliar, who has been the in-house shepherd of this book at Da Capo, senior production editor Cisca Schreefel, and copy editor Annette Wenda. I'd like to thank Judy Singer and Harvey Blume for coming up with the term "neurodiversity" and Kathleen Seidel for introducing me to it through her marvelous Web site, Neurodiversity.com. I'd like to thank Oliver Sacks for his body of work on the brain, which makes him in my estimation "the godfather" of neurodiversity. I'd also like to thank my psychiatrist, Dr. R. S. S. Gardner, for helping me with my own mood disorder so that I could finish this book despite going through a particularly difficult depressive period during most of its composition. Thanks too to Sandy and Archie Deeks for keeping it real. Finally, I'd like to thank my wife, Barbara Turner, for her love, patience, and understanding while I've been immersed in this project.

CHAPTER 1

Neurodiversity: A Concept Whose Time Has Come

If we are to achieve a richer culture, rich in contrasting values, we must recognize the whole gamut of human potentialities, and so weave a less arbitrary social fabric, one in which each human gift will find a fitting place.

—MARGARET MEAD,
*Sex and Temperament in
Three Primitive Societies*

Imagine for a moment that our society has been transformed into a culture of flowers. Now let's say, for the sake of argument, that the psychiatrists are the roses. Visualize a gigantic sunflower coming into the rose psychiatrist's office. The psychiatrist pulls out its diagnostic tools and in a matter of a half hour or so has come up with a diagnosis: "You suffer from *hugism*. It's a treatable condition if caught early enough, but alas, there's not too much we can do for you at this point in your development. We do, however, have some strategies that can help you learn to cope with your disorder." The sunflower receives the suggestions and leaves the doctor's consulting room with its brilliant yellow and brown head hanging low on its stem.

Next on the doctor's schedule is a tiny bluet. The rose psychiatrist gives the bluet a few diagnostic tests and a full physical examination. Then it renders its judgment: "Sorry, bluet, but you have GD, or *growing disability*. We think it's genetic. However, you needn't worry. With appropriate treatment, you can learn to live a productive and successful life in a plot of well-drained sandy loam somewhere." The bluet leaves the doctor's office feeling even smaller than when it came in.

Finally, a calla lily enters the consulting room, and the psychiatrist needs only five minutes to decide what the problem is: "You have PDD, or *petal deficit disorder*. This can be controlled, though not

cured, with a specially designed formula. In fact, my local herbicide representative has left me with some free samples if you'd like to give it a try."

These scenarios sound silly, but they serve as a metaphor for how our culture treats neurological differences in human beings these days. Instead of celebrating the natural diversity inherent in human brains, too often we medicalize and pathologize those differences by saying, "Johnny has *autism*. Susie has a *learning disability*. Pete suffers from *attention deficit hyperactivity disorder*." Imagine if we did this with cultural differences ("People from Holland suffer from *altitude deprivation syndrome*") or racial differences ("Eduardo has a *pigmentation disorder* because his skin isn't white"). We'd be regarded as racists. Yet with respect to the human brain, this sort of thinking goes on all the time under the aegis of "objective" science.

The lessons we have learned about biodiversity and cultural and racial diversity need to be applied to the human brain. *We need a new field of neurodiversity* that regards human brains as the biological entities that they are and appreciates the vast natural differences that exist from one brain to another regarding sociability, learning, attention, mood, and other important mental functions. Instead of pretending that there is hidden away in a vault somewhere a perfectly "normal" brain to which all other brains must be compared (e.g., the rose psychiatrist's brain), we need to admit that there is no standard brain, just as there is no standard flower, or standard cultural or racial group, and that, in fact, *diversity among brains is just as wonderfully enriching as biodiversity and the diversity among cultures and races*.

Our Disability Culture

Over the past sixty years, we've witnessed a phenomenal growth in the number of new psychiatric illnesses, resulting in our disability-plagued culture. In 1952 the first edition of the *Diagnostic and Statistical Manual (DSM)* of the American Psychiatric Association listed one hundred categories of psychiatric illness. By 2000 this number had tripled. We've become accustomed as a culture to the idea that significant segments of the population are afflicted with neurologically based disorders such as "learning disabilities," "attention deficit

hyperactivity disorder,” and “Asperger’s syndrome,” conditions that were unheard of sixty years ago. Now, even newer disabilities are being considered for the next edition of the *DSM* due out in 2013, including psychosis risk syndrome, temper dysregulation disorder, and mild neurocognitive disorder.

The National Institute of Mental Health (NIMH) has reported that more than one-quarter of all adults suffer from a diagnosable mental disorder in any given year. Research published in the journal *Archives of General Psychiatry* indicates that approximately *half* of all Americans may suffer from mental illness at some point during their lives.¹ One Harvard psychiatrist, John J. Ratey, has written a book titled *Shadow Syndromes: The Mild Forms of Major Mental Disorders That Sabotage Us*, suggesting that there may be “subclinical” varieties of psychiatric illness that exist undetected in many people. That is, they don’t meet the criteria for a full-fledged psychiatric diagnosis but are nevertheless present as “hidden” disorders.² It seems to me that we’re moving toward a day when virtually every single individual alive may be regarded as afflicted with a neurologically based mental disorder to one degree or another.

How did we get to this place? Certainly, one reason has to do with the tremendous leap in knowledge over the past several decades regarding the human brain. Hundreds, if not thousands, of studies come out every year giving us more and more information about how the human brain works. This is revolutionizing our understanding of human mental functioning, and that’s a good thing. But it’s also responsible for our becoming a disability culture. The trouble is that medical researchers generally have a *disease-based* perspective regarding the brain, not one that is focused on health and well-being. Funding for brain research goes to the squeaky wheel. There are plenty of studies, for example, about what’s wrong with the left hemisphere of the brains of dyslexics. Little research, however, exists on an area in the right hemisphere that processes loose word associations and may be the source of poetic inspiration.³ We want everybody to read, but we have little use for poetry as a society. Moreover, the people who make the diagnoses of mental disorder—psychiatrists mostly—generally haven’t received training in anthropology, sociology, or ecology, and thus aren’t in a position to regard individual differences from the standpoint of a diversity model.

One more reason for the proliferation of neurologically based disorders in our culture has to do with the growth of advocacy groups for specific mental diseases. These groups make it their mission to promote awareness of their particular disorder, whether it be ADHD, dyslexia, autism, or some other condition. Now, don't misunderstand me, these groups have done an enormous amount of good in raising people's awareness about the needs of the mentally ill. We mustn't forget how atrociously the mentally ill were treated before the emergence of these advocacy groups. If they were identified at all, the mentally ill were thrown into snake pits, prisons, and asylums that neglected and abused them. These groups have helped raise billions of dollars to provide essential services for the mentally ill. Yet there is some truth to the fact that each group vies for funding and public support in part by emphasizing the negative aspects of their particular disorder. People won't contribute financially to an advocacy group if the individuals to be served are merely instances of the wide variety of human diversity. Public schools aren't going to provide special education money for children who have no specific disorder. As a result, there is a tendency to emphasize deficits, disabilities, and dysfunctions and to de-emphasize strengths, talents, and aptitudes (although a focus on strengths does form a small part of the public relations campaign of some of these organizations).

The concept of neurodiversity provides a more balanced perspective. Instead of regarding traditionally pathologized populations as disabled or disordered, the emphasis in neurodiversity is placed on *differences*. As we'll see in this book, dyslexics often have minds that visualize clearly in three dimensions. People with ADHD have a different, more diffused, attentional style. Autistic individuals relate better to objects than to people. This is not, as some people might suspect, merely a new form of political correctness (e.g., "serial killers are differently assertive"). Instead, research from brain science and evolutionary psychology, as well as from anthropology, sociology, and the humanities, demonstrates that these differences are real and deserve serious consideration.

It is very important to underscore here that I recognize that these conditions involve tremendous hardship, suffering, and pain. The importance of identifying mental illness, treating it appropriately, and developing the means of preventing it in early childhood cannot be overstated, and there are hundreds of fine books that do a great job of

elucidating these tasks. However, in this book, I'm emphasizing the particular point that one important ingredient in the alleviation of this suffering is an emphasis on the *positive* dimensions of people who have traditionally been stigmatized as *less than normal*. In a sense, neurodiversity draws some of its vitality from the new movement in *positive psychology* spearheaded by former American Psychological Association president Martin Seligman, who suggests that psychology has spent too much time focusing on what is wrong with the human personality and now must research the positive side of humanity.⁴ This book offers the richest concentration of research and information in print on the strengths, talents, aptitudes, and abilities of individuals with neurologically based mental disorders. I hope that this effort will spark the beginning of a new movement in psychology and psychiatry to thoroughly map out the gifts of neurodiverse populations.

Neurodiversity: What It Really Means

Neurodiversity as a concept is only about ten years old. It originated as a movement among individuals labeled with autism spectrum disorders (ASDs) who wanted to be seen as different, not disabled. The first use of the word “neurodiversity” in print was in an article by journalist Harvey Blume published in the *Atlantic*, in September 1998. Blume wrote, “Neurodiversity may be every bit as crucial for the human race as biodiversity is for life in general. Who can say what form of wiring will prove best at any given moment? Cybernetics and computer culture, for example, may favor a somewhat autistic cast of mind.”⁵ The actual coining of the term has been attributed to Judy Singer—a self-described parent of an “aspie” (person with Asperger’s syndrome) who wrote a book chapter in 1999 titled “Why Can’t You Be Normal for Once in Your Life?” Singer wrote, “For me, the key significance of the ‘Autistic Spectrum’ lies in its call for and anticipation of a politics of Neurological Diversity, or what I want to call ‘Neurodiversity.’ The ‘Neurologically Different’ represent a new addition to the familiar political categories of class/gender/race and will augment the insights of the social model of disability.”⁶ Since that time, neurodiversity has continued to grow as a concept through the establishment of support groups (e.g., Developmental Adult Neuro-Diversity Association

[DANDA], Web sites and blogs (e.g., www.neurodiversity.com), and publications (e.g., Susanne Antonetta's book *A Mind Apart: Travels in a Neurodiverse World*).

Being a new word, the definition has not yet been set down in stone. DANDA, for example, sees itself as an organization “for people with conditions such as Dyspraxia, ADHD, and Asperger’s Syndrome.” The Web site www.neurodiversity.com, while focusing largely on issues related to autism, also includes articles on a wide variety of other conditions, including dyslexia, Down syndrome, Tourette’s syndrome, and nonverbal learning disabilities. Wikipedia currently defines “neurodiversity” as “an idea that asserts that atypical (neurodivergent) neurological development is a normal human difference that is to be tolerated and respected as any other human difference.” The online *Doubletongued Dictionary* defines “neurodiversity” as “the whole of human mental or psychological neurological structures or behaviors, seen as not necessarily problematic, but as alternate, acceptable forms of human biology.” Some definitions seek to differentiate “neurodiversity” from “neurotypical syndrome” (e.g., normal behavior), as in this tongue-in-cheek description from the online Institute for the Neurologically Typical, which views “neurotypical syndrome as characterized by preoccupation with social concerns, delusions of superiority, and obsession with conformity.”

My own definition of the word includes an exploration of what have thus far been considered mental disorders of neurological origin but that may instead represent alternative forms of natural human difference. In the book I’ve devoted a chapter for each of seven conditions: ADHD, autism, dyslexia, mood disorders, anxiety disorders, intellectual disabilities, and schizophrenia. I chose these seven disorders because they have all received a substantial amount of coverage in the scientific literature and the popular press, and because virtually everyone knows someone who has one or more of these conditions. In each chapter I build bridges between how the condition is conventionally regarded and how it might be reframed using material from science and social and cultural history. I’m especially concerned with how this new model of neurodiversity can help provide a powerful approach toward alleviating some of the pain and suffering associated with each condition. As part of this plan, I’d like to share eight principles that will provide you with a solid foundation from which to launch our new adventures in neurodiversity.

Eight Principles of Neurodiversity

Principle #1: The Human Brain Works More Like an Ecosystem than a Machine

The primary metaphor used to describe the workings of the brain for the past four hundred years has been the machine. The first person to use this kind of mechanistic language in describing human functioning was seventeenth-century French philosopher René Descartes, who wrote, “They will regard this body as a machine which, having been made by the hand of God, is incomparably better ordered than any machine that can be devised by man.”⁷ We’ve all grown up with mechanistic images of the human brain ranging from Tony Randall at the executive controls in the Woody Allen movie *Everything You Always Wanted to Know About Sex* to artificial intelligence projects that have been based largely on computer models. Harvard biologist Richard Lewontin writes, “Once the brain was a telephone switchboard, then it was a hologram, then it was an elementary digital computer, then a parallel processing computer, and now it is a distributed processing computer.”⁸ Machines are still invoked to help children understand the workings of the human brain. Psychiatrist Mel Levine, for example, uses what he calls the “Concentration Cockpit” to help children with ADHD understand the neurological basis of their disorder. Students illustrate their performance on fourteen attention tasks by plotting them on a laminated chart made to look like the cockpit of an airplane.⁹

The problem with this kind of approach is that the human brain is not a machine; it’s a biological organism. It isn’t characterized by levers and gears, gaskets and sockets, or even the simple binary codes of computers. It isn’t hardware or software. It’s wetware. And it’s messy. Millions of years of evolution have created hundreds of billions of brain cells organized and connected in unbelievably complex systems of organicity. The body of a neuron, or brain cell, looks like an exotic tropical tree with numerous branches. The electric crackling of neuronal networks mimics heat lightning in a forest. The undulations of neurotransmitters moving between neurons resemble the ocean tides. Nobel Prize-winning biologist Gerald Edelman has viewed the human brain as a kind of Darwinian jungle, where groups of neurons compete against each other for predominance in responding to environmental

stimuli. He writes, “The brain is in no sense like any kind of instruction machine, like a computer. Each individual’s brain is more like a unique rainforest, teeming with growth, decay, competition, diversity, and selection.”¹⁰

Like an ecosystem, the brain has a tremendous ability to transform itself in response to change. Pennsylvania student Christina Santhouse was eight years old when encephalitis and the seizures it caused resulted in the entire right hemisphere of her brain being removed. Nevertheless, she graduated with honors from high school and is now attending college. Her left hemisphere was able to take up the slack, so to speak, and function virtually normally. To give another example, there is a form of dementia that destroys anterior (front) areas of the brain, and patients with the disorder lose the ability to speak. However, it also results in posterior (back) areas of the brain being able to function with even greater strength as compensation, sometimes causing a torrent of creativity in art or music.¹¹ Since the human brain is more like an ecosystem than a machine, it is particularly appropriate that we use the concept of neurodiversity, rather than a disease-based approach or a mechanistic model, to talk about individual differences in the brain.

Principle #2: Human Beings and Human Brains Exist Along Continuums of Competence

I used to drive from my home near the California coast to Yosemite National Park, 270 miles inland, to engage in weekend hiking and camping. As I traveled along, I’d see the watery coastal regions give way to the green fields of the agriculturally rich Central Valley, which would then transform themselves into the brown foothills of Gold County. These, in turn, would slowly get higher and higher until I found myself winding along towering cliffs toward the magnificent Yosemite Valley itself. What struck me in this journey was how imperceptible the changes from one region to the next could be. The green fields didn’t suddenly stop cold to be replaced by the brown foothills. The foothills didn’t abruptly become mountains. It all happened gradually along a continuum.

In the same way, the differences between human beings with respect to a particular quality—say, sociability—exist along a continuum. On one end of the continuum there are human beings who exist in a state

of virtual total social isolation. These are the most severely autistic individuals among us. But there is a *spectrum* of autism disorders that includes individuals with greater levels of sociability, such as those, for example, with Asperger's syndrome. If we were to follow this continuum further, we might see eccentric individuals with "shadow syndromes" who don't qualify for a diagnosis of autism spectrum disorder but who nevertheless seclude themselves from their community. Some of these individuals might be diagnosed with "avoidant personality disorder." Moving further along the continuum, we might find individuals who can relate well to others but are highly introverted by temperament and prefer to be alone. Then, gradually, we might see increasing levels of sociability in individuals, until we ultimately come to the highly sociable person (and even beyond that to the *overly* sociable person). The point here is that people with disabilities do not exist as "islands of incompetence" totally separated from "normal" human beings. Rather, they exist along continuums of competence, of which "normal" behavior is simply a stop along the way.

We've selected sociability as our point of reference, but we might also have considered other mental functions, such as reading ability. Yale psychologists Sally Shaywitz and Bennett Shaywitz have studied dyslexia and concluded, "Reading difficulties, including dyslexia, occur as a part of a continuum that includes normal reading ability."¹² Even schizophrenia exists along a spectrum, with less severe forms sometimes diagnosed as "schizophreniform disorder" or "schizotypal personality disorder." And like other disorders, schizophrenia ultimately blends in with normal behavior. A research study conducted by Stanford School of Medicine professor Maurice M. Ohayon reported that almost 40 percent of the population has experienced an auditory hallucination sometime during their lives, and another study conducted at the University of Missouri revealed that normal subjects could be stressed in experiments to the point where their speech patterns resembled those of schizophrenics.¹³

We're all just a few hallucinations, speech patterns, and genes away from schizophrenia. And the schizophrenic is just a few typical perceptions, clear conversations, and genes away from normality. This is an important principle, because it helps to destigmatize individuals with neurologically based mental disorders. There is a tendency among us human beings to take people with diagnostic labels and put them as

far away from ourselves as possible. A lot of the suffering that individuals with mental disorders go through is a result of this kind of prejudice. Knowing that we're all connected to each other just like ecosystems are means that we need to have a far greater tolerance for those whose neurological systems are organized differently from our own.

Principle #3: Human Competence Is Defined by the Values of the Culture to Which You Belong

Before the Civil War there was a Louisiana physician named Samuel A. Cartwright who published an article claiming to have discovered a new mental disorder. He called it *drapetomania* (from the Greek *drapetes*, “runaway,” and *mania*, “madness”). Dr. Cartwright believed that this affliction plagued the lives of runaway slaves and that with “proper medical advice, strictly followed, this troublesome practice that many Negroes have of running away can be almost entirely prevented.”¹⁴ We now see this sort of “diagnosis” as an example of blatant racism. But at the time it was passed off as good science. More recently, individuals who received a low score on an intelligence test in the 1930s were regarded as *morons*, *imbeciles*, or *idiots*, and until the early 1970s homosexuality was regarded as a mental disorder by the American Psychiatric Association. These are only a few examples that illustrate how perceived “mental disorders” reflect the values of a given social and historical period. We like to think that our current array of mental disorders is free from those kinds of value judgments, but the reality is that in twenty-five or fifty years’ time, we will undoubtedly look back on today’s psychiatric diagnoses and see the bold imprint of our contemporary prejudices.

It may be too soon to know exactly what those biases will be, but I would like to suggest that one reason each of the mental conditions we will explore has been defined as abnormal by our society is because it violates one or more important social values or virtues. As former American Psychological Association president Nicholas Hobbs once put it, specifically focusing on the labeling and classification of children, “A good case can be made for the position that protection of the community is a primary function of classifying and labeling children who are different or deviant.” By specifying precisely which human behaviors represent abnormal functioning, society essentially

upholds those social values that it regards as sacrosanct. Attention deficit hyperactivity disorder, for example, appears to violate the Protestant work ethic in America. As Hobbs explains, “According to this doctrine . . . God’s chosen ones are inspired to attain to positions of wealth and power through the rational and efficient use of their time and energy, through their willingness to control distracting impulses, and to delay gratification in the service of productivity, and through their thriftiness and ambition.”¹⁵ Distractible, impulsive, and hyperactive children violate all of these values.

Dyslexia violates our belief that every child should read. A hundred and fifty years ago, in an agrarian society, only the privileged few were expected to be literate. But with the advent of universal education came a mandate that everybody learn to read, and those who had difficulty were seen as aberrant. Similarly, each of the other disorders that we will examine in this book violates specific contemporary values or virtues, including: autism (sociability), depression (happiness), anxiety (tranquillity), developmental disabilities (intelligence), and schizophrenia (rationality).

*Principle #4: Whether You Are Regarded As Disabled or Gifted
Depends Largely on When and Where You Were Born*

As we learned above, no brain exists in a social vacuum. Each brain functions in a specific cultural setting and at a particular historical period that defines its level of competence. Social critic Ivan Illich put it this way: “Each civilization defines its own diseases. What is sickness in one might be chromosomal abnormality, crime, holiness, or sin in another. For the same symptom of compulsive stealing one might be executed, tortured to death, exiled, hospitalized, or given alms or tax money.”¹⁶ Each civilization also defines its own forms of giftedness. In ancient cultures that depended on religious rituals for social cohesion, it might have been the schizophrenics (who heard the voices of the gods) or the obsessive compulsives (who carried out the precise rituals) who were the gifted ones. Even in today’s world, being at the right place at the right time seems to be critical in terms of defining whether you’ll be regarded as gifted or disabled. One of the things I noticed in my work as a special education teacher in the United States, and that I’ll elaborate on in the next chapter, is that kids in special ed classes tend to be weakest in those things that the schools value the most (the

three *r*'s, test taking, rule following) and strongest in those things that the schools value least (art, music, nature, street smarts, physical skill). So they end up being regarded by society as attention deficit disorder or learning disabled, ultimately defined by what they can't do rather than by what they can do.

Principle #5: Success in Life Is Based on Adapting One's Brain to the Needs of the Surrounding Environment

Still, it's true that people have to live in today's complex and fast-paced world, which places demands on them to read, be sociable, think rationally, follow rules, pass tests, have a pleasant disposition, and conform in other distinctly defined ways. Consequently, an important part of being successful in the world involves adapting to the environment that we're given, not one that existed a hundred years ago or one that should exist today. Here we can borrow another metaphor from biodiversity in recognizing that all the animals and plants living in today's world evolved from ancestors that managed, often through the luck of a random gene mutation, to adapt to changing circumstances over millions of years. In today's world we don't have the time to wait around for a random mutation to occur. We have to do whatever we can to fit ourselves into the surrounding environment if we want to survive.

Many of the conventional approaches used to treat the seven disorders covered in this book are essentially of this adaptive type. They help individuals with diagnostic labels fit in as much as possible with the "neurotypicals" among us. The best example of this adaptive approach is the use of psychoactive medications. Drugs such as Ritalin, Prozac, and Zyprexa have been invaluable in helping people with ADHD, depression, and schizophrenia function in the real world. Certain nondrug strategies, such as behavior modification, also represent a way to help neurodiverse individuals adapt to a conventional environment. What's often missing from this picture, however, are strategies that seek to discover surroundings for neurodiverse individuals that are compatible with their unique brains. This leads us to our next principle.

Principle #6: Success in Life Also Depends on Modifying Your Surrounding Environment to Fit the Needs of Your Unique Brain

(Niche Construction)

While it's true that individuals have to adapt to the world around them, it's also true that the world is very large and that within this complex culture of ours, there are many "subcultures," or microhabitats, that have different requirements for living. If individuals can only discover their particular "niche" within this great web of life, they may be able to find success on their own terms. The truth is that we are all constantly changing our surroundings to build such niches for ourselves. The term "niche construction," first used widely by biologist Richard Lewontin, the Alexander Agassiz Research Professor at the Museum of Comparative Zoology at Harvard University, represents the process by which an organism alters its own (or another species') environment to help increase its chances of survival.

A beaver building a dam and a spider spinning a web are examples of niche construction. So is a bird building its nest or a rabbit burrowing a hole. When animals migrate, they are seeking a favorable niche within which to flourish. Each of these activities assists the organism in achieving its basic needs—gathering food, protecting offspring, keeping clear of prey, seeking shelter from inclement weather—and thus raising the likelihood that it will pass its genes on to the next generation. Scientists are just beginning to appreciate that niche construction may be as important to evolution as natural selection. In the book *Niche Construction: The Neglected Process in Evolution*, Oxford lecturer F. John Odling-Smee and his colleagues write, "Niche construction should be regarded, after natural selection, as a second major participant in evolution. Rather than acting as an 'enforcer' of natural selection through the standard physically static elements of, for example, temperature, humidity, or salinity, because of the actions of organisms, the environment will be viewed here as changing and coevolving with the organisms on which it acts selectively."¹⁷

What this can mean for neurodiverse individuals is that instead of always having to adapt to a *static, fixed*, or "*normal*" environment, it's possible for them (and their caregivers) to alter the environment to match the needs of their own unique brains. In this way, they can be more of who they really are. A good example of niche construction for human beings has already been alluded to earlier in the chapter. Journalist Harvey Blume, in using the term "neurodiversity," noted that "cybernetics and computer culture . . . may favor a somewhat autistic

cast of mind.” As we’ll see in our chapter on autism citing research from the work of Cambridge University psychologist Simon Baron-Cohen, individuals with autism spectrum disorder tend to be *systematizers* rather than *empathizers*. Although it’s abundantly evident that they have difficulty interacting with people and engaging in other interpersonal tasks (e.g. empathizing), it’s less well known that they often work extremely well with non-human factors such as machines, computers, schedules, maps, and other systems.

The computer industry favors people working alone at their own workstations using programming languages and other systems. Thus, migrating to Silicon Valley would appear to be a good career move for a person with a high-functioning type of autism spectrum disorder and an excellent example of personal niche construction. Interestingly, it turns out that there are, in fact, a greater percentage of people with autism spectrum disorders living in and around Silicon Valley in California than in the general population. Steve Silberman, a contributing editor to *Wired* magazine, writes, “The Valley is a self-selecting community where passionately bright people migrate from all over the world to make smart machines work smarter. The nuts-and-bolts practicality of hard labor among the bits appeals to the predilections of the high-functioning autistic mind.”¹⁸

Principle #7: Niche Construction Includes Career and Lifestyle Choices, Assistive Technologies, Human Resources, and Other Life-Enhancing Strategies Tailored to the Specific Needs of a Neurodiverse Individual

Just as niche construction for animals consists of a wide range of strategies—nests, holes, burrows, paths, webs, dams, migration patterns, and more—so niche construction for human beings is likewise diverse. As noted in Principle #6, making choices about lifestyle or career may be among the most critical in determining whether a person suffers as a disordered individual or finds satisfaction in an environment that recognizes his strengths. One of the worst career choices for a person with attention deficit hyperactivity disorder, for instance, would probably be a nine-to-five desk job in a large, impersonal corporate office. Without an opportunity for movement, the person’s ADHD symptoms would stick out like a sore thumb. This would be a good example of poor niche construction.

On the other hand, if that individual were to pick a job that involved speed, novelty, change, and physical activity, factors associated with the strengths of ADHD (a UPS delivery person, for instance, or an itinerant photographer), then it's likely that the symptoms wouldn't even be regarded as a problem but instead would be seen as a positive set of traits useful in the workplace. Similarly, for a person with dyslexia who possesses spatial strengths (we'll look at the connection between dyslexia and spatial abilities in [chapter 4](#)), working with words at a computer all day long in a legal firm would likely be much more stressful and incongruent than spending time engaged with a computer graphics software program in an architect's office.

This raises another set of strategies important in building a good niche for the neurodiverse brain: assistive technologies. These refer to a wide range of high-tech tools, including computer hardware, software, and peripherals, that enable individuals with disabilities to perform tasks that they were previously unable to accomplish. The Kurzweil handheld reader, for example, scans printed texts and transforms them electronically into the spoken word. This enables people with severe dyslexia (as well as the blind) to access a whole world of print previously inaccessible to them. For individuals with ADHD or anxiety disorders, neurofeedback devices help focus attention and facilitate deep relaxation.

Assistive technologies can also include low-tech tools, such as sign language (used by the deaf community as well as by individuals with severe developmental disabilities to communicate with others), expressive arts (used by those with severe emotional difficulties to work out inner conflicts), and even worry beads or squeeze balls (for individuals with anxiety disorders to help them calm down). Throughout the book we'll explore a wide range of assistive technologies that can serve as "twigs in the nest" for a neurodiverse person. I also provide information in the "Resources" section about where many of these tools can be obtained.

Another dimension involved in good niche construction involves putting together a rich network of human resources that serve to validate, enable, or in other ways support the gifts of the neurodiverse. One such group of human resources is represented by positive role models. It's important for individuals coping with their neurological differences to see that others like themselves have also struggled and ultimately succeeded on their own terms. People with dyslexia might

be inspired by the success of dyslexic Carol W. Greider, winner of the 2009 Nobel Prize in Medicine, while individuals with mood disorders can learn how astronaut Buzz Aldrin overcame his depression with the help of therapy, support groups, and a strong relationship with his wife.¹⁹

A more day-to-day human resources strategy involves surrounding oneself with people who see the best rather than the worst in them. This group would include coaches, therapists, teachers, support groups, aides, and others possessing specialized knowledge designed to help neurodiverse people reach their fullest potential. Such help might include assistance with stress reduction, interpersonal skill building, alternative learning strategies, self-healing, or creative and spiritual development. Ultimately, each individual will put together (or receive help in putting together) her own unique niche that supports who she is as a positive neurodiverse human being.

Principle #8: Positive Niche Construction Directly Modifies the Brain, Which in Turn Enhances Its Ability to Adapt to the Environment

In the late 1960s at the University of California, Berkeley, biological psychologist Mark Rosenzweig, biochemist Ed Bennett, and neuroanatomist Marian Diamond engaged in an experiment that was pivotal to the field of neuropsychology. They placed rats in different environments (or “niches”) for an extended period of time. Some of the rats were in “enriched environments” consisting of large cages with a number of stimulating activities such as mazes, ladders, and wheels. Other rats were put into less enriching environments where they were either alone or with only one or two cage mates, while having no stimulating resources available to them. After several weeks, the brains of the rats were dissected and studied. Rosenzweig, Bennett, and Diamond discovered that the brains of the rats in the enriched cages had more synapses or brain connections than those in the less stimulating cages. It turns out that the environmental experiences of the rats directly changed their brain structure.²⁰

Since that time we’ve learned a lot about the powerful influence of environment on brain development, particularly in the early years. We know that environmental adversity (including family conflict and parent criminality) is associated with a greater risk of ADHD.²¹ We know that young children who have an episode of depression are at

greater risk of having a second episode because of the “kindling effect,” where the emotional trauma of the first depression sparks changes in the brain’s chemistry that make a second depressive episode more likely.²² On the positive side, we know that early intervention in autism can increase a child’s chances of significantly improving social functioning and that a warm home environment in childhood provides a buffer against depression.²³

These research findings provide another important reason for engaging in positive niche construction: it can literally *change the brain*. In his book *The Brain That Changes Itself*, psychiatrist Norman Doidge challenges the notion that the brain is hardwired as we grow into adulthood. He argues for the concept of “neuroplasticity,” the idea that it is never too late to change the brain through alternative learning strategies or innovative technologies. He shares the stories of individuals who experienced dramatic changes in their brains as a result of environmental changes and hard effort: “Without operations or medications, they have made use of the brain’s hitherto unknown ability to change. Some were patients who had what were thought to be incurable brain problems; others were people without specific problems who simply wanted to improve the functioning of their brains or preserve them as they aged.”²⁴ The brains of young children are especially “plastic” or susceptible to stimulation from the environment during the first few years of life. Thus, positive niche construction in the earliest years of life should be the number-one priority for parents and other caregivers of neurodiverse children.

Children who have a genetic vulnerability to depression or anxiety (who are emotionally sensitive), for example, need safe, warm, and predictable homes and schools. Children who are prone to learning disabilities (that is, those who learn in a different way) need a stimulating learning environment that helps them with their phonological skills. Children with autism need opportunities for meaningful social interaction. Caregivers should regard niche construction as a form of “special handling” for the child’s brain to help maximize its positives and minimize its negatives in both adjusting to the world and fulfilling its highest potential.

Neurodiversity: Not a Pollyanna Philosophy

I want to make it clear that in presenting a case for the concept of neurodiversity, I am not seeking to romanticize mental illness. Psychiatrist Peter D. Kramer, the author of the best-selling book *Listening to Prozac*, for example, has criticized people who idealize depression when they speak glowingly of the inspiration experienced by such figures as Vincent van Gogh and Edgar Allan Poe (both of whom suffered from depression). He decries the links that people make between depression, creativity, sensitivity, and perceptiveness. As he writes:

Depression is associated with brain disorganization and nervecell atrophy. Depression appears to be progressive—the longer the episode, the greater the anatomical disorder. To work with depression is to combat a disease that harms patients’ nerve pathways day by day. Nor is the damage merely to mind and brain. Depression has been linked with harm to the heart, to endocrine glands, to bones. Depressives die young—not only of suicide, but also of heart attacks and strokes. Depression is a multisystem disease, one we would consider dangerous to health even if we lacked the concept “mental illness.”²⁵

I have no illusions about the destructive aspects of depression. I’ve suffered from it (along with an anxiety disorder) for most of my sixty years. My father, a pediatrician, had the disorder and spent seventeen years out of work, lying in bed sighing, watching television, or sitting quietly reading magazines or listening to music. His deep rages, followed by long periods of eerily quiet depression, were violent storms in my life that extended as far back as I remember. His depression was, in my mind, a veritable wrecking ball to our family life that still (even after his death six years ago) leaves its harsh imprint on me.

I’ve experienced several episodes of major clinical depression in my life. There were times when I didn’t sleep for five days, times when I banged my head against the wall, times when I cried uncontrollably for hours, and times when I desired to throw myself off a bridge. Depression and anxiety have affected all aspects of my life, including my relationships, my self-concept, my work life, and my marriage. I

currently take three different antidepressants and during the writing of this book battled a resurgence of my depression after a hiatus of twenty years. So I have no illusions about the damage that depression and anxiety can do. Similarly, I realize that the other disorders I will discuss in this book—ADHD, dyslexia, autism, intellectual disabilities, and schizophrenia—have caused untold pain in countless households across the country and around the world, particularly among those who have the most severe forms of each disorder.

By focusing on the “hidden strengths” of mental disorders, I am not attempting to sidestep the damage that these conditions do. I am not saying that these really aren’t disorders or that somehow calling them “differences” will make all the pain go away. It won’t. But there is merit in focusing on the positives. The term “neurodiversity” is not a sentimental ploy to help people with mental illness and their caregivers “feel good” about their disorders. Rather, it is a powerful concept, backed by substantial research from brain science, evolutionary psychology, anthropology, and other fields, that can help revolutionize the way we look at mental illness.

By mounting a huge campaign on the strengths of people with mental disorders, some of the prejudice that exists against mental illness might be diffused. It also seems to me therapeutically useful for people with mental disorders (and their caregivers) to focus on the positives as much as, or more than, the negatives. Seeing our own inner strengths builds our self-confidence, provides us with courage to pursue our dreams, and promotes the development of specific skills that can provide deep satisfaction in life. This creates a positive feedback loop that helps counteract the vicious circle that many people with mental disorders find themselves in as a result of their disabilities.

I wrote this book because I wanted to start a *serious* campaign to begin researching the positives among people who are defined in terms of their negatives. This literature will serve to complement the gargantuan database that exists on the difficulties that exist among people with mental disorders. My hope is that this book will accomplish much more and that, like oppressed minorities everywhere who have achieved freedom around the world, people with neurodiverse brains will be liberated from all prejudice and helped to achieve dignity, integrity, and wholeness in their lives.

CHAPTER 2

The Joy of the Hyperactive Brain

The minister, of course, taught by rote, a method from which Alva [Thomas Edison] was inclined to disassociate himself. He alternated between letting his mind travel to distant places and putting his body in perpetual motion in his seat. The Reverend Eagle, finding him inattentive and unruly, swished his cane. Alva, afraid and out of place, held up a few weeks, then ran away from the school.

—ROBERT CONOT,
Thomas A. Edison: A Streak of Luck

As an educator in my twenties, I worked for an organization that was attempting to integrate the arts into the public schools around the country. Our administrative center was in a large warehouse in Cambridge, Massachusetts. We received quite a bit of volunteer help from children in the surrounding working-class community. One child in particular, a ten-year-old African American youngster named Eddie, caught my attention for his bright spark of energy and all-around enthusiasm. He accompanied an adult supervisor around the industrial areas of Boston and helped find recycled materials that could be used by teachers in developing art projects in their schools. He also assisted in organizing these materials back at our headquarters, and even field-tested them as potential learning tools. In the context of this small but innovative educational arts association, Eddie was a tremendous asset.

Several months after this work experience, I happened to become involved in an independent learning project through the Lesley Graduate School of Education, where I was getting my master's degree in special education. The goal of this project was to study "resource rooms." Resource rooms are a part of the special education programs of many public schools, where students who are having difficulty with learning or behavior or both in the regular classroom can go for an hour

or more a day to receive special help. During one visit to a Cambridge public school resource room, I unexpectedly ran into Eddie. He was a special education student in this program, and he turned out to be quite a problem. He had a hard time staying seated at his desk, walked around the classroom without permission, chatted up his classmates, and generally made his teacher's life miserable. In the context of this special education classroom, he was anything but an asset.

The interesting thing is that Eddie displayed the *same* qualities of positive enthusiasm and industrious energy in the resource room as he did in the arts organization. But because he was in a different context, with different expectations and a different environment, his tremendous vitality went from being an asset to becoming a deficit. In the context of neurodiversity, we might argue that Eddie, with his joyfully hyperactive brain, was radically out of his *niche* in the resource room. He was like a fish out of water. This, in fact, is what I saw, time and again, in five years of teaching kids in my own special education classrooms. When I was engaged in active learning with my students—taking walks, playing football, participating in the arts or other hands-on activities—kids like Eddie were in their niche, brimming with enthusiasm and happily productive. But when the focus turned to sitting quietly in their seats doing paper-and-pencil assignments, they were like caged lions.

These days, kids like Eddie are labeled with *attention deficit hyperactivity disorder* and medicated with Ritalin or other psychoactive drugs. These drugs alter their brain chemistry in such a way that they can adapt to the rules that society imposes on them. However, this doesn't solve the problem of finding a match between their unique brains and a favorable niche. As it turns out, the traditional classroom (and its typically stripped-down version in special education) is one of the worst possible places for a child with a brain like Eddie's. One of the nation's leading experts in attention deficit hyperactivity disorder, University of South Carolina psychologist Russell Barkley, in referring to children with ADHD, put it bluntly: "The classroom is their Waterloo."¹

The Origins of ADHD

Back when I was working with Eddie in the mid-1970s, the term “ADHD” wasn’t widely known or used. Instead, kids like Eddie were regarded as suffering from “hyperactivity,” “hyperkinesis,” or “minimal brain dysfunction.” The first use of the term “ADD” (*attention deficit disorder*, as it was originally known) was probably by McGill University psychology professor Virginia Douglas when she addressed the Canadian Psychological Association in 1970, saying that for restless children, attention problems seemed more important to treat than hyperactivity. The time was ripe for a new disorder based on attention deficits. The cognitive revolution of the 1960s had supplanted behaviorism as the leading paradigm in psychology, and this new study of the mind focused a great deal of research money on projects that dealt with perception, memory, problem solving, and, significantly, *attention*.

Research psychologists quietly studied ADHD in their universities during the 1970s and the first half of the 1980s. But it wasn’t until the late 1980s when ADHD really began to take off as a widely known disorder. This was largely due to the founding of the parent advocacy group CHADD (Children with Attention Deficit Disorder) in 1987. By the 1990s, in part through CHADD’s lobbying efforts, ADHD was being widely publicized through best-selling books, national talk shows, and other mass media, while hundreds of thousands of children with ADHD were being placed in special education programs.

The current consensus is that ADHD affects 3–5 percent of all children (although some figures go as high as 7–9 percent) and that 60 percent of these kids will continue to have the disorder into adulthood. ADHD is characterized by three key groups of symptoms: hyperactivity (e.g., being fidgety or restless), impulsivity (e.g., interrupting or grabbing things from others), and distractibility (e.g., forgetting things or having difficulty organizing life tasks). The American Psychiatric Association’s *Diagnostic and Statistical Manual* now recognizes three different forms of ADHD: one that is primarily “inattentive,” involving distractibility (this is often referred to as ADD, although the terms “ADD” and “ADHD” are sometimes used interchangeably), one that is primarily “hyperactive” and “impulsive” (de-emphasizing distractibility), and one that includes all three groups of symptoms. Although there are far more males diagnosed with ADHD than females, the primarily inattentive type has been increasingly observed in girls.

There is no authoritative tool, such as a blood test or brain scan, for diagnosing ADHD. Usually, a diagnosis is made by a physician through interviews, questionnaires or rating scales, observations, and a physical examination that rules out other potential reasons for the symptoms. Sometimes ADHD is found to coexist with other conditions such as learning disabilities, anxiety and depression, bipolar disorder, or Tourette's syndrome (a condition causing uncontrollable verbal or physical "tics"). The primary treatments for ADHD are adaptive in nature and include the use of medications, especially psychostimulants like Ritalin and Adderall, and behavior modification programs in the home and school.

Over the past thirty years, hundreds of research studies have been published seeking to locate the precise nature of this disorder and its connections with the brain. Many of these studies have centered around the relationship between the prefrontal lobes of the neocortex (those areas of the brain behind the forehead that control planning, problem solving, and the restraint of impulses) and areas of the brain that are responsible for emotional expression and motor coordination, including the basal ganglia and the cerebellum. There appears to be a disruption in the circuitry between the restraint and planning areas of the brain (the prefrontal lobes) and the emotional and motor areas of the brain (the basal ganglia and the cerebellum). In very simple terms, the restraint areas of the brain do not appear to be keeping the emotional and motor areas of the brain in check, resulting in symptoms of hyperactivity and impulsivity. In addition, problems with the executive functions of the prefrontal lobes appear to result in difficulty with planning, organization, and focused attention, resulting in distractibility. A ten-year study by scientists at the National Institute of Mental Health revealed that the actual volume of these three brain areas has been shown to be 3 to 4 percent smaller in kids diagnosed with ADHD than in groups of matched controls without the disorder.²

ADHD: An Evolutionary Leap for Humanity?

More recently, and significantly, a study commissioned by the National Institute of Mental Health and appearing in the prestigious journal *Proceedings of the National Academy of Sciences* has given us a clue

as to why these regions may be smaller. The study revealed that children labeled ADHD undergo normal patterns of brain growth, but they lag behind normal children by an average of three years. The study used a brain scan procedure called magnetic resonance imaging (described in [chapter 4](#)) to map out forty thousand distinct sites in the brain and demonstrated that children with ADHD attained peak thickness in half of those sites at an average age of ten and a half years old, compared with those in the matched group without the disorder who had matured in these areas three years earlier, at the age of seven and a half. The areas that showed greatest developmental lag were precisely those areas that integrate the sensory-motor areas of the brain with the planning, problem-solving, and inhibitory areas.³ Another study suggests that the rate of ADHD in any given age group declines by 50 percent every five years.⁴

These studies suggest that kids labeled ADHD are, in fact, better described as being late bloomers and not kids with defective brains. Many kids labeled ADHD simply act younger than their peers and need more time to mature. I had a twelve-year-old student in one of my special education classes who in some ways seemed mature when we were having philosophical discussions during walks outside of school, but in other ways was almost like a toddler. He would be sitting in his desk and see something on the other side of the classroom that grabbed his attention—a poster on the wall, for example—and like an infant would start walking toward it without awareness of anything outside that specific interest. Ordinarily, people might regard this so-called immaturity as a negative thing. However, research suggests that this kind of youthful behavior in someone chronologically older may actually be an evolutionary step forward for our species

In the field of developmental biology there is a concept called *neoteny*, which is Latin for “holding youth.” Neoteny refers to the retaining of childlike qualities into later development. A good example of this is the well-known picture of Albert Einstein sticking out his tongue at the camera. Many anecdotes about Einstein revealed his childlike nature. He was even quoted once as saying that he was delayed in his own development. He wrote, “I sometimes ask myself, how did it come that I was the one to develop the theory of relativity. The reason, I think, is that a normal adult never stops to think about problems of space and time. These are things which he has thought of as a child. *But my intellectual development was retarded*, as a result of

which I began to wonder about space and time only when I had already grown up.”⁵ Einstein’s fame as the quintessential absentminded professor would likely have qualified him in today’s world for the “distractible” variety of ADHD. It turns out that many of civilization’s most celebrated individuals were in some ways like children in adult bodies, including Picasso, Mozart, and Shakespeare (whose childish puns and insults offended the serious critics of his day).

Princeton anthropologist Ashley Montagu has suggested that neoteny is a progressive feature of evolution: the more evolved a species is, the more likely there are to be childlike features held into adulthood. He illustrates this process by comparing human beings to chimpanzees. The baby chimp has features that are very humanlike. The forehead is flat, and the chin is gently rounded. But by the time the chimp grows into adulthood, he’s lost these features: the chin now juts out sharply, and the forehead recedes. There is no neoteny or “holding of youth” with respect to these two features in chimpanzees. However, further on in evolution, with *Homo sapiens*, you see the rounded chin and flat forehead of the child more or less retained in the adult. In other words, there *is* neoteny, or the holding of youth into adulthood, among human beings with regard to those two traits (paleontologist Stephen Jay Gould suggested half-humorously that human beings are merely neotenous chimpanzees).⁶ These are examples of physical neoteny that operate from one species to another, but there are also examples of behavioral neoteny that vary from one person to another. Montagu suggests that some of these behavioral qualities include curiosity, playfulness, wonder, creativity, flexibility, inventiveness, and humor. These are qualities of childhood that tend to be held into adulthood for some individuals (those who’ve held onto their youth) while disappearing in others (those who’ve tended to become rigid over the years).

It could be that children labeled ADHD, with their lag in brain development, may be the leading edge in evolution, demonstrating childlike patterns of behavior, including playfulness, spontaneity, and humor, that need to be retained into adulthood if we’re going to continue to survive and thrive as a species. If we lose the ability to be flexible as we grow into adulthood, for example, we’d have a civilization of inflexible people, which could be disastrous in the event of a global showdown that threatened us with nuclear war. Thus, flexibility, carefully nurtured into adulthood, provides a kind of

protective influence for international stability. Many of these other so-called immature qualities that shine so brightly in kids labeled ADHD have similarly positive effects on culture. As Ashley Montagu writes, “From their ‘mature adult’ heights adults only too frequently look down patronizingly upon the ‘childish’ qualities of the child, without any understanding of their real meaning. Such adults fail to understand that those ‘childish’ qualities constitute the most valuable possessions of our species, to be cherished, nurtured, and cultivated.”⁷

Creating “Good Chemistry” in the ADHD Brain

Another neurodiverse aspect of ADHD involves brain chemistry. Although many brain chemicals are involved in the disorder, it seems that one in particular, dopamine, is particularly important and appears not to function properly. Dopamine is a neurotransmitter (a chemical that facilitates communication of nerve impulses throughout the brain) associated with, among other things, motor activity, motivation, and reward seeking. People with ADHD seem to have lower levels of dopamine in their brains, thus causing a kind of chronic hunger for stimulation. This helps to explain their need for constant motor activity, impulsivity, and thrill seeking. It also helps explain why the normal stimulation of traditional classrooms, or office cubicles, is not enough to satisfy their starved dopaminergic brain pathways. Contrary to what many people believe, people with ADHD are actually *understimulated*. What stimulates the average person is not enough for them. They need a higher dose of thrills and chills. This is why psychostimulants are so very often effective. By increasing the levels of dopamine in the brain, they provide a higher level of stimulation that then, paradoxically, calms them down.

These problems associated with dopamine regulation appear to have a genetic basis. Scientists have known for many years that ADHD is one of the most easily inherited of all psychiatric disorders. One study indicates that 25 percent of the close relatives of children diagnosed with ADHD also have the disorder compared with 5 percent for the general population.⁸ Another indicates that if an identical twin has ADHD, there is a 75 to 91 percent chance that the other twin will also have it.⁹ Recently, researchers have identified one variant (or allele) of

a gene that is involved in the production of dopamine receptors (the part of a neuron that receives neurotransmitters from other brain cells). This allele (referred to as the Dopamine D4 Gene 7-repeat allele, or DRD4 for short) is more prevalent among children diagnosed with ADHD than in those without the disorder. It has been called the “novelty-seeking gene” and is also prevalent in individuals who enjoy activities such as skydiving, bungee jumping, and other high-intensity thrills.¹⁰

What is particularly significant about this gene is that, while it has been associated with risky behaviors, scientists are now beginning to appreciate its value in furthering the evolution of the human species. A recent study suggested that DRD4 arose comparatively recently in human evolution, between ten and forty thousand years ago.¹¹ The chief investigator in this report, Robert Moyzis, professor of biological chemistry at the University of California, Irvine, noted, “Our data show that the creation of the 7R allele was an unusual, spontaneous mutation, which became an advantage for humans.”¹² Novelty seeking was particularly important at this stage in the development of human beings, when the earliest forms of culture and civilization were being created. Those individuals who possessed the gene variant might have been more likely to explore new territory, discover new food sources, or create new forms of social organization, and thus have been in a better position to survive and pass their genes on to future generations than those without the allele.

The Gifts of ADHD in Other Times and Places

In fact, a look at the three major symptom groups of ADHD—hyperactivity, distractibility, and impulsivity—reveals numerous potential advantages for coping with difficulties during prehistoric times. A human being who has increased motor activity (hyperactivity) does a better job of foraging for food, seeking shelter, and engaging in other important survival tasks. The ability to rapidly shift one’s attention from one thing to another (distractibility) makes a person constantly vigilant to possible threats to his safety and the safety of his family and tribe. The capacity to respond quickly to one’s instincts (impulsivity) is vital to situations where quick action is required, such

as meeting dangers from other humans or animals in the immediate area.¹³ One author of several books on ADHD, Thom Hartmann (himself diagnosed with the disorder), has used an interesting metaphor to describe this advantage. He has said that people with ADHD are *hunters in a farmer's world*. The hunter is always moving, always vigilant, always tuned into his instincts while seeking food and shelter and trying to avoid becoming prey. The farmer is very different. He plants seeds in the ground and waits. Patience is required. Instead of living in the present, the farmer needs to think about the future and plan ahead. These two important precursors to modern civilization, hunting and farming, represent two distinct energy styles that still persist in our contemporary world.¹⁴

Today, around the world, there are still many cultures where ADHD symptoms are viewed as positive traits. Take the Puluwat culture in the South Sea Islands, for example. They live on five hundred different islands, so the ability to navigate from one island to another has high cultural value. They teach their children to memorize the constellations in the sky to use for navigation. They teach them how to recognize the little bumps on the horizon that appear and recede as they sail across the ocean. They show them how to identify dark and light patches in the water so that they can know when they're near a coral reef.

In a culture like theirs, the ADHD kids of our own society—multitasking, always moving, constantly shifting perceptions—would likely be the gifted ones. Conversely, there are a lot of us who are calm and focused but can't find our cars in large shopping malls who would be the disabled ones in that culture. We'd be the ones in the "navigation remediation programs." We'd be the ones labeled not with ADD but CDD—*constellation deficit disorder*—"Sorry, Mrs. Jones. I taught Johnny that constellation yesterday, but it just went in one eye and out the other!").

The point is that different cultures require different abilities and have different expectations for behavior. Author and educator Terry Orlick writes about his family's experience in two cultures: "If I take my daughter out to eat in North America, she is expected to sit quietly and wait (like an adult), even if there are all kinds of interesting objects and areas and people to explore. . . . Now if I take her out to a village feast in Papua New Guinea, none of those restrictions are placed on her. The villagers don't expect children to sit quietly for an hour while orders are taken and adults chat. Children are free to do what is natural for

them, thus eliminating potential hassle for everyone.”¹⁵ This echoes Principal #4 in [chapter 1](#): whether you’re labeled as gifted or disabled has more to do with when and where you were born than anything intrinsic to you as an individual.

ADHD and the Creative Connection

One can, of course, repeat the argument (from [chapter 1](#)) that we *don’t* live in prehistoric times, nor in the South Sea Islands or Papua New Guinea, but in a complex modern society. However, even in this contemporary world of ours, the traits of ADHD still appear to confer distinct advantages. This became clear to Bonnie Cramond, director of the Torrance Center for Creative Studies and Talent Development at the University of Georgia, when she began to compare the warning signs of ADHD with the traits of the creative person. The two lists appeared to be indistinguishable except for the fact that the words used for the ADHD individual were negative and those used for the creative person were positive.¹⁶

The ADHD person, for example, is considered *impulsive*. For the creative person, we call this *spontaneity*, and it’s considered to be a good thing. We admire the artist Jackson Pollock for throwing paint wildly onto a canvas. We respect the Greek thinker Archimedes for yelling out “Eureka!” in his bathtub after having solved a scientific problem. Similarly, the ADHD person is said to be *distractible*. With the creative person this is called having a *divergent mind*, and is seen as one of the hallmarks of a great mind. Creative people think “outside of the box,” and in order to accomplish this, they must follow their ideas, images, or instincts wherever they might lead. One of the world’s greatest novels, James Joyce’s *Finnegans Wake*, for example, is a hodgepodge of puns, historical and literary allusions, and mythic themes, put together in a highly divergent manner. Finally, the ADHD person is diagnosed as being *hyperactive*. This is the *vitality* of the artist or scientist, who is constantly on the prowl for the answer to a creative problem. Edison, for example, tested thousands of substances before coming up with a filament that would burn for hours in his electric lightbulb.

One of the great disadvantages of the term “ADHD” is that it speaks of a deficit in attention. Children (and adults) labeled ADHD are actually *very good at paying attention*. They excel in paying attention to what they’re not supposed to be paying attention to! This is called “incidental attention” and is another trait of the creative person. As Matthew Kutz, a thirteen-year-old student with ADD puts it, “Being ADD means you see things other people miss. When *you* see a peach you see a piece of fruit. I see the color, the texture, and the field where it grew. . . . Being ADD, when I read a book about marine life my mind allows me to travel with the fish and imagine life beneath the sea. Or I can read a book about astronomy and dance among the stars.”¹⁷ As Lara Honos-Webb, author of *The Gift of ADHD*, states, “While the A students are learning the details of photosynthesis, the ADHD kids are staring out the window and wondering if it still works on a cloudy day.”¹⁸

People labeled with ADHD are also very good at paying attention to what *interests* them. Many parents have written to me saying that their ADHD-diagnosed kids will spend hours focused on building with Legos, dancing, operating video games, or engaging in other absorbing tasks. Unfortunately, the ADHD community has also taken *this* admirable trait and turned it into a negative. They call it “hyperfocus” and consider it to be yet another “warning sign” of attention deficit disorder. But the ability to focus the mind for hours on a single topic has been considered for centuries to be the trait of an exceptional mind (otherwise, why do so many cultures and religious traditions cultivate the ability to concentrate?).

Maria Montessori called this facility—when a child becomes totally consumed by a learning task—“the great work” and said it was the most wonderful of all learning experiences. More recently, Claremont College psychologist Mihaly Csíkszentmihályi has used the word “flow” to describe this experience of total absorption in a task. He has studied “flow” in highly proficient individuals, including rock climbers negotiating steep mountain cliffs and surgeons engaged in twelve-hour sessions in the operating room.¹⁹ The fact of the matter is that children and adults with ADHD have *a different attentional style* than neurotypical individuals. They have a “roaming” attention that can notice many different things in a short period of time and a “homing” attention that can fasten onto one thing of great interest and stay with it for a long period of time. It does a great disservice to those diagnosed

with ADHD to say that they have a deficit in attention, when they are actually *good* at two different forms of attention and have problems primarily with one other form, sometimes referred to as “central-task” attention, where sustained attention must be paid to routine (and often boring) events that have often been externally imposed.

Niche Construction for ADHD Kids: Keep It Stimulating!

How, then, does a parent go about creating a favorable niche for children with such unique minds in a society that all too often pathologizes their gifts? One answer to this question lies in paying closer attention to how people diagnosed with ADHD respond in different “microhabitats” and then constructing niches that provide more time in favorable and less time in unfavorable environments. We’ve seen, for example, that the brains of children labeled ADHD are often *understimulated*. This means that one of the worst environments for ADHD kids would be a room that lacks much stimulation, including a boring classroom. One ADHD researcher, Sydney Zentall at Purdue University, discovered that researchers could calm down and focus hyperactive children by providing them with a highly stimulating environment in school. She rigged up classrooms with music, color, movement, and interaction and found that the kids’ symptoms decreased.²⁰ In a sense, they were receiving “educational Ritalin.”

There are many ways of providing this kind of stimulation, even in a traditional classroom. A teacher in one of my seminars told me that when she has a student labeled ADHD in her regular classroom, she gives him *two desks* so that whenever he gets out of his desk, he has another desk to move to. Another classroom teacher brought in a parent volunteer to build a special lectern so that the child could do his class work seated or standing up. They installed a pedal from an old sewing machine at the base of the lectern so he could keep his feet in motion, and they lined the inside of the desk with felt so he could get tactile stimulation. This not only solved the problem behavior but also resulted in that student later choosing a career in adulthood as a special education teacher. Another study demonstrated that children with ADHD improved their ability to concentrate on their schoolwork when they sat on large, bouncy therapy balls instead of chairs.²¹

In some cases, parents have discovered that the schools are so unresponsive to their requests for changes to the classroom environment, sometimes putting their children in special education classrooms that are even more boring than the regular classroom, that they decide to take them out of school and homeschool them. This gives them more freedom in constructing positive niches. One mother, writing in a homeschooling newsletter, told about her son Matt, who was diagnosed as ADHD in first grade, medicated, and referred to a special education program in the second grade. “Matt’s teachers gave stickers for each week’s completed assignments,” she said. “These were openly displayed in the classroom. The children who didn’t have many stickers were called ‘dumb,’ ‘flunker,’ or ‘stupid’ by their classmates. . . . Children with behavior problems were threatened with not being allowed to go on the yearly overnight camping trip. Instead of helping, this threat made the kids, including Matt, more anxious, resulting in more behavior problems.” After more difficulties in third grade, the family decided to homeschool him. “We saw an immediate improvement in all areas. . . . He is currently studying oceanography and American history, especially Civil War battles and modern military machinery. He can tell you more about aircraft, tanks, and ships than most adults know. . . . He enjoys learning again and our whole family is a lot happier.”

The threat to take away an overnight camping trip turns out to be an especially poor attempt at niche construction. Recent research suggests that being in the outdoors has a particularly salutary effect on children diagnosed with ADHD. In a study published in the *American Journal of Public Health*, scientists discovered that children as young as five showed a significant reduction in ADHD symptoms when they were engaged with nature. The more natural and “wilderness-like” the setting, the more the children’s behavior improved. The chief investigator of the study, Frances E. Kuo, University of Illinois professor and director of its Human Environment Research Laboratory, observed, “The theory is that, when you have to struggle to maintain attention—what happens when you concentrate on a task like writing or doing computations—neurotransmitters in the brain’s prefrontal cortex get depleted. If you struggle too long without a break, you experience a condition that might be called ‘attention fatigue.’ You need to let the system replenish itself, and being in a natural environment seems to let it do that.” For ADHD children who

chronically suffer from a depletion of dopamine in their system, this need is even more pronounced. She recommends giving ADHD kids “green time” before any activity that requires attention. “For example, if your child has trouble sitting still in church,” she notes, “send him to play ball on the lawn for 20 minutes before you go. If you have a garden, enlist your child’s help with gardening. Pay a family visit to the park or a nature preserve on the weekend.”²²

Rough-and-tumble play is another important niche activity that ADHD kids (particularly boys) need to be involved with in order to diminish or eliminate symptoms. Jaak Panksepp, Distinguished Research Professor Emeritus of Psychology and Adjunct Professor of Psychiatry at the Medical College of Ohio in Toledo, has suggested that the increased number of ADHD children being diagnosed in our country may largely reflect the fact that more and more of our children “no longer have adequate spaces and opportunities to express this natural biological need to play with each other in vigorous rough-and-tumble ways, each and every day.”²³ In experiments with rats, Panksepp noticed that those that played had increased levels of dopamine in their brains compared with those that didn’t play. He also noted that access to play in rats promoted frontal lobe development. Translating this research into practical benefits for kids diagnosed with ADHD suggests that dopamine-starved children with frontal lobe dysfunction can benefit tremendously from vigorous free-play experiences. The problem is that increasingly we’re seeing a cultural trend toward a more sedentary childhood, where children sit passively watching television, “playing” video games (which is not true play), working at their computers, and being involved in adult-supervised competitive games (also not true play). The implications for parents and educators are: more recess time at school and more time at home to build forts, play-wrestle, do cartwheels and somersaults, and engage in child-centered informal physical games like sandlot baseball or football.

Niche Construction for Adults: Use Your Dynamic Brain

While traveling on a 747 to Europe a few years ago, I happened to sit next to a man who told me that he’d just been diagnosed by his

physician with ADHD. A little bit later, as our conversation progressed, I happened to ask him what he did for a living. He told me that he worked as a media consultant for an international religious group. His job was to go to different countries around the world and make documentaries on their various projects. Each job lasted just a few weeks, after which he would go on to his next assignment. Later on, I thought to myself, “This man is in a perfect job for someone labeled ADHD. He goes to a new country and works for a short period of time. Then, just at the point where he’s likely to start feeling bored (because of a lack of stimulation), his job is over, and he gets to go to a new place. And even now, he’s in a jet plane going 550 miles an hour!” How different this man’s life would have been had he been in a typical office job, sitting in a cube farm for several hours a day. It’s likely that the routine, boredom, and lack of physical movement would have made his life miserable. As it turned out, without even realizing it, he had created a positive niche for himself.

Physical movement, change, novelty, high stimulation, and hands-on activity are all factors that make up some of the ingredients of good niche construction for people with ADHD. Most of these elements are found, for example, in the field of firefighting. Fire chief Harold C. Cohen gave his crew a list of twenty items from a checklist that appeared in the best-selling book for ADHD adults *Driven to Distraction* by Edward Hallowell and John Ratey to determine whether they might have ADHD. More than half of his staff identified eight or more ADHD traits in themselves, including “a frequent search for stimulation,” “impatience,” and “a tendency to be creative.” He wrote, “The intense, fast-paced world of the fire service is practically tailor-made for someone who craves, for example, constant change and adrenaline-producing situations. In turn, people with ADHD often naturally exhibit the personality characteristics—such as creativity, risk-taking and quick decision-making—that are required of the best firefighters and EMTs.”²⁴ He also noted that those with ADHD who had trouble keeping on task and managing their time were helped by the fire department’s paramilitary organization, which provided a much-needed structure to keep them in line.

The fields of business and entrepreneurship also seem to be a good match for many ADHD adults. David Neeleman, founder of JetBlue Airways, who was himself diagnosed with ADHD, observed, “I knew I had strengths that other people didn’t have. . . . I can distill complicated

facts and come up with simple solutions. I can look out on an industry with all kinds of problems and say, ‘How can I do this better?’ My ADD brain naturally searches for better ways of doing things.” Paul Orfalea, the founder of Kinko’s, and also an ADHD adult, explains how his hyperactive temperament helped him build his business. “Because I have a tendency to wander, I never spent much time in my office. My job was going store to store, noticing what people were doing right. If I had stayed in my office all the time, I would not have discovered all those wonderful ideas to help expand the business.”²⁵ Psychologist Kathleen Nadeau, another ADHD adult, told ABC News, “ADD people are high-energy and incredibly good brainstormers. They will often happily work 12 to 15 hours by choice. The business community should not fear ADD. Instead, they should see that they have a potential gold mine here.”

Here is a partial list of careers that emphasize the gifts of ADHD adults:

- disc jockey or radio announcer
- traveling salesperson
- music or dance therapist
- forest ranger
- recreational worker
- itinerant teacher
- radio, television, or newspaper reporter
- police officer or firefighter
- nature photographer
- building contractor
- craftsperson
- artist or sculptor
- inventor or designer
- private detective
- community ombudsman
- truck, bus, or taxicab driver
- emergency-room physician
- freelance researcher
- farmer or ranch worker
- choreographer or dancer
- athlete or coach
- lecturer or workshop leader

- aerobic or fitness instructor
- surveyor or cartographer
- fashion model
- public relations consultant
- freelance writer, artist, or editor
- airline pilot, ship captain, or train engineer

In each of these careers, there is at least one element that favors the abilities of individuals diagnosed with ADHD, including: being out in nature, traveling or moving around frequently, working with one's hands, being actively involved with new situations from day to day, handling emergencies, being physically engaged, doing many different things in a short period of time, engaging in creative pursuits such as the arts, and being able to work for oneself.

In addition to career choices, there are a number of new technologies that can help adults with ADHD build a comfortable niche within the confines of a busy and complex world. Particularly helpful is the personal digital assistant, which is a handheld computer that can help with organizing and managing all the different aspects of one's hectic daily schedule. Most PDAs these days have been incorporated into "smartphones" such as the Apple iPhone or the RIM Blackberry. The tasks that these devices (with their various software applications) do include:

- providing reminders for appointments
- prioritizing commitments
- communicating with others (e-mail and cell phone capabilities)
- accessing the Internet
- navigating from one place to another (global positioning system)
- organizing accounts and budgets
- taking notes (word processing, dictation software)
- documenting events (camera, video recorder)
- providing stimulation and entertainment (computer games, radio, movies)

As one woman diagnosed with ADHD put it, "I have a cute little five ounce, tangerine colored friend that never stays home, my PDA. It goes everywhere with me—to the grocery store, the bank, the farm store, the doctor's, the airport, the accountant's, the hairdresser's, and

occasionally into the bathroom, where it rests on the sink, ready to remind me to get OUT of the shower!”²⁶

People with ADHD also find human resources invaluable in helping them to prioritize, focus, and get things done. With his holistic mind, JetBlue Airways founder David Neeleman surrounds himself with individuals who are good at the specifics of the business: “My assistant helps me write letters and keeps my calendar. . . . I have no idea what I’m doing one day to the next.” Kinko’s Paul Orfalea notes, “I can’t write a letter and I can’t fix a machine. My biggest advantage is that I don’t get bogged down in the details because of my ADD. I hire capable people to handle that.”²⁷

Many people diagnosed with ADHD hire a trainer or personal coach to help them with organization, time management, follow-through, motivation, and discovering “work-arounds” for dealing with challenges. A number of individuals have become known in the ADHD community for providing these services by phone, through e-mail, or in person. One forty-year-old man with ADHD writes about his own personal experience with his coach: “Pete and I worked on developing my ability to listen. I’d look at my planner and pick out four meetings that were coming up. For each one, I’d plan to practice a few specific things that would improve my listening skills: Don’t talk until the other person has completed his sentence. Recap with them, to make sure you understood what they said. I wrote reminders to do these things at the top of my notepad.”²⁸

What About Medications?

Establishing a compatible niche for oneself does not preclude taking medications. For some individuals, medications provide an important “platform” on which a positive niche can be created. A person needs to consult with his physician before making any decisions about starting, stopping, or changing medications or medication doses. But especially with children, the issue of medications should be viewed with caution. Ritalin and other psychostimulants can have rare serious side effects and have a potential for abuse (adolescents use them as a street drug). Children on psychostimulants may tend to attribute their improved behavior to their “good pill” rather than their own personal effort. Our

look at the “hidden strengths” of ADHD reveals children’s ADHD symptoms can often be dramatically lowered when children are in environments that are stimulating, nature based, playful, and creative. There’s a danger in using medications to provide chemical stimulation as a *substitute* for good living. In addition, there is evidence from Jaak Panksepp and other researchers that rats given methylphenidate (Ritalin) tend to play less. As a bottom line, it’s important to provide children, who are just starting out on life’s journey, with a strong developmental foundation of play, sensory-rich experiences, and dynamically interactive environments. If problems still continue after this healthy lifestyle has been instituted for a period of time, then consultation with a physician about psychoactive medications becomes more appropriate. It’s interesting to note that hyperactive Thomas Edison is famous for writing, “The doctor of the future will give no medicine, but will interest her or his patients in the care of the human frame, in a proper diet, and in the cause and prevention of disease.”²⁹ In a new world of neurodiversity, people with ADHD may discover that their greatest improvements in mental health come about not so much through drugs but through changing the ecology of their outer surroundings to match the brisk and ebullient nature of their joyful hyperactive brains.

CHAPTER 3

The Positive Side of Being Autistic

Some guy with high-functioning Asperger's developed the first stone spear; it wasn't developed by the social ones yakking around the campfire.

—TEMPLE GRANDIN,
QUOTED IN *New York Magazine*

Amanda Baggs, a woman in her late twenties, made a big impact on the Internet a few of years ago, when she produced a video that was broadcast on YouTube, titled “In My Language.” In this video clip she gave her personal account of being an autistic person. Watching the video is a fascinating experience. Amanda hums at different frequencies somewhat like a Buddhist monk throughout the first half of the nine-minute video and makes a lot of different sounds using various objects around her home. She taps on surfaces, twirls a necklace, and drops a slinky. I had the feeling that I was watching the world-famous percussionist Evelyn Glennie as Amanda passed her fingernails repeatedly along a corrugated metal surface, rattled a ring of wire around a door handle, flapped a sheet of paper, played with water pouring out of the kitchen faucet, and in many other ways interacted with the world around her. Although she does not generally speak, and has been viewed by some professionals as “low-functioning,” Amanda just happens to communicate eloquently in words via a computer and voice synthesizer.

In the second half of her video, we hear her synthesized voice declaring a manifesto of sorts for those who possess different ways of communicating. People, she says, think of her as living in a “world of her own” (a typical stereotype held about autistic individuals) despite the fact that she is wide open to conversing with the world of objects around her home. Ironically, she notes that she would be regarded as “opening up to the world” if she narrowed her focus to only words and

interpersonal interaction. She says, through her synthesizer, “The thinking of people like me is only taken seriously if we learn your language, no matter how we previously thought or interacted. As you heard I can sing along with what is around me. It is only when I type something in your language that you refer to me as having communication.” Similarly, she observes, “I find it very interesting . . . that failure to learn your language is seen as a deficit but failure to learn my language is seen as so natural.” She ends her video with a declaration of human rights for “the many shapes of personhood.”¹

Getting Interpersonal on the Internet

Amanda’s manifesto and others like hers on the Internet are increasingly becoming an important part of the autism rights movement. Just as many in the deaf community have argued for the unique value of sign language and deaf culture, so many in the autism community are demanding that they be viewed as different and not disabled.² As we observed in [chapter 1](#), the term “neurodiversity” first emerged out of the autistic rights movement in the late 1990s. Ironically, a medium of social communication—the Internet—has helped catalyze this movement. Autistic individuals have significant difficulty with one-to-one personal contact. They have what has been termed “mindblindness”—the inability to perceive or even guess at the thoughts of other people. This is something that most of us take for granted. If a close friend of ours suddenly stops calling us, we have the capacity to think of reasons why this might have happened: maybe something we said made them angry, maybe they’re sick, perhaps they’re traveling. We have the ability to “mind read” and, on the basis of our hypotheses, act accordingly. Autistic people lack this ability. They have difficulty reading faces and gestures, guessing intentions, perceiving motivations, and most especially, perhaps, understanding emotions.

On the Internet, however, few of these skills are required. The point of contact is verbal communication, not reading subverbal cues. In [chapter 1](#) we noted that autism exists along a continuum. Up to 70 percent of those with autism have also been diagnosed with intellectual disabilities. (This category will be the topic of [chapter 7](#).) However,

many of those on the “upper” part of the autism spectrum (those often described as “high-functioning” or having Asperger’s syndrome) do possess the requisite verbal skills needed to communicate via a computer. Consequently, the Internet turns out to be an important part of the niche construction of many autistic adults (and some older children and adolescents as well). This is certainly true of Amanda Baggs, who has a wide command of Internet protocols, software, chat sites, blogs, and virtual communities (she has her own “avatar,” or simulated personality, on the Internet site Second Life). Referring to her video-production facilities, she commented to *Wired* magazine, “My care provider wouldn’t even know how to work the software.”³

Autism: History and Causes

Amanda’s situation both reveals and overturns certain tacit assumptions about autism (the word is derived from the Greek *autos*, meaning “self”), a condition said to affect 1 in every 110 people. The disorder was discovered by two physicians, Leo Kanner and Hans Asperger, independently of each other in the 1940s, but was not listed in the *Diagnostic and Statistical Manual* of the American Psychiatric Association until 1980 and was not included as a disability eligible for special education services in the United States until the 1990s. Autistic individuals are seen to have disturbances in social relationships and communication and to demonstrate unusual and repetitive interests and behaviors. Strictly speaking, autism exists as a spectrum of disorders, from classical autism (nonspeaking, socially isolated, intellectually disabled, with repetitive behaviors like rocking and hand flapping), on one end, to high-functioning autism and Asperger’s syndrome (good language skills, average or above-average intelligence, interest in specialized areas), on the other. In the 1950s and 1960s autism was thought to be environmentally caused, due largely to uncaring parents who had rejected their children’s attempts to be comforted (the term “refrigerator mothers” was commonly used to describe them). Not until the 1970s was autism regarded as a biological disorder. No definitive biological cause has been given for autism, but it is believed to result from brain damage arising from any number of possible factors, including genetics, pregnancy or birth complications, and viral

infections. The idea that ingredients in children's vaccines cause autism has been largely discredited by the scientific community, although this area continues to be extremely controversial among many parents of autistic children.⁴ Abnormalities in several areas of the brain have been observed among autistic populations, including the frontal lobes (responsible for, among other things, planning and control), the limbic system (responsible for emotional regulation), and the cerebellum (responsible for motor control). High levels of the neurotransmitter serotonin have been found in between 30 to 50 percent of autistic children.⁵

One theory concerning the neurological basis of autism is that there is dysfunction in the "mirror neurons" of autistic individuals in the premotor cortex of the frontal lobes. It was observed in the early 1990s that the mirror neurons of macaque monkeys fired when they performed an action but also when they saw another living creature perform that same action. The neurons "mirrored" the action of another, just as if the monkeys had done the action themselves. The mirror-neuron system helps explain how people can learn things just by observing them in other people. However, there seems to be some sort of breakdown in this system among autistic people, leading to their not being able to "read" and interpret the actions of others. Another more recent theory suggests that there is an evolutionary struggle between the genes in the father's sperm and those in the mother's egg and that this conflict can tip brain development in one of two directions. If the father's genes are favored, then brain growth is pushed toward developing along the autistic spectrum, whereas if the mother's genes are favored, this can move brain development along a spectrum that includes depression, bipolar disorder, and schizophrenia.⁶

Working Within the System

Support for this latter view, at least with respect to the autistic spectrum, comes from work done by Dr. Simon Baron-Cohen at the Autism Research Centre at Cambridge University in the United Kingdom.⁷ As a background to his theory of autism, Baron-Cohen suggests that there are basic cognitive differences between the sexes. Women, he argues, are *empathizers*. Compared with males, they are

better at establishing intimate relationships, cooperating, reading the moods of other people, and understanding emotions, both their own and those of others. Men, on the other hand, are *systematizers*. A system is anything that takes inputs and delivers outputs. It could be technical, like a computer; natural, like the weather; abstract, like the field of mathematics; organizable, like a DVD collection; or motoric, like a tennis shot. What is important about a system is that it is predictable and can be controlled. If we know what went into the system, we can predict what will come out of it. On the other hand, empathizing is unpredictable. We never can say for sure what's in the mind of another person. Women can handle this uncertainty more easily than men, who prefer the predictable, controllable world of systems. Men are more likely to gather around a car and discuss the hydraulic system than sit around a coffee table and discuss the problems of a friend. They're more likely to talk about computers than personal feelings. As author and linguist Deborah Tannen has pointed out, men talk about *things* (a political election, a football game, how a machine works), whereas women communicate to establish intimacy (make friends, share secrets, commiserate together).⁸

Baron-Cohen makes it clear that empathizing and systematizing exist along a continuum. Men are more likely to be on the systematizing side and women on the empathizing side, yet there are many exceptions. Some women are very systems oriented, while some men are quite empathetic, and there are also those who have these two dimensions of life more or less in balance. As we move out toward the extreme end of the systematizing part of the spectrum, however, Baron-Cohen points out that this is where we begin to see individuals on the autistic spectrum. Along with difficulties in social development and communication, as noted above, another important feature of autistic people is their unusually strong interests. This can range from a severely autistic child's fascination with the movement of an electric fan's blades, on one end of the autistic spectrum, to an autistic savant's ability to calculate large numbers quickly, on the other. In both cases, we're dealing with systems: the operation of a mechanical object and a method of rapid mathematical calculation. In essence, Baron-Cohen is suggesting that autism represents extreme male behavior in terms of its overabundant focus on systems. In one study of children with Asperger's syndrome, 90 percent were seen to have special interests in systems as diverse as deep-fat fryers, the passenger list of the *Titanic*,

waist measurements, the livery of Great Western trains, Rommel's desert wars, paper bags, light and darkness, toilet brushes, globes and maps, yellow pencils, oil paintings of trains, photocopiers, the World War II propeller plane, industrial fans, elevators, and shoes.⁹

Unfortunately, too often these abilities are overlooked, minimized, or negatively characterized in autistic individuals. Autistic people are seen in terms of what they *can't do* (empathize) rather than in terms of what they *can do* (systematize). Their personal interests are often regarded as "obsessional" and "unimaginative," or as "splinter skills," rather than being appreciated for what they are: a specific fascination with a particular system. The world *needs* systematizers: computer programmers, mathematicians, engineers, mechanics, and scientists, among others. One study of 378 Cambridge University students found that autism was seven times more likely to be found among mathematics students compared with those in other disciplines. Other studies have shown that fathers and grandfathers of children with autism are twice as likely to work in engineering, and science students have more relatives with autism than those in the humanities.¹⁰ I remember talking with a postgraduate fellow at one of the country's premier scientific training universities, and he told me he thought the majority of his professors had Asperger's syndrome or manifested Asperger-like behaviors. In fact, he said that he was leaving the university and the field of molecular genetics because he "wanted to get a life."

What he really meant was a social life. It seems that people labeled autistic violate a key value in our culture by not being sufficiently sociable. Yet why shouldn't a deep immersion in nonhuman systems represent a good life as well? Psychiatrist Anthony Storr, in his book *Solitude: A Return to the Self*, points out that the mental health profession has helped contribute to the idea in our culture that happiness can only come through relationship with others. Yet he observes that many people find their satisfaction in solitary pursuits. He writes, "It is not only men and women of genius who may find their chief value in the impersonal rather than in the personal. I shall argue that interests, whether in writing history, breeding carrier pigeons, speculating in stocks and shares, designing aircraft, playing the piano, or gardening, play a greater part in the economy of human happiness than modern psycho-analysts and their followers allow. . . . We must all have known people whose lives were actually made worthwhile by

such interests, whether or not their human relationships were satisfactory.”¹¹ Of course, I’m not arguing here that a child without speech who bangs his head and plays with his fingers all day long is involved in the kind of positive solitude that Anthony Storr is talking about. Clearly, there is a need for autistic children to adapt to the social world around them, and later in this chapter we will examine early-intervention approaches that have been used to help children on the autistic spectrum open up to contact with those around them. However, we need to do a better job of examining the strengths and abilities of those along the autistic spectrum and realize that these strengths represent legitimate ways of being in the world.

Welcome to the World of “Where’s Waldo?”

Another area of strength for individuals diagnosed with autistic spectrum disorders is their ability to see details. Autistic individuals are experts at “Where’s Waldo?”-type search puzzles. They score higher than so-called normal people on the Block Design Test of the Wechsler Intelligence Scale for Children, which requires subjects to manipulate a group of blocks to match various two-dimensional patterns.¹² They also score better on the Embedded Figures Task, which involves locating specific shapes or patterns within a larger, more complex design.¹³ They are more likely than controls to have “perfect pitch” musically and to be able to pick out or “disembed” individual notes from complex chords in a musical score.¹⁴ In fact, it may be these perceptual talents, along with a prodigious memory, that allow autistic savants to accomplish some of their most astonishing achievements. The American autistic savant musician Leslie Lemke, for example, was able to play Tchaikovsky’s entire Piano Concerto no. 1 after hearing it only once. British autistic savant Steven Wilshire was able to draw in meticulous detail the skyline of Rome after taking a fifteen-minute helicopter ride around its environs. Autistic savant Daniel Tammet has performed Rainman-style tasks such as working out the mathematical structure of pi (the ratio of the circumference of a circle to its diameter) to 22,514 digits in five hours. He also learned the Icelandic language fluently in one week.

Yet, ironically, the gift for detail among autistic individuals is typically defined by psychologists in terms of *deficit* rather than *strength*. Many psychologists currently view the abilities described above as evidence for what they call the “weak central coherence theory.” This theory suggests that autistic persons are unable to see the whole gestalt of a structure (its central coherence), and it is this failure that allows them to see the details within it more clearly. So-called normal people, when confronted with a “Where’s Waldo?”-type task, for example, are more likely to see the whole group of individuals, making it harder for them to identify one single individual. Autistic persons, on the other hand, are less likely to see the group, and are thus more likely to home in on tiny details. Another way of putting it is that autistic individuals can’t see the forest for the trees. Yet this is a negative way of describing what is also a positive cognitive style. Instead, the phrase “strong local analysis” would say the same thing in positive language. One group of researchers, including Michelle Dawson, who is herself autistic, has suggested the term “enhanced perceptual functioning.”¹⁵ This puts the emphasis on what is working rather than on what is broken and needs fixing.

Making this shift in terminology is not just an academic exercise. It can help us understand why the characteristics for autism still remain in the gene pool. It may be that there were evolutionary advantages in having individuals around in earlier times who could see very small, seemingly irrelevant things. A pair of little circles in a bush, for example, could be edible berries, or they could be the eyes of a predator. I would want someone in my tribe who was very good at distinguishing between the two. Autistic individuals are systems oriented rather than people oriented. I’d want plenty of individuals around who were concerned with objects and systems: how to construct a spear, how to make a fire, how to build a shelter. I’d want people who knew the geography (a system), the weather (a system), and the complete list of all the poisonous and nonpoisonous plants in the region (another system). After all, small details on a plant could spell the difference between life and death. I’d want individuals who could pay attention to animal tracks, animal feeding patterns, and animal moods. It wouldn’t matter to me if they couldn’t get along with other people or preferred solitude. I’d let them specialize in what they did best. This reminds me of a story told to me by a researcher in autism. It concerns an individual in the Congo who had all the classic signs of autism but

was regarded as a gifted individual by his tribe. He was a master weaver. His love of meticulous detail and patterns gave him an important niche in the community, where his drawbacks were less important than what he had to contribute to the culture.¹⁶

In today's complex society we still need detail-oriented, systems-based people working on our plumbing, on our cars, and on thousands of other things that make up a part of daily life. A good case in point would be the career of Temple Grandin, perhaps the most famous autistic individual in the world today. She designs animal machinery for meatpacking plants. One third of all the livestock-handling facilities in this country have been designed by Dr. Grandin. Although during her life she has had significant difficulty in learning to relate to others, she possesses an uncanny ability to understand the needs of animals. In her book *Animals in Translation*, she lists eighteen tiny details that scare farm animals, including reflections on smooth metal, metal clanging or banging, high-pitched noise, air hissing, and sudden changes in the color of equipment. She's used her ability to pay attention to these kinds of details in constructing chutes, gates, pens, and doors and in making other modifications to the environment. At a pig processing plant, for example, pigs were backing up in an alley, and employees were using electric cattle prods to move them along. The plant was poised to fail its animal-welfare audit, which required that electric prods be used on fewer than 25 percent of animals. To help solve the problem, Dr. Grandin got down on her hands and knees and went through the chute herself. "I could see that there were lots of tiny bright reflections glancing off the wet floor. Plant floors are always wet, because they're always being hosed down to keep them clean. Nobody could have seen those reflections even if they did know what to look for, because the humans' eyes weren't on the same level as the pigs."¹⁷ After adjusting the overhead lighting with a stick to remove each little reflection, they had solved the problem.

Part of what allowed her to do this was her attention to detail, but a contributing factor was her exceptional visual-spatial skills, another area that is a strength for many autistic people. Grandin reflects: "I think in pictures. Words are like a second language to me. I translate both spoken and written words into full-color movies, complete with sound. . . . When somebody speaks to me, his words are instantly translated into pictures. Language-based thinkers often find this phenomenon difficult to understand, but in my job as an equipment

designer for the livestock industry, visual thinking is a tremendous advantage.” She even tests her designs in her imagination before attempting to construct them. “I visualize my designs being used in every possible situation,” she reports, “with different sizes and breeds of cattle and in different weather conditions. Doing this enable[s] me to correct mistakes prior to construction.”¹⁸ As we noted earlier, autistic individuals perform much better at tests that involve visual-spatial tasks such as Block Design and Embedded Figures. There are even suggestions that when the interpersonal and language demands are removed from intelligence tests, and the focus is on reasoning based on pictures (such as is the case, for example, in the Raven’s Standard Progressive Matrices [RSPM] intelligence test), IQ scores of autistic children increase from thirty to seventy percentile points compared with testing on the Wechsler Intelligence Scale for Children. This is a research finding that could potentially lift many individuals diagnosed with autism out of the ranks of intellectually disabled.¹⁹ A recent study, in fact, suggests that autistics are actually 40 percent faster at the kind of problem solving done on the Raven’s test compared with nonautistics. The lead researcher, Isabelle Souliere, notes, “Some critics argued that autistics would be unable to complete the RSPM because of its complexity, yet our study shows autistics complete it as efficiently and have a more highly developed perception than nonautistics.”²⁰

There are those who would regard my efforts thus far in this chapter to describe the many strengths and abilities of autistic individuals as an attempt to exonerate them from social responsibilities. Nothing could be further from the truth. Principle #5 in [chapter 1](#) states: “Success in life is based on adapting one’s brain to the needs of the surrounding environment.” Although it is difficult for autistic people to enter the socialized world, we live in a culture where socialization is an important value. Thus, it is especially important that we help autistic children—starting as early in life as possible—to relate to other people. There are a number of adaptive early-intervention models that have been used to accomplish this aim, the most famous and widespread method being Applied Behavior Analysis. In ABA parents and teachers identify specific behaviors to be modified and then use explicit rewards (such as candy, toys, and praise) to reinforce positive social behaviors like language communication or appropriate social interaction, while ignoring or “extinguishing” negative behaviors such as rocking, hand

flapping, and finger flicking. The advantage of this approach is that specific behaviors can be charted over a period of time, and clear progress can be documented. The downside of this approach is its artificiality (children behave appropriately mainly to get rewards) and its externally controlling aspects (the adult is the almighty dispenser of reinforcements).

Protecting Their Special Interests

There are many other treatment alternatives for autism available (one Web site, Research Autism, lists more than seven hundred).²¹ For the purposes of this book, however, I'd like to focus on strategies that build on Principle #6: "Success in life also depends on modifying your surrounding environment to fit the needs of your unique brain (niche construction)." In other words, how can we help autistic persons (and their caregivers) construct niches that acknowledge *who they really are*, and that includes their strengths and abilities?

One approach that seems to me to be more developmentally appropriate than ABA and a good example of niche construction is the Floortime model developed by child psychiatrist Stanley Greenspan and psychologist Serena Wieder. It is based on the idea that parents should pay attention to cues from their autistic children and set up naturally occurring scenarios of involvement where the child is encouraged to emotionally interact, solve problems, express needs, and in other ways move out into a meaningful engagement with the social world. This approach is more natural because it begins with the child, not with adult attempts to force interaction through external reinforcements. There's a lot of emphasis in Floortime on laughing, playing, and having a good time—essentially creating a positive social and emotional niche for the child. Greenspan writes, "To facilitate engagement and relating, observe what kinds of interactions—silly sounds, kisses, tickles or favorite games—bring the baby or child pleasure. Peekaboo and hide-the-toy-under-the-box are visual games that delight most babies, and rhythmic clapping games like patty-cake will especially intrigue babies with auditory strengths. Moving trucks delight toddlers, and imaginative dramas bring joy to most preschoolers. . . . Tune in to the baby's or child's rhythms, to his

emotions and how he uses his senses and movements.”²² These playful interactions are most helpful when done, according to Greenspan and Wieder, for at least fifteen to twenty minutes several times a day when the child is most alert and available. A report on autism from the National Research Council suggests that the Floortime model is effective in developing basic capacities for thinking, communicating, and relating and helps children use these skills in a wide range of natural situations.²³

The Floortime model succeeds because it focuses on the positive behaviors of the child. Paying attention to the special interests of children on the autistic spectrum is, in fact, an excellent way of promoting niche construction. The codiscoverer of autism, Hans Asperger, in reflecting on his own patients, observed that “a special interest enables them to achieve quite extraordinary levels of performance in a certain area.”²⁴ Educator Stephen Shore’s parents, for example, were given the diagnosis of autism when he lost speech as a toddler and withdrew from his surroundings. Instead of institutionalizing him (as was common at that time), they turned their efforts toward focusing on his specific strengths and interests. They played music, helped him mount his collection of seashells, encouraged his interest in astronomy, and provided him with plenty of reading materials.²⁵ Today he has a doctoral degree, runs an educational consulting business, and is the author of two books. This is just one example showing that even if a child seems to be “low functioning” (a label that can itself have a negative impact on a child’s prospects for the future), whatever interests him can be used as a starting point. As one mother of an autistic child put it: “Does it matter that your 3 year old finds flags the coolest thing on earth? No. Does it matter that your 2 year old is attracted to soup cans? No. It does not matter what *it* is, you can build off these interests and bring in other topics/ideas and see where it takes your child.”²⁶ The parents of Justin Canha discovered this when they observed how this unresponsive, nonverbal child would just stare at the television screen, even when there was nothing on it except snow. They drew simple pictures regarding how to play soccer, how to follow basic safety rules, and how to get in bed at night. Then they videotaped these still pictures with a voice-over and played them on the television screen. Suddenly, he began to respond. Now he works as an artist, exhibiting and selling his drawings at an art gallery in New York.²⁷

As children grow older, their special interests can serve as a means of helping to negotiate their difficult relationships with others. One study of interests among students aged seven to twenty-one with Asperger's syndrome, for example, revealed that as they shared their special interests with others, their self-esteem, body language, and communication skills improved, while their self-stimulation and distraction decreased. At times this also meant modulating their excitement level based on the attention that others showed to their interests. One student, for example, realized that not everyone was as passionate about airplanes as he was. "Well, if they're not really interested, I really don't talk about airplanes at all." But then he explained: "First, I usually don't talk about it . . . and if I have a really good friend . . . they might come over to my house and then they'll see all these planes around and they'll tell me that 'planes are a really cool thing' . . . and then I'll know." The authors of the study concluded:

To truly know a child or youth with AS [Asperger's syndrome], one must know his or her SIA [Special Interest Area]. It is not enough just to acknowledge that interests are important to children and youth with AS; these children's interests define who they are. Interests represent safety, boundaries, and a measure of control. To punish the child by removing the cherished interest is, in essence, to strip the child of him-or herself and his or her source of comfort, soothing, and strength. Interests are more than hobbies or pastimes. Interests help [them] . . . make sense of the world.²⁸

Ultimately, special interests can serve as an avenue to a career in adulthood. Hans Asperger noted, as far back as 1944, that "we can see in the autistic person, far more clearly than with any normal child, a predestination for a particular profession from earliest youth. A particular line of work often grows naturally out of his or her special abilities."²⁹ Jobs need to be tailored to both strengths and difficulties. As writer Lisa Jo Rudy points out, "It's a common trait among autistic people: they see the parts instead of the whole. It's a problem in some settings, but a terrific attribute if you're looking for . . . deep space anomalies (as an astronomer), unique cells (as a lab technician), differences among species (as a biological researcher), particular

qualities of objects (as a gemologist, antiques appraiser, or art historian).”³⁰ Temple Grandin gives some examples of *bad* job matches for people on the autistic spectrum, including those that involve multitasking, high levels of socializing, and sensory overload, such as cashier, airline ticket agent, waitress, and receptionist or telephone operator. A job as a taxi dispatcher would be a mismatch, because there are too many things to keep track of, yet working as a taxi driver might well be a match, especially if the detailed-oriented individual had a good mental map of where every street was located in the city. Other jobs well suited to the strengths, talents, and abilities of individuals on the autistic spectrum include:

- accountant
- artisan
- automobile mechanic
- industrial designer
- computer programmer
- veterinary assistant
- lab technician
- bank teller
- clerk
- statistician
- gardener or horticulturist
- forest ranger
- carpenter

Grandin suggests that working freelance can free up autistic individuals from too many social complexities and allow them to express their individual talents. She herself has benefited from freelancing in her own work designing livestock facilities: “I can go in, do the design job, and then get out before I get involved in a social situation where I could get into trouble. . . . Freelance jobs which can work well for people with autism are piano tuner, motor repair, and graphic arts. These jobs all make use of skills that many people with autism have, such as perfect pitch, mechanical ability, and artistic talent.”³¹

Another important element in niche construction for people on the autistic spectrum is the modulation of sensory input. Because of their high perceptual processing abilities, many autistic individuals are

acutely sensitive to sensory stimuli, such as noise, lights, touch, smells, and tastes. Part of creating a niche involves eliminating those stimuli that cause pain or discomfort and adding sensory input that is pleasing. As Amanda Baggs indicates, the autistic person can revel in sensory stimuli, as long as he is in control of what he experiences. When the child flaps his hands, flicks his fingers, rocks, or stares in fascination for hours at the turning of a fan, this is seen as “stimming” (giving self-stimulation). Too often, these attempts to modulate their own sensory input (and reduce stress) are regarded as negative behaviors to be eliminated. Instead, there are many cases where these behaviors should be regarded as starting points for expanding the inventory of creative sensory experiences and stress-reduction techniques. Temple Grandin reports her own sensitivities to auditory input (“My hearing is like having a sound amplifier set on maximum loudness”), and she also recoils at human touch. But she craves the feeling of being held and discovered a way of creating an optimal level of kinesthetic sensory input based on her interest in animal behavior. During a summer vacation when she was eighteen, she saw a herd of cattle being sent through a squeeze chute (a mechanism used to keep cattle still while a veterinarian gives them their shots). She observed how the device made the cattle calm down. “Watching those cattle calm down, I knew I needed a squeeze chute of my own. When I got back to school that fall, my high school teacher helped me build my own squeeze chute. . . . I bought my own air compressor, and I used plywood boards for the V. It worked beautifully. Whenever I put myself inside my squeeze machine, I felt calmer. I still use it today.”³² In fact, these “hug machines” are now being used by autistic individuals all across the country (see the “Resources” for ordering information). Like Grandin, blogger Joel Smith dislikes most forms of touch, including those that are light or gentle. Even someone brushing against him causes a great deal of unpleasantness that continues for some time. He writes, “But, I love heavy pressure! I look forward to crawling under loads of blankets before I get to bed. It gives me great joy and happiness to feel the comforting weight all over my body. I’ll lay under the weight, laughing and squealing with delight. I find that it relaxes me tremendously, too.”³³ Another blogger with Asperger’s syndrome, Rachel Cohen-Rottenberg, wears a noise-reduction headset to filter out disturbing noises, noting, “It’s a risk to go without ear protection, even for a minute. . . . I might hear a siren, or loud music, or people shouting, and

then my nervous system is like a wire that won't stop vibrating for several hours."³⁴

There is still a great deal about autism that we don't understand. Because of their strong interest in visual-spatial pursuits, we might regard autistic individuals as right-brained learners. On the other hand, it also seems as if the gifts and abilities of autism have a lot to do with *back-brain* functions. Noted neurosurgeon Karl Pribram has pointed out that posterior (back) areas of the brain have to do with the objective world (e.g., things), while the anterior (frontal) areas of the brain are concerned with the narrative world (e.g., self and other).³⁵ Since we've seen that autistic people show their greatest strengths relating to objects and their greatest weaknesses relating to self and others, it would seem that they are both "back-brained" and "right-brained." Many of their difficulties arise from having to perform in a "front-brained" and "left brained" world. If the world were different and social interaction were regarded as a "splinter skill" while facility with objects were regarded as the touchstone of intelligence, perhaps we wouldn't even have a disability category for autism. But even though we don't live in such a world, knowing about the strengths, talents, and abilities of autistic people builds a strong case for a new level of respect and understanding for those who function along the remoter regions of the sociability continuum.

CHAPTER 4

A Different Kind of Learner

It is commonplace to hear parents of dyslexics say that they knew that a particular child would be dyslexic because like his dyslexic siblings . . . even at the age of three . . . he was showing unusual skill in drawing, or doing mechanical puzzles, or building models.

—NORMAN GESCHWIND,
“WHY ORTON WAS RIGHT,”
Annals of Dyslexia

There’s an old story from the Mideast that I like to tell during my speaking engagements. A schoolteacher was on his way to a new teaching appointment in a faraway land. He was traveling on foot and was quite exhausted from his day’s journey, when all of sudden he came to a wide river that he had to cross in order to get to his destination. He looked around and saw that there was no bridge in sight, and so he found someone who lived nearby who had a boat who agreed to take him across the river for a small fee. The schoolteacher was quite a scholarly fellow and had two bundles of possessions with him. One was a tiny little bundle that held his personal effects, such as his toothbrush, his dental floss, and his PJs. And the other sack contained a huge bundle of books. When he got into the boat, he reached into the huge bundle and took out the thickest, heaviest book of them all and began to read it. They got about a third of the way across the river when the schoolteacher popped his head up from the book he was reading and saw that they still had quite a ways to go, and so he turned to the boatman and said, “My dear fellow, can you tell me when we might reach the other side?”

The boatman hadn’t said anything up to this point. He was definitely a nonverbal fellow with a gnarly face and piercing eyes, and he turned to the schoolteacher and said, “I ain’t got no idea.” This shocked the schoolteacher, and he looked at the boatman and said, “Have you never

studied grammar?” The boatman replied, “No!” The schoolteacher responded, “In that case, *half* your life has been wasted!” That didn’t make an impression on the boatman, and he went back to his job, which was to get that boat across the river. Well, they got about halfway across the river when a storm broke out unexpectedly. Rain started pouring into the boat, the wind started rocking the boat back and forth, and the water level at the bottom of the boat started to rise. Just when it seemed like things couldn’t get any worse, the boatman looked up at the schoolteacher and said, “Do you know how to swim?” The schoolteacher was hanging on to the end of the boat and cried out in terror, “No, I don’t know how to swim!” The boatman replied, “In that case your *whole* life is wasted, because we’re going down!”¹

I love this story because it puts things in perspective with regard to language and literacy. Sure, reading is important. There’s a high social value put on reading in our culture. If you’re at a cocktail party and you tell a group of people, “I really can’t balance my checkbook,” everyone will laugh understandingly. But if you say, “I can’t read,” there’s likely to be shocked silence. We expect *everyone* to read in our culture. But this story suggests that there are other ways of knowing. After all, we’ve been speaking (and navigating rivers) for tens of thousands of years as a species. But reading is only five thousand years old. In a sense, it’s amazing that anyone has learned to read, given the short amount of time humanity has had in mastering it. And, as this story suggests, there are more important things than reading and grammar. In this case, it required the skills of the boatman to get the schoolteacher across the river to safety (more about this later on in the chapter). Set against this backdrop, the bookishness of the schoolteacher and his fanatic concern with grammar seem almost ridiculous to us.

Probing the Dyslexic Brain

The fact of the matter is that there are a lot of people out there who, like the boatman, have significant difficulty with grammar, as well as with reading, writing, and spelling. Many of these people are diagnosed as having dyslexia (which in Latin literally means “trouble with words”). According to some estimates, dyslexia affects from 5 to 20 percent of all schoolchildren, and experts are quick to say that this

condition isn't something that one grows out of into adulthood. Dyslexia is considered to be a "learning disability" that can severely impair a student's performance in school. People with dyslexia have trouble with some combination of the following: reading, writing, spelling, handwriting, speaking, listening, and memory. It's not considered to be due to motivational or emotional issues. In other words, it's not the stress of a teacher or parent yelling at you in first grade to pronounce your vowels better that causes dyslexia. It's true, as well, that most people with dyslexia score at an average or above-average range on standardized intelligence tests. Also, contrary to popular opinion, and a lot of jokes on the subject, dyslexia does not usually involve reversing letters and words, although a small percentage of dyslexics do have significant problems analyzing words visually.

Recent research, however, suggests that for the most part, people diagnosed with dyslexia have difficulty processing the *sounds* of words compared with good readers. In experiments done at Yale Medical School, dyslexics have had their brains scanned while doing reading tasks.² This scanning process is called "functional magnetic resonance imaging" (fMRI) and involves placing the head in a huge circular contraption that looks a little like an iron lung, while the subject is asked to do a reading task such as telling whether two words (nonsense or real), like "lete" and "jete" or "bug" and "tag" rhyme. As the person does these tasks, the flow of blood through the brain is scanned in a noninvasive way using magnetism. Oxygenated hemoglobin in blood has magnetic properties (hemoglobin is what transports oxygen throughout the body). The magnetic properties of a hemoglobin molecule change depending on how much oxygen is bound to it. Blood that has more oxygen concentrations produces a stronger magnetic signal than blood with less oxygen. Oxygenated blood flows to areas of the brain where mental processing is taking place. Thus, by tracking the magnetic patterns indicating where blood flows in the brain, neuroscientists can tell us which areas of the brain "light up" when a person is doing specific cognitive tasks like reading.

It turns out that when the brains of dyslexic subjects are scanned during reading tasks using fMRI, two specific areas in the posterior (back) of the left hemisphere of the brain are *underactivated* (less blood flow) compared with nondyslexic readers. Yale neuroscientist and pediatrician Dr. Sally Shaywitz, a lead investigator in several of

these studies, describes these areas as the “word-analysis area” and the “word-form area.”³ The word-analysis area is located in the parieto-temporal region of the left hemisphere, just above and slightly behind the ear. This area, highly active in nondyslexic novice readers, analyzes a word, pulls it apart, and connects the visual letter (like *b*) with the sound (“buh”). It is also involved in combining word sounds into letters, such as “puh” “llll” “ay” to make “play.” Dyslexics have trouble differentiating these smallest units of language, called “phonemes.” “Puh,” “buh,” and “duh” may all sound alike and be easily confused with one another. Difficulty in combining these phonemes (there are forty-four in the English language) with each other to make words is also a major contributor to slowing down the reading speed and accuracy of most people diagnosed with dyslexia, and this correlates to less activity in this brain region.

The other posterior area of the brain, the word-form area, is located in the occipito-temporal area of the left hemisphere, also behind the ear, but lower down from the word-analysis area. This area processes whole words quickly. It is highly active in skilled readers, who perceive word forms rapidly—in fewer than 150 milliseconds. After a novice reader has decoded a word successfully several times in the word-analysis area, it becomes recognizable very quickly and is then stored in the word-form area of the brain. The dyslexic person, however, having difficulty recognizing words quickly, shows less brain activation in this area. But another area of the left hemisphere, toward the anterior (front) part of the brain, actually has *more* activation in dyslexics than in fluent readers. This is around Broca’s area, which is associated with the spoken language. It appears that dyslexics use this part of the brain a lot when analyzing words, but it’s a very cumbersome process tied up with vocalization or subvocalization of whole words, one word at a time.

Dyslexic readers also use areas of the *right* hemisphere in reading, which can be a slow process as well, since the right hemisphere recognizes whole word forms, visual configurations, emotional nuances, and other features not based on the essential sound-symbol relationships necessary for quick and accurate reading (although it’s also true that use of these areas can supplement and help with some reading tasks). Thus, there are clear differences in the ways in which the dyslexic and nondyslexic brain processes written words. There even appear to be anatomical differences. In fluent readers, the left

hemisphere of the brain is generally larger than the right. However, in dyslexic brains (based on the dissection of cadavers) the two hemispheres are more symmetrical, with the right hemisphere being more prominent among dyslexics than nondyslexics. This is an important fact, because the right hemisphere, while not so expert at reading fluently, happens to possess a range of strengths related to holistic perception, visual-spatial skills, out-of-the-box thinking, and other unconventional abilities.

In Their Right Mind

I noticed these differences while working with my poor readers in special education classes. They struggled with reading but showed clear abilities in a number of other areas. I had one dyslexic boy who held the national record in his age group for swimming the breaststroke. Another dyslexic student, a girl, was a model for a leading department store chain. Many others were artists or had mechanical abilities—picture-smart and machine-smart kids. These abilities are all associated with right hemispheric functions. Perhaps the boatman in our opening tale was such a right-brained learner. In a classroom he might have been a dunce, but in the middle of a storm-swollen river he was king of his situation. And conversely, the schoolteacher, gifted and in his element in a traditional school environment, was “swimming disabled” out there in the storm.

As the late Harvard neurologist Norman Geschwind said about the dyslexic student:

We happen to live in a society in which the child who has trouble learning to read is in difficulty. Yet we have all seen some dyslexic children who draw much better than controls . . . who have either superior visual-perception or visual-motor skills. My suspicion would be that in an illiterate society such a child would be in little difficulty and might in fact do better because of his superior visual-perception talents, while many of us who function well might do poorly in a society in which a quite different array of talents was needed to be successful.⁴

Geschwind (and his colleague Albert Galaburda) had a very interesting hypothesis to explain both the language difficulties of dyslexics and their visual-spatial abilities. They suggested that for some individuals, too much testosterone was secreted during prenatal development. This resulted in a slowing down of the left hemisphere. However, they suggested that in compensation, the right hemisphere grew larger than normal to make up for the loss (a great example of the rain-forest brain in action). In such situations, the person born would be more likely to have language difficulties (because of the less developed left hemisphere) and strong visual-spatial and mechanical abilities (because of the more developed right hemisphere).

Art is one area where people diagnosed as dyslexic often excel. Many of my own dyslexic students showed both proclivities and talent in this area, and I often provided them with opportunities to draw and work in both two and three dimensions. In many respects they were out-of-the box-thinkers who shared characteristics with well-known dyslexic artists. One of my favorite modern artists, the dyslexic Robert Rauschenberg, said about his school experience: “I was considered slow. While my classmates were reading their textbooks, I drew in the margins.” Many other famous artists have been viewed as dyslexic, including Leonardo da Vinci, Pablo Picasso, Ansel Adams, Auguste Rodin, and Andy Warhol. Dyslexia also runs rampant in art schools, with several studies showing a greater than average percentage of dyslexics among their populations. In one study at Central Saint Martin’s College of Art and Design in London, a whopping 75 percent of the 360 foundation-year students were assessed as having some form of dyslexia. The investigator, psychologist Beverly Steffart, wrote, “My research so far seems to show that there does seem to be a ‘trade-off’ between being able to see the world in this wonderfully vivid and three-dimensional way, and an inability to cope with the written word either through reading or writing.”⁵

Experimental research studies also support the view that people with dyslexia possess higher than average visual-spatial skills. In one study, children labeled learning disabled scored lower than a group of non-learning-disabled students on the verbal subtest of the Torrance Test of Creative Thinking but higher than the control group on the figural (visual-spatial) subtest.⁶ In a similar study where subjects were asked to create novel images from five basic geometric shapes and give alternative uses for a brick or a soda can, researchers concluded,

“Compared with non-dyslexics, dyslexic adults presented consistent evidence of greater creativity in tasks requiring novelty or insight, and more innovative ways of thinking.”⁷ More recently, Catya von Károlyi at the University of Wisconsin, Ellen Winner at Boston University, and their colleagues gave batteries of tests to dyslexic and nondyslexic populations assessing a wide range of visual-spatial skills. While the dyslexic groups generally scored more poorly or comparably on most of these tests (possibly due to their requiring non-visual-spatial abilities—like memory skills—which dyslexics often have difficulty with), there was one visual-spatial ability in which dyslexics consistently came out on top: the recognition of impossible three-dimensional figures. Subjects were shown pictures of three-dimensional shapes, some of which were clearly impossible objects. These were very much like the drawings of the Dutch graphic artist M. C. Escher, who drew pictures of buildings that contained optical illusions, showing stairs or columns that could not possibly be constructed by an architect. Dyslexic subjects were able to recognize these impossible objects more quickly with the same level of accuracy compared with nondyslexic individuals. The researchers wrote, “The compelling implication of this finding is that dyslexia should be characterized not only by deficit, but also by talent. Global visual-spatial processing (what we refer to as ‘holistic inspection’) may underlie important real-world activities such as mechanical skill, carpentry, invention, visual artistry, surgery, and interpreting x-rays or magnetic resonance images.”⁸

Dyslexics: The Vanguard of a New Era

Author and dyslexic Thomas G. West has suggested that the kinds of abilities that dyslexics possess are tailor-made to the new visual-spatial world of software design, imaging technologies, hypertext, and other recent innovations. Arguing along the same lines as futurist Marshall McLuhan, West says that the rise of print technology from the time of the Gutenberg printing press in the sixteenth century favored the highly literate “one-step-at-a-time” thinker. However, we’ve entered a new era in the past few decades, where we live in a “global village” and visual-spatial information is simultaneously available to everyone.⁹ West quotes computer programmer Scott Kim: “Before Gutenberg,

illustration and type were one and the same; they were inseparable. But afterward, the two disciplines became separate and diverged. Now that we've got the [graphic computer], I can see a medium where they come back together again. In [graphics software] there is no distinction between words and pictures.”¹⁰ In this new world of information processing, visual-spatial abilities combine with many other disciplines to create novel technological fields that favor three-dimensional thinkers.

A good example of how visual-spatial thinking enters the realm of science and technology comes from Bill Dreyer, a dyslexic inventor and biologist at Cal Tech who was involved in researching the genetic coding for protein structure, gene splicing, and monoclonal antibodies. As he described it, “I think in 3-D Technicolor pictures instead of words.” Dreyer believed that picture thinking was essential for him in developing groundbreaking theories about how antibodies are made and in inventing one of the first protein-sequencing machines, an invention that helped to launch the human genome revolution. “I was able to see the machine in my head and rotate valves and actually see the instrumentation,” he said. “I don't think of dyslexia as a deficiency. It's like having CAD [computer-aided design] in your brain.”¹¹ Another scientist, astrophysicist Larry Smarr, noted: “I have often argued in my public talks that the graduate education process that produces physicists is totally skewed to selecting those with analytic skills and rejecting those with visual or holistic skills. I have claimed that with the rise of scientific visualization as a new mode of scientific discovery, a new class of minds will arise as scientists. In my own life, my ‘guru’ in computational science was a dyslexic and he certainly saw the world in a different and much more effective manner than his colleagues.”¹²

Out-of-the-Box Entrepreneurs

It's not only artists and scientists who may benefit from recent changes in technology but also creative individuals from other fields who can see the big picture and not get lost in all the details. This includes entrepreneurs and others in business who are in a position to take advantage of new trends and developments in the economy. As it turns

out, dyslexics flourish in the world of business. According to a report by Julie Logan, a professor of entrepreneurship at Cass Business School in London, 35 percent of the 139 business owners from across the United States that she surveyed identified themselves as dyslexic. This compared with a dyslexia rate of 1 percent among corporate managers. Logan writes, “Dyslexics had a clear vision of how their business would grow and seemed to have exceptional ability to communicate this vision, allowing them to motivate those around them. They were good at delegation and this seemed linked to ability to grow their companies quickly. They also reported enhanced ability to apply creative solutions to overcome the various problems they encounter whilst running a successful business.”¹³ She speculates that their abilities may have arisen as a compensation for having to overcome obstacles in school and early development, but it seems clear that innate abilities played a role as well.

A look at some of the most famous examples of dyslexic entrepreneurs reveals the kind of qualities needed for making a business successful. Charles Schwab, the founder and CEO of one of the largest discount brokerage houses in the world, reflected on his own personal assets: “I was great at conceptualizing. I was naturally good in science and math. . . . Even though I couldn’t read quickly, I could imagine things much faster than some other people who were stuck thinking sequentially. That helped me in solving complex business problems. I could visualize how things would look at the end of the tunnel.”¹⁴ Billionaire businessman Richard Branson noted, “Perhaps my early problems with dyslexia made me more intuitive: when someone sends me a written proposal, rather than dwelling on detailed facts and figures, I find that my imagination grasps and expands on what I read.”¹⁵

Craig McCaw, a dyslexic pioneer in the cellular phone industry, did not believe others when they said that the idea of the cell phone was impractical: “To me it just seemed completely obvious that if you could find a way not to be tethered to a six-foot cord in a five-by-nine office, you’d take it. Maybe if your mind isn’t cluttered with too much information, some things are obvious.” John Chambers, dyslexic CEO of computer giant Cisco Systems, Inc., observes: “It’s very easy for me to jump conceptually from A to Z. I picture a chess game on a multiple-layer dimensional cycle and almost play it out in my mind. But it’s not a chess game. It’s business. I don’t make moves one at a

time. I can usually anticipate the potential outcome and where the Y's in the road will occur." Diane Swonk, former president of the National Association of Business Economists, uses her dyslexic-holistic brain to make economic forecasts: "You realize that the worst forecasting in the world takes a trajectory, a trend, and says that it will go on forever," says Swonk. "Sometimes the recent past is just a stage, not the trajectory of where we are heading. My learning difference allows me to say, 'Hey, when X happens, it doesn't mean that the next steps are going to be Y and Z.' The next step may be to go back to A."¹⁶

Rewiring the Brain for Words

You may be thinking at this point, "All these abilities sound great, but you still need to be able read in order to make your way in society." This is very true. As we observed at the beginning of the chapter, we expect everyone in our culture to read. So one answer to this question is simply to learn how to read better. As noted in [chapter 1](#), in order to survive in an ecosystem, organisms first need to adapt to the surrounding environment. Since this is a society where reading and writing are highly valued, then one can see clear merit in mastering the written code. There is encouraging news from neuroscience on this subject. In a series of studies completed over the past five years, researchers have shown that the areas of the brain that good readers use can be activated in dyslexics using an enriched environmental intervention based on phonological skills. In one study, dyslexic children and controls had their brains scanned using fMRI while engaged in reading tasks. The dyslexic children then engaged in an intensive program called Fast ForWord. This software program engages children in gamelike activities that require them to discriminate between fast-changing sounds, similar-sounding phonemes, and different consonant-vowel-consonant patterns like "cat" and "fan." The children spent one hundred minutes a day, five days a week, for eight weeks engaged in the program. At the end of the eight-week period, they had improved significantly in reading tasks, and their brains were scanned again and showed activation patterns much more like those of normally reading children. A more recent study suggests that these

results hold up, not just with single words but with reading sentences, a year after engaging in the reading program.¹⁷

There is hope for adult dyslexics as well. Researchers from Georgetown University Medical Center, in collaboration with the Wake Forest University School of Medicine, did a study comparing two groups of dyslexic adults, one that completed an eight-week intervention using a multisensory phonologically based remediation program administered by the Lindamood-Bell Learning Corporation and one group that received no intervention. Results showed that the group undergoing the intervention were reading more proficiently and also had similar changes in their brain scans, indicating that their patterns of activation looked more like those of normally reading adults. “People in this study showed us that it may never be too late for adults who want to improve their reading skills,” said Dr. Lynn Flowers from Wake Forest University, the senior author who has followed this group of dyslexics since the 1980s.¹⁸ There are a number of good reading remediation programs recommended by dyslexia expert Sally Shaywitz available for adult readers, including the Wilson Reading Program, Language! and Lexia Reading SOS.

Making the Most of Your Dyslexic Brain

One implication we can derive from the success stories of famous dyslexics related above is that it may make a lot of sense to enter a profession where visual-spatial or entrepreneurial abilities are required. As we observed in the first chapter, if you’re dyslexic it may not make sense to enter a career that puts a lot of emphasis on the printed word, especially if that’s not where your strength or your interest lies. On the other hand, it does bear pointing out that dyslexics have flourished in areas where both oral and written language are heavily used. There are famous writers who are or have been dyslexic, including novelist John Irving, screenwriter Stephen Cannell, mystery writer Agatha Christie, and poet W. B. Yeats. The successful trial lawyer David Boies is dyslexic. So was Woodrow Wilson, who was the president of Princeton University before he became president of the United States. Children’s author Sally Gardner observes, “ I had a head like a sieve and any information put into it would fall out, and I was told I could only do

jobs where I would not need reading and writing. I went into publishing thinking I could do illustrating because I liked drawing, but everyone said, ‘You’re a storyteller!’ I told them about my dyslexia, and they said, ‘We don’t see it as a problem.’ That, to me, was revolutionary. So I started writing children’s books 10 years ago. And, finally, I found what I really loved.”¹⁹ Someone with dyslexia can succeed in any career if they have the drive and really put their mind to it. But having said that, there are some careers that may especially favor those with a holistic-dyslexic frame of mind. These include:

- graphic artist
- entrepreneur
- sculptor
- filmmaker
- interior decorator
- animator
- engineer
- physicist
- fine artist
- computer software designer
- surveyor
- architect
- urban planner
- photographer
- surgeon
- inventor
- cartographer
- pilot
- television camera person
- fashion designer
- visual advertiser
- product designer

In addition to finding a career match, niche construction should involve searching for the right mentors to help you along your way. On one level, these role models can be inspirational examples of successful dyslexic individuals who have found their talents and developed them. Along with the writers, artists, and scientists listed above, famous dyslexics have come from a number of other fields as well, including

entertainment (Harry Belafonte, Tom Cruise, Cher, Whoopi Goldberg), athletics (Mohammed Ali, Bruce Jenner, Greg Louganis, Nolan Ryan), and politics and the military (Nelson Rockefeller, George Patton). Closer to home, a mentor can be a person in the life of the dyslexic who made a difference in recognizing and nurturing their neurodiversity. Researcher Sally Shaywitz observes, “In each instance [of successful dyslexics highlighted in her book *Overcoming Dyslexia*] there was someone—a parent, a teacher, a coach—who truly believed in him and who helped him to develop a passionate interest in an area in which he could find success. For writer John Irving, it was his wrestling coach; for playwright Wendy Wasserstein and novelist Stephen J. Cannell, it was a college professor who saw beyond the spelling errors and slow reading to recognize and to encourage true talent.”²⁰ Dyslexic biochemist Ronald Davis notes:

My high school biology teacher encouraged me to read more science books and take more science courses. He helped me with my experiments on plants and put me in contact with a biology professor at Eastern Illinois University. Later, when I was a Ph.D. student at Cal Tech, they told me I was gonna flunk out because I kept failing the foreign language tests. But Davidson, my thesis advisor, went to bat for me. He convinced the Graduate Committee to let me do a translation project instead of the language test because I was an unusual circumstance. He wrote me this note: Dear Ron: The Committee decided to accept your translation project for fulfillment of the foreign language requirement. It was the happiest note of my life.”²¹

Once you have found a suitable career, another part of niche construction entails putting together a human resource network that can help you get things done, especially in your areas of deficiency. Alan Meckler, CEO of information technology giant Jupitermedia, depends on his colleagues to help him through the maze of his own incoming information: “I can understand very simple bar graphs,” he notes, “[but] once the chart has multiple lines, I can’t follow it. . . . I’ll go to my chief financial officer and say ‘take me through this.’”²² Balancing his checkbook is also left to others. John Chambers, CEO of Cisco, has

his staff prepare three-page summaries of his reading material, with major points highlighted in yellow. He relies on his wife to help him navigate a phone book.

Many dyslexics have built their niches with the assistance of technology. A boon to dyslexics (as well as to the blind) is text-to-speech software, where a device scans printed text and then translates the material into a digital “voice” that “speaks” to the user. First developed by futurist inventor Ray Kurzweil and originally massive in size, this technology has now been adapted to cell phone use in the form of the kREADER Mobile (manufactured by K-NFB Reading Technology, Inc.), so that people can take the devices anywhere and use them to scan and have dictated to them books, magazines, restaurant menus, signs on walls, and other printed text in clear, synthetic speech. Dyslexics can also use this pocket-size reader to enlarge, read, track, and highlight printed materials using the phone’s large and easy-to-read display. In addition, there is a reading software program available called ReadIt (by Soliloquy) utilizing text-to-speech technology. Users read text on the screen and can get help with individual words or blocks of text by clicking on the highlighted material and having the computer read the material back. The software also keeps track of the user’s reading rate, provides definitions of words, and keeps track of words that are particularly difficult. Finally, there is computer software such as Dragon NaturallySpeaking (by Nuance) that takes a user’s speech and puts it on the screen as printed text. This helps dyslexics who have great oral skills but have trouble putting their ideas down on paper.

Finally, there are a number of tools, tricks of the trade, and strategies that dyslexics can use in constructing their niche. When taking on reading material, the best strategy is to start with books in your area of greatest interest. A survey of sixty successful male and female dyslexics revealed that interest-based reading was the key to their high literacy levels. The study reported, “Reading was extremely difficult and laborious for these men and women. So why did they read avidly? And, how did they do it? With few exceptions, literacy development was spurred by a strong desire to know more about a content area of passionate personal interest. Consequently, they read every book and magazine they could find in order to satisfy their curiosity about a particular topic.” Dyslexic interior designer H. Girard Ebert states, “I’ve always been attracted to books and anything that has to do with

history, decorative arts, architecture. . . . So I took reading, which was a problem, and turned it around, because it was the only way that I could explore what I was interested in.” Also, dyslexics often use *context* to help them with difficult reading materials. Sylvia Law, a dyslexic attorney, notes, “When you’re immersed in a field, you kind of know what the forest looks like, and you’re looking to see if there’s a particular tree in here. So it’s easy to just skim and zero in on the important stuff in the law. You know, the most important sentence in a 100 page document, where it says, ‘The court says. . . .’ So there are a lot of techniques and filtering devices that I use to get through lengthy legal documents.”²³

Because dyslexics have greater visual-spatial abilities than “normal,” using pictures and visualization can be a better way to take in and express information than words. One dyslexic woman, writing on the Web site Gift of Dyslexia, observed that she had failed in school only to return thirty years later and successfully complete her Ph.D. “Then my brain sucked it all up like a sponge, and I learnt to learn everything by pictures. I got honors in molecular biology by pictures, and I did a PhD in nanobiomechanics by pictures. The chemistry dept. employed many people to make computerized graphics of the molecule I could turn and twist in my minds eye all the time.”²⁴ At the Central Saint Martin’s College of Art and Design in London instruction is presented in the form of diagrams, and lecture notes and essay plans are laid out as visual patterns. Other strategies include using colored markers to highlight important themes in reading material and making up little songs or visual stories to memorize material. Also, when studying at a college or university, make sure to ask for accommodations, such as getting more time to take tests, receiving help with note taking, and tape recording or videotaping lectures.

Ultimately, being dyslexic means being oneself—a round peg in a square hole perhaps—but with a great deal to contribute to society. If it’s true, as we’ve noted, that dyslexics are the wave of the future, then it’s up to us, as advocates of neurodiversity, to help prepare the way. We need to alter our educational systems to provide more opportunities for children with dyslexia to learn through visual-spatial strategies, since it seems that we’re becoming a more picture-oriented and 3-D world. We need to provide more opportunities for accommodations in the workplace, so that people with dyslexia can use some of the exciting technologies described above to make their work more suited

to their needs and styles. We need, perhaps, to acknowledge that our literacy system itself, with its increasing emphasis on texting and alternative spellings, may actually be making it easier for the dyslexic person to communicate in today's fast-paced world. So, while it is important to provide the kind of adaptive methods described in this chapter to help dyslexic people learn how to read more effectively, it almost seems like the world and the dyslexic are coming closer together. Perhaps there will come a day when the dyslexic is no longer seen as a disabled person but is looked upon more as a different kind of information processor whose out-of-the-box brain is a decided asset to the world.

CHAPTER 5

The Gift of Mood

In my book The Noonday Demon, I wrote about how grappling with depression had given me strength and depth of character and said that while major depression is a horrifying illness that should be erased from human experience, the mood spectrum that includes extreme sadness is essential to our capacity for love. I would not be myself without those diversities.

—ANDREW SOLOMON,
New York Magazine

In the autumn of 1913 Swiss psychiatrist Carl Jung began a headlong journey into hell. Groomed to take over the psychoanalytic movement by founder Sigmund Freud, Jung found himself cut adrift from the psychoanalytic community when he and Freud ended up feuding on some significant theoretical issues. Not knowing where to go at that point in his career, according to one biographer, “he felt as if he had fallen into an immense hole.”¹ Having lost all pleasure in his work, and unable to concentrate on his professional reading, he resigned his position as a lecturer at the University of Zurich to keep others from finding out about his condition. In the fall of 1913 he had a vision while traveling on a train of a sea of blood descending over northern Europe. This and other intense visions and dreams left him fearing that he was being threatened by a psychosis. Around this time he had a dream that reminded him of how he had played with building blocks as a ten or eleven year old. Taking a cue from this image, the thirty-eight-year-old Jung began to play again like a child on the shores of Lake Zurich, making miniature communities out of stones and wood found along the banks. He thought to himself, “There is still life in these things. The small boy is still around, and possesses a creative life which I lack.” Jung began to write about and draw images of the dreams and visions that came out of that creative play. The psychic

material that emerged from this work formed the basis of his theory of the collective unconscious and other core features of his work over the next forty years. In his eighties, looking back over this time, he wrote, “The years when I was pursuing my inner images were the most important in my life—in them everything essential was decided. It all began then; the later details are only supplements and clarifications of the material that burst forth from the unconscious, and at first swamped me. It was the *prima materia* for a lifetime’s work.”²

Had Jung undergone his psychic turmoil in today’s world, it is likely that he would have been diagnosed with depression, possibly with psychotic features, given an antidepressant such as Prozac, Zoloft, or Paxil, and perhaps provided with a few sessions of cognitive-behavioral therapy where he would have been taught to recognize and correct his negative thinking patterns. Lacking these tools, Jung had to choose another path and decided to descend into his depression and see what turned up. That he ended up finding himself in the process suggests that our current clinical views of mood disorders may be shortsighted and may fail to take into consideration the fact that for some people, low or high mood may represent a gift from the psyche that signals the release of creative powers, a transformation in consciousness, or a significant change in one’s outlook on life. To be sure, major depressive disorder or severe bipolar disorder is nothing to be wished for, and deserves to be, as Andrew Solomon points out in the epigraph to this chapter, eradicated from the human experience. And medications such as Prozac, Zoloft, and Lithium still remain essential tools in the fight against major depression and bipolar disorder. Still, there is the possibility that in some mood disorders, there may be a silver lining that represents a “hidden strength” that can come to the aid of the personality and fortify it on its journey toward wholeness.

Anatomy of Mood Disorders

Like other features of the self, including sociability, literacy, and attention, mood exists along a continuum of competency that runs from major psychotic depression on one side of the spectrum to extreme psychotic mania on the other. In between these two poles exists a gradation of milder disorders, temperaments, and conditions that give a

distinctive torque to the range of human emotions. Chronic depression, or dysthymia, has its counterpart on the other side of the spectrum in milder forms of mania (hypomania). Closer to the center we find melancholic temperament and normal forms of sadness balanced by a stormier temperament and healthy exuberance on the manic side. Those with severe bipolar disorder move idiosyncratically between the extreme poles, while those with cyclothymia experience less severe mood swings, moving from “jest and youthful jollity, quips and cranks, and wanton wiles” to “a sad leaden downward cast,” as John Milton characterized these two contrasting moods in his complementary poems *L’Allegro* and *Il Penseroso*. Sometimes the cycles of depression and mania are brought on by external events (trauma, the winter season, pregnancy), while at other times they occur without obvious causes (as for example, in so-called endogenous depression).

The biology of depression and bipolar disorder is complex and still largely to be explored. However, it appears that a major cause of mood disorders results from a dysregulation of the limbic system, or “emotional brain” (consisting of, among other structures, the amygdala, the thalamus, the hippocampus, and the hypothalamus), with the frontal lobes of the neocortex, or “thinking brain.” Normally, the frontal lobes serve to modulate the emotions in the limbic system. But because of a disturbance in the flow of neurotransmitters between these two major systems (and areas in the back of the brain as well), the neocortex is not able to modulate the ups and downs of the limbic system and engages in dysfunctional thinking processes of its own (including recrimination, guilt, and negative rumination). Scientists have determined from the positive effects of certain psychoactive drugs on mood that three specific neurotransmitters in particular, serotonin, dopamine, and norepinephrine, are involved in mood disorders such as depression. The antidepressant Prozac along with similar drugs like Zoloft, Paxil, and Luvox, work by inhibiting the reuptake of serotonin, thus facilitating the transfer of this important mood stabilizer between brain cells or neurons. They are called “selective serotonin reuptake inhibitors” (SSRIs). To use a “brain forest” analogy, imagine that there are two bodies of land (pre- and postsynaptic neurons) with a narrow gap of water between them (the synaptic cleft). Imagine that a wave of serotonin momentarily floods from the presynaptic neuron into the gap, and then rolls back to its point of origin (its reuptake). While it is in that gap, it delivers serotonin to the postsynaptic neuron. Prozac

functions by keeping the serotonin in the gap for a longer period of time (by inhibiting its reuptake), so that more serotonin can be delivered to the postsynaptic neuron, and from there to regions throughout the brain. Likewise, Lithium, used to treat bipolar disorder, also has an impact in the way that neurotransmitters are passed along from one neuron to the next.

Another cause of mood disorders can be found in abnormalities in the way that the endocrine system processes stress. Under normal stress conditions the hypothalamus secretes corticotropin-releasing hormone (CRH), which stimulates the pituitary gland to secrete adrenocorticotrophic hormone. ACTH in turn stimulates the adrenal glands to produce the stress hormone cortisol. Cortisol activates the “flight or fight” response to provide the energy needed to cope with a legitimate threat, like escaping from a tiger or fighting an intruder. It then signals the hypothalamus and pituitary glands to stop the secretion of CRH and ACTH. In depression, however, there is no tiger or intruder, and this feedback loop is disturbed for some reason, allowing levels of cortisol to build up in the blood and giving rise to some of the chronic stress symptoms that characterize depression.

In the Eye of the Beholder

Major depressive disorder (symptoms of low mood, negativity, insomnia, and other indicators for at least two weeks) occurs in 13 percent of Americans over the course of their lifetime, while bipolar disorder is far less common, with a lifetime incidence of only 2 or 3 percent. The large percentage of individuals in the United States experiencing depression has given rise to questions about the validity of the diagnosis. As it turns out, different cultures have fundamentally different ways of viewing symptoms of depression. Anthropologist Ruth Benedict was one of the first thinkers to point out the cultural relativity of so-called abnormal behavior. She writes, “Most of those organizations of personality that seem to us most incontrovertibly abnormal have been used by different civilizations in the very foundations of their institutional life.” She argues that what might be considered depression or paranoia in one culture may be a perfectly normal part of another culture. Among the Coast Salish group of

Native Americans in British Columbia, Washington, and Oregon, according to anthropologist Terry O’Neill, 75 percent of the community identified themselves as being depressed. However, they had integrated the experience of depression into their own self-identity as a people. Writing about the Salish, anthropologist Roy Richard Grinker notes, “The way to deal with the depression, the Salish believe, is by transforming one’s sadness into compassion for others. It doesn’t get rid of the depression, but it does make the depressed individuals more useful members of their families and communities. The Salish think that depressed people—that is, the most ‘real Indians’—are the best guides and teachers for their community.”³ Similarly, anthropologist Gananath Obeyesekere suggests that the Buddhists of Sri Lanka see symptoms of hopelessness, meaninglessness, and sorrow as part of a recognized philosophy of life, not as a disorder.⁴ We might also think of the keeners of Ireland, whose labile emotional life served as an asset in mourning for the dead, and of the berserkers of Scandinavia, whose fierce manic behaviors were regarded as positive signs of a true warrior.

Even in our own culture, there is room for interpretation about the meaning of mood disorder symptoms. Social scientists Allan V. Horwitz and Jerome C. Wakefield, for example, have suggested that many depressed individuals are simply experiencing normal sadness as a result of specific losses or traumas in their lives (e.g., death of a spouse, losing one’s job). They claim that the *Diagnostic and Statistical Manual* of the American Psychiatric Association fails to distinguish between those who become depressed as a result of a specific cause and those who become depressed “without cause.” Horwitz and Wakefield point out that for the past twenty-five hundred years, depression, or melancholia, has been recognized by various historical and cultural traditions as consisting of two kinds, “with cause” and “without cause,” and that this distinction was lost with the 1980 publication of the *DSM-III*, which based its diagnosis only on symptoms and not on underlying causes. They write, “Sadness is an inherent part of the human condition, not a mental disorder. Thus to confront psychiatry’s invalid definition of depressive disorder is also to consider a painful but important part of our humanity that we have tended to shunt aside in the modern medicalization of human problems.”⁵

Productive and Nonproductive Depression

Another important distinction that isn't made in the current psychiatric diagnosis of depression is between what psychoanalyst Emmy Gut calls "productive" and "nonproductive" depression. She points out:

We have in our reservoir of mental health concepts no model of normal depression that shows which circumstances can be expected to cause an adequately functioning human being of any age to get depressed . . . nor one which shows the function which this emotional response and its symptoms may serve. But as long as we do not have a model of what would happen if depression were running a healthy course—productive of insight, growth, and reorientation—it is a confusing task, indeed, to sort out potentially productive from unproductive aspects of the responses we observe in a seriously upset person seeking help for depression.

Gut regards a "productive depression" as occurring "when there is evidence . . . that some useful learning or maturation has occurred, some behavior has been reorganized, some plan revised, so that following the depressed episode we function more effectively in the attainment of some goal, or become more realistic in setting our goal." She speaks of "unproductive depression" as when "no maturation occurs, development is arrested, personality or health deteriorates; and perhaps death is the final outcome."⁶

We've already seen an example of how a productive depression might function in the case of Carl Jung's midlife crisis. Another instance can be seen in the life of Ludwig von Beethoven. In 1796 Beethoven had begun to experience hearing loss, and over the next six years would go from doctor to doctor, seeking a cure. By 1802, however, his hearing had only become worse, and he despaired of ever recovering. In addition, around this time, he had fallen in love with one of his piano students, Giullietta Guicciardi, but was prevented from marrying her because of her father's objections to his common background. Beethoven entered a depressive period of isolation that he documents in his posthumously published *Heiligenstadt Testament*. In

what was essentially a will, Beethoven wrote of how he was driven to the point of killing himself because of his hearing loss. Yet, he continued, “Thanks to [virtue] and to my art, I did not end my life by suicide.” Following the writing of the *Heiligenstadt Testament*, Beethoven entered into one of the most creative periods of his life, writing, among other works, his groundbreaking Symphony no. 3, the *Eroica*. The suffering that Beethoven went through during that time was nothing that anyone would willingly choose to go through. Yet, looking back at the whole process of his depression and recovery, one can see that there were underlying processes of transformation taking place and that the depression or withdrawal served as a functional means for him to work out the inner conflicts that ultimately led to his resolution to continue developing his creative self. As he wrote, “It seemed impossible to me to leave the world until I had brought forth all that I felt was within me.”⁷

Old Man Saturn

Thomas Moore, the author of the best-selling book *Care of the Soul*, has an entire chapter in the book called “The Gift of Depression” where he writes, “The soul presents itself in a variety of colors, including all the shades of gray, blue, and black. To care for the soul, we must observe the full range of all its colorings, and resist the temptation to approve only of white, red, and orange—the brilliant colors. . . . Melancholy gives the soul an opportunity to express a side of its nature that is as valid as any other, but is hidden out of our distaste for its darkness and bitterness.”⁸ Moore points out that in medieval times, to be depressed was considered to be “in Saturn” and a person with a melancholic constitution was known as a “child of Saturn.” During the Middle Ages systems such as alchemy and astrology were as much portraits of personality and maps of spiritual transformation as they were early attempts at scientific research. Saturn in astrology was known as the “old man,” the planet of time and experience.

To feel Saturn’s influence was to go through a certain heaviness, a sense of *gravitas*—one of the principal symptoms of depression—that deepens the personality and gives it the wisdom of old age. Moore states, “One advantage of using the traditional image of Saturn, in

place of the clinical term depression, is that we might see melancholy more as a valid way of being rather than as a problem that needs to be eradicated.” He points out that certain gardens during the Renaissance had a bower—or dark, shaded, sheltered area—dedicated to Saturn, where a person could retire and enter into the darkness of Saturn’s gifts without being disturbed. Caroline Bertorelli, an artist, seems to touch upon this reflective dimension of depression when she writes:

I get depressed quite regularly and often. It used to distress and frustrate me that I have such a tendency. But as I grow older, I see my depression as a valuable time for introspection and deep thinking about life. When I am not depressed, I can be fairly active in terms of work and getting things done, as well as being physically active cleaning the house or whatever. But being depressed gives me time out to be an observer of things that are happening around me and to me. I now just accept it as part of my personality. Sometimes I’m up and sometimes I’m down. When I’m up, that’s my time for getting things done, solving problems, and being productive. When I’m down, that’s my time for taking things more slowly and thinking—and in a way I’m grateful for that.⁹

There is in this quality of Saturn as an old man a strong element of *realism*—of an individual who has seen events come and seen them go and is not fooled by the illusions woven by societal customs and habits. Research actually supports the idea that people who are depressed see the world more realistically than those who are not depressed. Psychologists have recruited groups of mildly depressed and nondepressed individuals and sat them in front of a lightbulb and a button. When the subject pressed the button, the lightbulb either came on or did not. In truth, the button didn’t control the lightbulb at all, but individuals in the nondepressed group were more likely to think they were in charge of events and had control over the lighting of the bulb, while those in the depressed group were more realistic in their evaluation of events.¹⁰

Depressed people, although sadder, appear to be wiser than nondepressed individuals. Perhaps the epidemic of depression in our culture has more to do with a realistic appraisal of world events and a

refusal to sugarcoat life than with an abnormal propensity toward gloominess. As Jungian psychologist James Hillman points out, “Sometimes I think there’s an underlying depression in our culture. . . . *It makes me think that if you’re not depressed, you’re abnormal* because the soul knows about the trees that are destroyed, the buildings that are destroyed, the ugliness that is spreading, the chaos of the culture in many ways . . . and somehow if you’re not in mourning for what’s going on in the world, you’re cut off from the soul of the world. So in that sense I would think an underlying depression is a kind of adaptation to the reality of the world.”¹¹ This should not be construed as an endorsement of clinical depression as a preferred method for coming to grips with the problems of the contemporary world. After all, times have been hard throughout history and prehistory, and clinical depression is a serious illness. However, Hillman is suggesting here that the conditions of today’s world should evoke perhaps a sense of mournful empathy and that depression in our times cannot be untangled from the atrocities that occur in the name of civilization.

The Downside of Happiness

In that sense, depression may violate a key social value in our culture that raises the emotion of “happiness” to the highest point in our pantheon of emotions. As a culture we’re fixated on happiness: the happy face, the happy meal, the how-to-be-happy self-help books. A poll conducted by the Pew Research Center indicated that 85 percent of Americans believe they are happy or very happy. Eric G. Wilson, professor of English at Wake Forest University, writes in his book *Against Happiness*, “We wonder if the wide array of antidepressants will one day make sweet sorrow a thing of the past. We wonder if soon enough every single American will be happy. . . . What are we to make of this American obsession with happiness that could well lead to a sudden extinction of the creative impulse? . . . Aren’t we . . . troubled by our culture’s overemphasis on happiness? Don’t we fear that this rabid focus . . . leads to half-lives, to bland existences, to waste-lands of mechanistic behavior?” Similarly, Emmy Gut states, “In a competitive industrial, technocratic, and combative society as ours, it is an unacceptable thought that the depressed affect causing us to slow

down and withdraw into ourselves could be useful and necessary to our personal development and to our adaptation to change. In business and industry, in military service, and in public education, where human activity is conducted in keeping with rigid time schedules, only physical disability is—grudgingly—tolerated as an excuse for deserting one’s desk, one’s machine, or one’s platoon during working hours.”¹²

The experience of depression, then, could represent a certain kind of *revolt* against core American values, a protest against a busy society, where the individual is bargaining for some time off to look at life and its complex problems and find a way to cope with it all. There is research from the field of evolutionary psychology indicating that this may be why depression evolved in the first place. Evolutionary psychologists suggest that depression may have initially developed as a way of dealing with extraordinary levels of goal frustration: an inability to hunt, difficulty in obtaining the mate of one’s choice, insufficient help with child care, or other prehistoric tasks. Depression served, first, to put the brakes on so that some time could be given to searching out possible solutions (this may be the function of rumination in depression). In some cases, unrealistic goals needed to be abandoned. In other cases, a change in niche was required (a hunter needed to become a gatherer or vice versa). Second, it served as a way of extorting help from one’s contemporaries.¹³ The depressed person was essentially saying, “If I refuse to hunt, or care for my child, or withdraw my labor from the labor pool—if I go on strike—maybe you’ll see how valuable I am as a resource to the tribe and you’ll give me some support.”

On the other hand, the manic pole of mood disorders may have evolved as a way of increasing one’s energy to a peak level so that one could engage in sexual or aggressive activities that ultimately would have advanced one’s genetic cause and lead to the passing of one’s genes on to future generations. As psychiatrist Jim Phelps points out, “Several mood experts have speculated that mania might be ‘too much of a good thing,’ where the good thing is the confidence, the drive, the ability to motivate oneself and get things done, the decrease in need for sleep, and even the increased sexual activity, of the top-of-the-heap animals in a social hierarchy.”¹⁴

It may be that these deeper evolutionary reasons behind depression and bipolar disorder help explain the link between mood disorders and creativity. Eons of introverted melancholic problem solving, on the one

hand, and intense levels of peak energy, on the other, may have laid the groundwork for creative pathways in modern times. As far back as Greek antiquity, Aristotle commented on this link: “Why is it that all men who have become outstanding in philosophy, statesmanship, poetry or the arts are melancholic, and some to such an extent that they are infected by the diseases arising from black bile? . . . They are all, as has been said, naturally of this character.”¹⁵ Psychologist Arnold Ludwig surveyed one thousand eminent individuals of the twentieth century and discovered that 77 percent of poets, 54 percent of fiction writers, 50 percent of visual artists, and 46 percent of composers had undergone at least one significant depressive episode in their lives. This compared with only 16 percent for sports figures, 5 percent for military leaders, and 0 percent for explorers.¹⁶ Psychiatrist Nancy Andreasen interviewed thirty writers from the prestigious Iowa Writer’s Workshop, discovering that 80 percent had experienced at least one episode of an affective disorder (e.g., major depression or bipolar disorder), compared with 30 percent for a control group. Two-thirds of the writers had received psychiatric treatment for their disorder.¹⁷

Studies at Stanford University have revealed important links between creativity and bipolar disorder. In one study, it was revealed that healthy artists and individuals with manic depression scored higher on creativity tests than did people in the general population.¹⁸ In another study, children with bipolar disorder and children of bipolar parents scored higher on creativity tests than healthy control children.¹⁹ Psychiatrist Kay Redfield Jamison, author of the seminal book *Touched with Fire: Manic-Depressive Illness and the Artistic Temperament* (and herself a bipolar individual), records in detail the links between bipolar symptoms and creative expression among writers and artists through the centuries, stating, “Who would not want an illness that has among its symptoms elevated and expansive mood, inflated self-esteem, abundance of energy, less need for sleep, intensified sexuality, and . . . ‘sharpened and unusually creative thinking’ and ‘increased productivity’?”²⁰

Mood Disorders and Niche Construction

The fact remains, however, that depression and bipolar disorder remain devastating conditions for millions of children and adults across the country. Strictly speaking, adaptive approaches to relieving mood disorders—including antidepressants and cognitive-behavioral therapy—are vitally important in helping people with mood disorders live normal or close-to-normal lives. I don't know where I'd be without my antidepressants. I'd be spending my days wondering whether I could get any sleep at night or calling people on the phone to get reassurance that I wasn't deteriorating into total insanity. In all of the jokes about Prozac that abound in our culture, there is little compassion or understanding for those whose lives are made better by it and related drugs. Among the many benefits of Prozac (and other SSRIs) is a recent clinical observation that they increase the proliferation of glial cells (cells that support the neurons of the brain) in limbic system structures such as the hippocampus, an effect that could reverse the loss of glial cells in depressed patients.²¹ Still, drugs and cognitive-behavioral therapy are not the whole story. In addition, it is necessary for depressed people to utilize niche-construction strategies that tailor the outer environment to their uniquely different brains.

I was always ashamed as an adolescent and young adult that my pediatrician father quit work because of his depression and remained unemployed for seventeen years. But now that I'm older, I can see that he was trying to create a niche for himself. Back when the word wasn't in vogue, my father would explain his nonemployment to others as due to "stress." He'd done his medical training in the 1940s at McGill University, where Hans Selye first developed the concept and later wrote about it in his book *The Stress of Life*. My dad's response to major depression was to eliminate stressors—in particular the highly stressful job of being a pediatrician in a close-knit, "clubby" clinic partnership. Sitting at home reading magazines and watching television, or listening to classical music, was not an ideal niche, to be sure—but it was a niche nevertheless—that made it so that he never experienced another major depressive episode in his life and eventually was able to return to work in his fifties and take a position in a less stressful medical position until his retirement in his late seventies. In looking back on my own adulthood, I see how I've structured my daily life in such a way as to create an environment that reduces stress as much as possible. For most of my adult life I've worked at home, setting my own schedule (getting up in the late morning and working

until the early evening) and basically working for myself. This way I've avoided the tension that can come from office politics, authority issues with bosses, and the stress of having to fit into someone else's timetable. I still have book deadlines and speaking engagements, but they're few and far between, and I have a good-enough sense of self-discipline to carry through on them from one day to the next. I also have flexibility during the day to engage in additional stress-reducing activities such as yoga, meditation, and exercise.

There are a wide range of other strategies for combating depression through positive niche construction, including eating a healthy diet (whole grains, fruits and vegetables, and foods high in omega-3 oils like salmon and sardines), engaging in simple activities that you enjoy, such as a walk in nature, or time spent with pets, volunteering to help people less fortunate than yourself, keeping a journal of your thoughts, getting enough sleep, and joining a support group for depression.²² One can also study the lives of eminent people with mood disorders to see what kind of components went into their own niche construction. Abraham Lincoln, for example, who suffered from chronic depression, used sad songs and poems as vehicles for lamenting his grief. He was often heard reciting these refrains and verses for hours at a time. John Stuart Mill said that it was reading the romantic poetry of William Wordsworth that pulled him out of his depression in his early twenties. Winston Churchill, who spoke of his lifelong depression as a "black dog," built brick walls and painted pictures. Tennessee Williams swam every day to relieve his depression. In many cases, it was the *creative work* of depressed and bipolar individuals that provided real relief from the most grueling symptoms of mood disorder. Robert Lowell, who had bipolar disorder, poured his grief and mourning into his poetry. Artist Edvard Munch channeled his melancholy into his masterwork "The Scream." Closer to the present day, comedian Bob Saget noted: "If a really good comedian isn't depressed, something's wrong." Jim Carrey, for example, in an interview on the television program *60 Minutes*, revealed that the inspiration behind his funnyman antics was "desperation." It may be, in fact, that individuals with a tendency toward mood disorders should think of creative livelihoods (and also careers involving helping others with their emotions) when planning their careers. Such a list might include the following:

- writer

- entertainer
- clinical psychologist
- counseling psychologist
- marriage, child, and family counselor
- theologian
- philosopher
- chaplain
- journalist
- musician
- dancer
- sculptor
- painter
- life coach

Of course, one also needs the talent and aptitude for engaging in any one of these professions. However, it certainly bears remarking that high-stress jobs, such as a firefighter, CEO, or air traffic controller, may not be the best match for a person with a tendency toward depressive or manic behavior. In addition, it seems that the humanities rather than the sciences are a more hospitable ecosystem for sensitive minds and hearts. Ludwig's study indicated that while more than 50 percent of writers and artists experienced depression, this figure was far lower—28 percent—for scientists.

Another critical ingredient in niche construction for mood disorders is creating and strengthening positive relationships with family, friends, and professionals. Research in developmental psychology suggests that if an infant does not have a positive emotional attachment to his mother during the first two years of life, there is an increased risk of depression later on in life.²³ It is estimated that 2.5 percent of children suffer from depression. A secure relationship provides a kind of buffer or emotional vaccination against stressful events in later life. Similarly, children who have experienced trauma in early childhood have a better chance of overcoming this challenge—of being resilient—if they have a supportive relationship with at least one healthy family member or friend of the family in later childhood.²⁴ Once depression occurs in adulthood, then it is often the relationship with a mental health professional, such as a psychotherapist, that proves to be most helpful. A therapist can help pinpoint frustrated goals, assist the depressed person in problem solving, and often suggest a more suitable niche

within which to develop. Psychiatrist J. Anderson Thompson Jr., for example, was working with an eighteen-year-old girl whom he described as “intensely depressed, feeling suicidal and doing self-cutting.” He discovered that the patient’s parents had been pressuring the girl to attend college and major in science, whereas her own interests inclined toward the arts. In the course of the therapy, Dr. Anderson helped the girl become more assertive about her goals, which led to her transferring to another school and changing majors. As a result, her depression lifted.

Regardless of the specific goals involved, what seems most important in positive niche construction for mood disorders is the building of a context of *meaning*, regardless of content. We live in such fragmentary times that depression and mania seem, in many ways, to be a response to the loss of coherence in our culture. As Andrew Solomon, author of *The Noonday Demon: An Atlas of Depression*, puts it, “The climbing rates of depression are without question the consequence of modernity. The pace of life, the technological chaos of it, the alienation of people from one another, the breakdown of traditional family structures, the loneliness that is endemic, the failure of systems of belief (religious, moral, political, social . . .) have been catastrophic.” Anything that can give direction and purpose to life serves ultimately to advance an individual toward well-being. And ironically, it is the experience of depression itself, the experience of having endured the suffering and undergone the initiation, that can sometimes supply that sense of deeper meaning. As one participant in Solomon’s study noted, “Having so much low mood gives you mettle; I think I deal with difficult losses better than most other people because I have so much experience of the feelings they entail. Depression isn’t an obstacle in my path; it’s a sort of part of me that I carry along down the path, and I believe that it’s supposed to help me at various points. How? That I don’t know. But I believe in my depression, in its redemptive power, nonetheless. I’m a very strong woman, and that’s partly because of the depression.”²⁵ Commenting on her bipolar disorder, writer Marya Hornbacher notes, “My brain sometimes departs from the agreed-upon reality, and my private reality is a very lonely place. But in the end, I’m not sure I wish I’d never gone there. I find value in having been to the places I’ve been. While there are days when I wish to God I could trade brains with someone else, just for a minute, just long enough to get some peace, I wouldn’t exchange the life of my

mind for the life of another. . . . Whatever else it is, whatever it brings
—it's mine.”²⁶

CHAPTER 6

The Advantages of Anxiety

Anxiety is the handmaiden of creativity.

—T. S. ELIOT

When it comes to good niche construction, neurodiverse individuals can be quite creative. We've already seen in this book how a touch-averse Temple Grandin created a "squeeze machine" to provide her with the feeling of bodily contact and how a nonspeaking Amanda Baggs equipped her apartment with a state-of-the-art video-recording studio as a means of communication. Another great example of neurodiverse niche construction comes from former Oakland Raiders coach and television football color commentator John Madden. Despite a career that required him to be at a different location around the country every week from September to January, Madden did not fly; he took a bus. In 1979 he experienced what he called a "full-blown panic attack" while aboard an airplane. "It wasn't about flying, bad turbulence or anything. The flight attendant closed the door and before we'd even moved I knew I had to get off the plane, but I gutted it out. You think you're going to die. I was sweating, shaking, the whole thing. It was about being encased and not being able to get out."¹

Madden has never flown since. Instead, during his thirty years as a television commentator he used a luxury Greyhound-size bus—dubbed the "Madden Cruiser"—that covered approximately eighty thousand miles a year. It had five flat-screen plasma TVs; a bedroom with a queen-size air mattress; a high-tech office with a phone, a fax machine, taping equipment, and a laptop computer; two bathrooms, one that included an extralarge steam shower; a kitchen with a double oven, electric stove, and full-size fridge; a dining room area; and a living room space with leather recliners and sofa. Powering it all was a generator capable of running a five thousand-square-foot house. Madden says that this bus fulfilled a childhood fantasy for him, when

he read John Steinbeck's memoir *Travels with Charley*, about Steinbeck's adventures in a motor home with his dog traveling around the country in the 1950s. "People pay money to see scenes like this," he commented once in an interview. "You only get to see America driving through places like Nebraska for eight hours."

John Madden is one of more than forty million Americans who have an anxiety disorder. Over the years, he has done much to publicize the experience of panic and anxiety. Madden's own description of his experience aboard the airliner would probably qualify him as having either a panic disorder or a specific phobia (e.g. aerophobia, the fear of flying, or claustrophobia). There are several other categories of anxiety disorders (to be discussed later in this chapter), including generalized anxiety disorder, post-traumatic stress disorder (PTSD), social anxiety disorder, and obsessive-compulsive disorder (OCD). Anxiety disorders cost the American public around forty-five billion dollars a year in direct and indirect health-care costs (representing one-third of the entire health-care bill). They seem to affect slightly more women than men, with a female-to-male ratio of 3:2. Most anxiety disorders begin in childhood, adolescence, and early adulthood, although they can also have late onset among elders, especially those suffering from other medical problems. The words "anxiety" and "fear," sometimes used interchangeably, can be differentiated from each other to the extent that anxiety represents a vague sense of worry toward an unknown object, while fear is a strong emotion directed at a specific known entity. At the same time, specific phobias (e.g., fear of snakes) and the terror felt by someone with post-traumatic stress disorder, for example, seem to indicate that fear and anxiety are closely related to each other.

The Biology of Anxiety

Many of the neurological links to anxiety point to the amygdala, a small almond-shaped structure (*amygdala* is Greek for "almond") located deep within the temporal lobes of the brain. The amygdala is constantly on the alert for changes in the environment that might signal danger. It receives input from many different sources. It has, for example, a direct connection from the olfactory lobe and a connection via the thalamus from the other senses. This means we can smell

something from the outer environment, or hear, see, touch, or taste it, and our amygdala can signal the presence of danger before we're even aware that we've experienced it through our higher brain centers. Once our amygdala rings the danger alarm, it activates the hypothalamus-pituitary-adrenal (HPA) axis that initiates the flight-or-fight response. Our heart starts beating faster, we breathe harder, and we tense our body to meet the threat. This circuitry obviously evolved to help us survive very real dangers out there in the wild. If a tiger threatened, you didn't want to spend too much time thinking with your prefrontal cortex about what it might be. That would take valuable time, which could make the difference between eating lunch and being lunch. At the same time, the amygdala also has secondary inputs from the prefrontal cortex and other higher brain structures. This means that after the initial threat has been processed, we can think rationally about whether a threat actually exists, and if not to signal the amygdala to shut its alarm off.

This system breaks down in people with anxiety disorders. Either the fear threshold of their amygdala is set too low, or their higher brain centers feed the wrong information to it, informing it that there is danger when in fact there is none. Scientists at Columbia University School of Medicine have demonstrated through fMRI brain scans that when anxious subjects were shown split-second images of fearful faces (viewed too quickly to be consciously assimilated), their amygdalas lit up to a greater extent than those with less anxious temperament. "Psychologists have suggested that people with anxiety disorders are very sensitive to subliminal threats and are picking up stimuli the rest of us do not perceive," says Dr. Joy Hirsch, professor of neuroradiology and psychology and director of the fMRI Research Center at Columbia University Medical Center, where the study was conducted. "Our findings now demonstrate a biological basis for that unconscious emotional vigilance."²

Part of the reason for this vigilance may be genetic. In a similar study at the National Institute of Mental Health, subjects who inherited one or two copies of the short variant of the human serotonin transporter gene experienced greater activation of the amygdala when shown frightful images than those with two copies of the long variant of the gene.³ As we observed in the last chapter, serotonin is a neurotransmitter that helps facilitate communication between the neocortex and deep brain structures such as the amygdala. Another

reason for hyperreactivity of the anxiety circuits is due to environmental causes. Childhood physical or sexual abuse, or trauma from war, for example, can reset the amygdala-HPA pathways at a more sensitive level, making it more likely that future stimuli will trigger anxiety. Or chronic stress can deplete the supply of neurotransmitters that keep the brain functioning in balance.⁴ The same drugs that help with depression, selective serotonin reuptake inhibitors such as Prozac, Zoloft, Paxil, and Luvox, also help with anxiety disorders and are not addictive like many tranquilizers, which before antidepressants emerged in the 1990s were the primary means of treating anxiety (Miltown, the world's first modern tranquilizer, was introduced into the marketplace in 1956). There is, in fact, a high level of "comorbidity" (having two or more disorders at the same time) between mood disorders and anxiety disorders. A person with one has a 25 to 50 percent chance of developing the other.⁵

The Virtues of Anxiety

Somewhere along the anxiety continuum there are forms of anxiety that are positive and even useful to the human condition. Many people choose to put themselves into a state of anxiety, for example, when they go on amusement park rides, attend suspenseful movies, or engage in high-action video games. As educator Samuel Nathan Gillian, author of *The Beauty of Fear*, points out: "We love horror stories and scary movies. There is a huge market in creating scary stories so that we can positively enjoy being afraid. . . . We want to experience the biggest thrills, the greatest excitement. . . . We are willing to pay dearly to enjoy being scared, no matter how high the price of a movie ticket goes up."⁶ In these cases, it appears that the amygdala and the higher brain centers are effectively communicating with each other (e.g., the higher brain center "says" to the amygdala: "I'm sending you some scary stuff, but it's not *really that scary*, if you know what I mean, wink, wink.").

Similarly, a certain amount of anxiety helps us perform well on a test at school, or out in the business world. It seems incongruous to me sometimes why I don't seem to mind speaking before large groups of people when some polls indicate it is the greatest fear of the American

public. This is especially strange, given the fact that I've had disabling anxieties about a lot of other things, including heights, flying, and the groundless fear that I have serious diseases. But I remember what someone told me a long time ago, that it was "okay to have butterflies—just make sure that they're all flying in the same direction." In the business world a certain amount of focused anxiety seems to provide motivation that gives individuals the edge they need to compete. Alan Mulally, the CEO of Ford Motor Company, explains:

I started a Thursday business plan review. And that always creates anxiety. You're either ahead of the plan or behind it. So right away, boom. You've built a gap between where you are and where you want to be. You've built in anxiousness, excitement, motivation. . . . Half the time, at the end of the day I don't know how we're going to get it done. You always give it your best shot, and you can never get down or immobilized. So anxiety is a good thing. It means you're thinking about your goals, your objectives and plans, and the risks and opportunities. It's very useful and very enabling. If you're free and open to deal with the uncertainty of it all, then you have to be able to say you're anxious."⁷

In this case, the diffused nature of generalized anxiety is concentrated into a manageable tool that can help get things done in the workplace.

Anxiety is also important to the creative process. Philosopher Charles Frankel once wrote that "anxiety is the essential condition of intellectual and artistic creation and everything that is finest in human history." When an artist faces an empty canvas or a writer confronts a blank piece of paper, there is the anxiety of "what now?" How does one create something out of nothing? Most artists channel their anxieties (including those from childhood) into their artistic works. Also, there is a certain tension present in the creative act, which makes a virtue out of anxiety. Writer Ralph Keys points out, "A writer's fears are never 'conquered.' Nor should they be. Were an antidote discovered to literary anxiety, writers would be deprived of a powerful ally. When anxious, I'm also sharp: alert, observant, sometimes even witty. Fear energizes me." In addition, when artists create, they tap into the collective fears of humanity and help make them sensible and bearable.

Clinical and forensic psychologist Dr. Stephen Diamond notes, “The more conflict, the more rage, the more anxiety there is, the more the inner necessity to create. We must also bear in mind that gifted individuals, those with a genius for certain things, feel this inner necessity even more intensely, and in some respects experience and give voice not only to their own demons but the collective daimonic as well. So they are kind of like little oracles of Delphi, or canaries in a coal mine, sensing the dangers, the conflicts, the cultural shadow, and trying to give it some meaningful expression.”⁸ To be human, after all, is to experience anxiety, especially in this age of anxiety, when nuclear annihilation is possible, global warming could destroy the planet, and other threats, both ancient and modern, assail us on all sides. Psychologist Rollo May points out that the self develops essentially by facing anxiety-producing situations. He quotes the Danish philosopher Søren Kierkegaard: “To venture causes anxiety, but not to venture is to lose oneself.”

On a cultural note, it appears that back in the 1950s, when American values were particularly set on progress and achievement, anxiety was looked on in a very different way than it is now. Social historian Andrea Tone, in her book *The Age of Anxiety: A History of America's Turbulent Affair with Tranquilizers*, writes:

In 1950's American culture, anxiety was viewed less as a serious psychiatric disorder than as a badge of achievement: an emblem of struggle, but also of success. Anxiety was the predictable yet commendable offshoot of Americans' insatiable hunger to get ahead, their relentless determination to become new and improved. This can-do mentality also underlay the belief that Americans not only could accomplish anything but were entitled to do so with minimum discomfort and inconvenience. In this cultural tableau, tranquilizers were welcomed as a means of personal fulfillment with the same fervor as credit cards, electric refrigerators, television dinners, and cosmetics.²

At the same time, there exists a deeper tradition that suggests anxiety may violate a time-honored social value: tranquillity. Founding father Benjamin Franklin, in his *Poor Richard's Almanack*, considered

tranquillity one of his thirteen virtues. He wrote: “Be not disturbed at trifles, or at accidents common or unavoidable.”¹⁰ The very fact that we refer to anxiety-combating drugs as “tranquilizers” also suggests this deeper valuation.

The Evolutionary Advantages of Anxiety Disorders

Up to this point, we’ve been considering anxiety and anxiety disorders as a whole. However, as we’ve noted above, anxiety disorders come in a variety of manifestations. There are, in fact, six major forms of anxiety disorders. Generalized anxiety disorder is an ongoing sense of worry that lasts at least six months without there being present a specific object of fear. Panic disorder causes repeated, unexpected attacks of intense fear lasting from a few minutes to hours. Symptoms include palpitations, sweating, trembling, and sensations of choking or smothering. Post-traumatic stress disorder can occur in the wake of a traumatic event such as physical or sexual abuse or combat duty in the military and can include nightmares, flashbacks, and hypervigilance. Social anxiety disorder is the fear of being seen negatively by others or humiliated in public, resulting in an avoidance of social situations. Symptoms can include blushing, shaking, fear of vomiting, or urgency or fear of bladder or bowel movements. Obsessive-compulsive disorder is characterized by unwanted thoughts or behaviors that seem impossible to stop or control. Finally, the largest category of anxiety disorder includes those with specific phobias, of which there are many, covering everything from achluophobia (fear of darkness) to zelophobia (fear of jealousy).

Each of these forms of anxiety disorder appears to be in the gene pool because it served some important function in evolution. This may help explain why anxiety disorders are so prevalent in today’s society, affecting almost 20 percent of the population, far more than any other psychiatric disorder. In prehistoric times, life was, to quote the philosopher Thomas Hobbes, “poor, nasty, brutish, and short.” Dangers lurked around every corner: beasts of prey, poisonous plants, drought, fires, floods, intertribal warfare, and more. Generalized anxiety disorder probably evolved as a way of dealing with threats whose nature could not be identified very distinctly. Panic disorder, on the

other hand, may have evolved as a way of quickly activating the “fight-or-flight” mechanisms of the brain (releasing large amounts of adrenaline into the body) in order to get away from danger immediately.

Interestingly, a recent study suggests that anxious people have fewer fatal accidents in young adulthood. William Lee, a researcher at the Institute of Psychiatry in England, and colleagues, took data from the Medical Research Council National Survey of Health and Development and analyzed the fortunes of 5,362 people born in 1946. Those individuals who had higher anxiety—as measured by the evaluation of their schoolteachers when they were thirteen—were significantly less likely to die in accidental circumstances before they were twenty-five (only 0.1 percent of them did) compared to nonanxious people (0.72 percent of them did). Similar results were found when anxiety was measured using teacher anxiety judgments when they were fifteen and also when using the subjects’ completion of a neuroticism questionnaire when they were sixteen. In contrast, anxiety had no connection with the number of nonaccidental (e.g., illness-related) deaths before twenty-five. “Our findings show, for the first time in a representative sample of humans, a relatively strong protective effect of trait anxiety,” according to the researchers.¹¹ The data did reveal that after twenty-five this protective effect seemed to be counterbalanced by a greater likelihood that older anxious people would die of medical-related problems (e.g., illness) than nonanxious people. However, evolution was more concerned with the fate of young people and perhaps supplied them with enough anxiety to avoid accidents long enough to pass their genes along.

The excessive watchfulness and avoidance behaviors of post-traumatic stress disorder seem to involve the role of memory in avoiding previously dangerous situations. Some studies suggest that the hippocampus (important for memory) is actually smaller in the brains of those with PTSD because of a stress-induced degeneration of dendrites. Chris Cantor notes in his book *Evolution and Post-traumatic Stress*: “If ancestral individuals have had seriously threatening experiences, their long term survival might be promoted if their lessons were not forgotten (re-experiencing symptoms); if they remained for an extended period on high alert (overarousal symptoms); if they avoided high-risk locations and activities (avoidance behaviours) and were quick to use other defences as determined by contextual demands.”¹²

These mechanisms were designed to warn us of very real dangers that might exist in our presence, including, in our current times, the threat of military enemies, terrorists, rapists, thieves, and serial killers.

Gavin de Becker, author of *The Gift of Fear: Survival Signals That Protect Us from Violence*, relates the story of a woman who encountered a man in her apartment building offering to help carry an overload of groceries to her apartment (one bag had already broken, releasing cans of cat food down the stairwell). Something in the man's tone bothered her, but she ignored the signal. After his friendly insistence that he help, she surrendered one bag to him, and again felt that she had gone against her deeper instincts. Finally inside her apartment, the man proceeded to assault and rape her with a gun to her head over the following three hours. After he had finished and she lay there naked in bed, he said he wouldn't harm her, but she noticed that he closed the bedroom window. Again, another fear signal went off inside of her head that something wasn't right, and this time she followed her gut. When the man left the room briefly to go to the kitchen, she bolted for the door and made it safely into a neighbor's apartment. She recognized that when the man had closed the window, he was signaling that he planned to murder her and wanted to minimize the noise it would make. De Becker comments, "What she experienced was real fear, not like when we are startled, not like the fear we feel at a movie, or the fear of public speaking. This fear is the powerful ally that says, 'Do what I tell you to do.' Sometimes, it tells a person to play dead, or to stop breathing, or to run or scream or fight, but to Kelly it said, 'Just be quiet and don't doubt me and I'll get you out of there.'"¹³ In the case of PTSD, however, after a traumatic experience has occurred, triggering these evolutionarily adaptive defenses, the person usually returns to a safe environment (e.g., comes home from military service) where the mechanisms are no longer needed. Yet nature doesn't know this and continues to activate these responses, resulting in serious debilitating illness, often lasting years.

In the case of social anxiety disorder, which involves fear of evaluation by others and avoidance of social contact, there may have been an advantage to knowing one's place in the social hierarchy in ancient times, avoiding confrontation with powerful figures in one's own tribe by averting one's gaze, and withdrawing from the social scene to forestall potential conflicts with others. As psychologists Mark R. Leary and Robin M. Kowalski note, "A heightened state of anxious

arousal alerted individuals to threats by more dominant members of the group, put them in a state of ‘braced readiness’ to respond to these threats, and motivated submissive behaviors to diminish the threat.”¹⁴ For people with agoraphobia (the fear of leaving home), it’s possible that this evolved from the dangers that existed in areas that did not have protection from outside threats. About seventy thousand years ago, *Homo sapiens* expanded beyond its heavily forested East African indigenous niche into sparsely wooded habitats. In these open spaces, there was much greater vulnerability to attack from predators. It may have been an evolutionary advantage to instinctually want to retreat to a safe home base, and if this was followed by anxiety, it would have served to have kept them from venturing out into potential danger and thus served an important adaptational function.

Similarly, other phobias can be traced back to legitimate fears in ancient times: Achluophobia, or fear of darkness, would be appropriate in an environment where nighttime was filled with the fear of roaming predators. Phonophobia, or fear of loud sounds, would make sense in situations where lightning or ferocious animals threatened. Psychologist John Bowlby writes:

In a wide array of animal species, including man, a principal condition that elicits alarm and retreat is mere strangeness. Others are noise, and objects that rapidly expand or approach; and also for animals of some species though not for others; darkness. Yet another is isolation. Now it is obvious that none of these stimulus situations is in itself dangerous. Yet, when looked at through evolutionary spectacles, their role in promoting survival is not difficult to see. Noise, strangeness, rapid approach, isolation, and for many species darkness too, are all conditions statistically associated with an increased risk of danger.”¹⁵

Obsessive-Compulsive Disorder and Cultural Rituals

An interesting case of an anxiety disorder having a unique connection to a wide range of religious rituals and cultural ceremonies around the world can be seen in obsessive-compulsive disorder. OCD is characterized by thoughts or behaviors that seem impossible to stop or control. This involves obsessive thoughts (“I forgot to lock the back door,” “I’m contaminated with germs,” “I have a terminal disease”), which cause anxiety. In an attempt to quell the anxiety, the person engages in compulsive actions, such as continually checking to make sure the back door is locked, washing one’s hands, or checking for medical symptoms. The behavior temporarily reduces the anxiety, but then the obsession returns, resulting in a resumption of the compulsive behavior. In severe cases of OCD, a person may spend hours a day checking locks, washing hands, visiting doctors, or engaging in other groundless activities to such an extent that they interfere with their work, family, and social roles. The OCD individual realizes that the obsessions and behaviors are irrational but can’t stop experiencing or doing them.

The biology of OCD seems to involve a miscommunication among the orbitofrontal cortex (part of the frontal lobes just behind our eyes); the cingulate gyrus, which is part of the limbic system, or emotional brain; the caudate nucleus, which is part of the basal ganglia, a set of structures important in voluntary movements; and the thalamus, which relays information between the frontal lobes and the limbic system. The orbitofrontal cortex notices that something seems to be wrong (the door isn’t locked, my hands are dirty, I’ve got a lump in my back) and signals this to the cingulate gyrus, which triggers the anxiety response discussed above. The caudate nucleus ordinarily processes the flow of ideas from one to the next and initiates motor activity. It typically turns off the warning light from the orbitofrontal cortex when the matter is resolved. The door is checked, the hands are washed, the lump is examined by a doctor. And then life moves on. But with OCD the orbitofrontal cortex and cingulate gyrus appear to be “on” all the time, and the caudate nucleus gets stuck and doesn’t turn off the warning light.

Jeffrey Schwartz, professor of psychiatry at UCLA Medical School, calls this process “brain lock” and has successfully changed people’s behavior using a form of cognitive-behavioral therapy that has four basic steps: first, relabeling the obsessions as due to a medical disorder, OCD; second, reattributing the ferocity and intrusiveness of the thought

or urge as due to OCD; third, refocusing one's attention on something positive for at least a few minutes; and fourth, revaluing the OCD thoughts and urges as useless. To demonstrate the effectiveness of his approach, Schwartz and his colleagues have used a brain-scanning technique called positron-emission tomography, which involves injecting safe levels of radioactive glucose into the brain, which can then be monitored in terms of which areas of the brain "light up." Dr. Schwartz and his colleagues did PET scans of nine subjects before and after ten weeks of this therapy (without medication). The "brain lock" disappeared in most of the subjects. The orbitofrontal cortex, cingulate gyrus, caudate nucleus, and thalamus all became less hyperactive in the scans, and the energy use among the four areas became less tightly linked than before.¹⁶ Schwartz had literally changed the brain chemistry of these individuals, or to put it another way, he had helped these people construct a biological adaptation to enable them to function without the distress of OCD symptoms.

One of the significant features of OCD is its concern with rituals. Hands must be washed a certain number of times, every fence post on the way to work needs to be touched, or cracks must be avoided at all costs when walking down the street. One boy with OCD, for example, always felt dirty and had to wash his hands thirty-five times a day. He went through various rituals whenever he swallowed saliva, including crouching down and touching the ground or touching his fingers to his lips. In a sense, there is a continuum of such obsessive and compulsive behaviors in most of us. We all have little quirks and rituals that we consciously or unconsciously go through during the day, such as knocking on wood to forestall some negative event, or crossing our fingers for luck or when telling a fib. Baseball players are famous for having superstitions about wearing the same hat or engaging in repetitive rituals prior to an at bat. In the case of one major league pitcher, for example, he "begins his ritual preparation a full day before he pitches by washing his hair. The next day . . . he eats bacon for lunch. When [he] dresses for the game, he puts on his clothes in the same order, making sure he puts the slightly longer of his two outer, or 'stirrup' socks on his right leg. . . . He always wears the same shirt under his uniform the day he pitches. During the game he takes his cap off before each pitch, and between innings he sits on the same place on the dugout bench."¹⁷ The important distinction is that these rituals

don't interfere in our lives in the way that they do for people with OCD.

However, there are gray areas along the continuum where “normal” and “abnormal” behaviors seem at times to be indistinguishable. This becomes particularly evident when looking at cultural and religious rituals. Sigmund Freud noted, “It is easy to see the resemblance between the neurotic ceremonials of obsessions and compulsions and the sacred acts of religious ritual.” Judith Rapoport, one of the world’s greatest authorities on obsessive-compulsive disorder, has written that “culturally meaningful rituals are composed in part from a universal repertoire of elements corresponding closely to the symptoms of OCD.” In an important paper titled “Cultural Rituals and Obsessive Compulsive Disorder: Is There a Common Psychological Mechanism?” anthropologists Siri Dulaney and Alan Fiske write that “an examination of some of the most detailed and comprehensive ethnographies reveals that cultural rituals are composed of actions and thoughts that are morphologically similar to the symptoms of OCD patients.”¹⁸ They describe, for example, rituals of the Gujars, a caste of Hindi-speaking people in India. To prevent or remove harmful influences, they engage in ritual bathing and teeth cleaning followed by the circling of a deity seven times. Similarly, if a child is born on an astrologically “inauspicious day,” the priest is required to recite a specific religious mantra twenty-eight thousand times. Among the Mapuche of Chile, funeral rituals consist of four stanzas of prayer and four sessions of dance divided into four parts, each largely a repetition of each other, where the prayers and activities must be repeated perfectly.

OCD-like behaviors may in some cases have represented a certain advantage in cultures where rigid rituals were important. Back in ancient times (and still today, as noted above) priests would perform elaborate rituals to propitiate the gods. In some cases, patrons would pay handsomely for these rituals to be carried out for their own benefit. Such rituals had to be performed in a precise way. Any omission of a single syllable or act required that the entire ritual had to be performed all over again. In this environment, priests with OCD characteristics may have been just what was required to carry out the rituals with exactitude. Perhaps this wouldn't apply to people with such severe OCD that they would be crippled by the fear of making mistakes during the ritual, but it may have been true for individuals with milder

forms of OCD along the continuum. Since priests were often the individuals with the greatest prestige and wealth in ancient Greece, Rome, Egypt, Israel, India, and elsewhere, then having OCD-like behaviors may have been one of the surest routes to success in those cultures.

Niche Construction and Anxiety

In today's busy world, it's a little more difficult to think about which careers would best suit individuals with anxiety disorders. In many cases, having an anxiety disorder can interfere with one's career. However, one can look at some of the features of certain anxiety disorders, when kept under control, as potentially congruent with certain occupations. My father had an OCD personality, which demanded that our house had to be immaculately clean. He chose a career as a physician, which makes sense in a way, since precision and cleanliness are certainly two important virtues needed in the medical profession.

On the other hand, some individuals with anxiety disorders require professions that are creative enough to take their minds *off* of their worries, or into which they can channel their anxieties. Woody Allen has commented that making films gives him a way to keep his mind off his biggest worries: "I make films because if I don't make them then I don't have anything to distract me. . . . My whole life I am constantly fighting all kinds of depression and terror and anxiety and I find that, like a mental patient in an institution, that if they keep the patient busy finger painting then they are more relaxed."¹⁹ Another movie director with an anxiety disorder is Lars von Trier, who once commented, "Basically I'm afraid of everything in life, except filmmaking." In making his movie *Breaking the Waves*, he was too anxious to shoot a scene that took place on an oil rig in the North Sea because of his fear of flying and had to do it by remote. Nevertheless, he has been able to channel his anxieties into his passionate and unsettling films. The performing arts as a whole seem to be a field that attracts many people with anxiety disorders, including among many others, Aretha Franklin, Cher, Sheryl Crow, Donny Osmond, Barbra Streisand, Johnny Depp,

Edi Falco, Eric Clapton, Ray Charles, David Bowie, and Roseanne Barr.

There is a range of assistive technologies that can help people cope with anxiety. First, a number of biofeedback devices allow users to control one or more physiological events in their body (e.g., heart rate, muscle relaxation, body temperature, or electrical waves in the brain). Neurofeedback, which monitors brain-wave activity, is the most common form of biofeedback training to reduce anxiety. Electrodes are attached to the scalp and measure electrical activity in the brain. This information is then inputted into a computer software program so that when certain waves are produced, something happens on the computer screen (boulders are lifted, a boat floats, a cloud disappears). In this way, an individual can begin to control brain waves associated with calmness, relaxation, or a meditative state (usually theta waves in the 4–8 HZ range or alpha waves in the 8–12 Hz range or both) by manipulating the images on the screen. Usually, a number of sessions are required under the supervision of trained personnel. However, increasingly we're seeing the introduction of user-friendly models and even toys that employ biofeedback.

A different form of assistive technology is available to help individuals with specific phobias or PTSD. This technology uses virtual-reality computer hardware and software to help desensitize users to their fears by providing them with a gradual exposure to the feared object. Using a platform and a headset, the person is immersed in a computer-generated environment (both audio and visual) designed to reproduce the real-world setting (e.g., an airplane for fear of flying, an elevator for fear of heights, a combat situation for a person with post-traumatic stress disorder). Then the individual is gradually exposed to stimuli from the setting until they get used to that level of stimulation, after which the level is increased in a series of steps. Eventually, the user becomes habituated to the stimuli so that they can take a plane flight or maintain their calm in a hectic environment without triggering PTSD symptoms.

Another powerful technology, this one using only the breath and awareness, is mindfulness meditation practice (also useful for ADHD and depression). The practitioner sits in a comfortable position in a chair or on a pillow with feet flat on the floor and back straight. Then, for a period of twenty to thirty minutes or more, she trains her attention on the breath. Perhaps focusing on the rising or falling of the belly, or

on the rush of air through the nostrils, she stays in the “now” with the incoming and outgoing of breath. If the mind should wander, the practitioner simply notices what she is experiencing and then returns her attention to the breath. For example, if her mind thinks about some shopping she needs to do later, she would simply notice what she is thinking and perhaps say to herself, “planning, planning,” and then return her focus to the breath. For people who are highly anxious, using this technique gives them an opportunity to gain some distance from their experience. If they start to worry about some future event, they can simply label what they’re experiencing (“worrying, worrying”), and then go back to being aware of their breathing. The breath serves as an anchor for awareness, and pure awareness is ultimately free of anxiety. A number of studies have shown mindfulness meditation to be an effective treatment for anxiety disorders.²⁰ What is interesting about this approach is that one doesn’t suppress the anxiety, or try to turn it into something else. Rather, one simply notices the anxiety, acknowledges it, labels it, and then turns the focus elsewhere. This means that we’re accepting anxiety into our world, not turning it away.

This seems to be the key: allowing ourselves to experience a certain amount of anxiety without its becoming debilitating. Nature has equipped our neurological system with a strong propensity for anxiety, much as it has given us a multiplicity of pain receptors to protect us against physical harm. For good or ill, people with anxiety disorders seem to have greater access to these ancient adaptive mechanisms. This means that they have more anxiety to help motivate them, keep them out of harm’s way, communicate their concerns to others, prepare for stressful events, and focus attention on things that may need immediate attention. On the other hand, too much anxiety seems to dramatically undercut these benefits and makes life miserable for too many people. It is our fortune to live in a less dangerous world than existed in prehistoric times. Neurodiverse people with anxiety disorders to some extent may be saddled with outdated equipment that at one time was essential for survival. The good news is that with the help of certain adaptive interventions (e.g., medication) and niche construction (e.g., mindfulness meditation), people with anxiety disorders can learn to channel their worries into constructive pathways and see their anxieties as an integral part of their humanity. As artist Roy Lichtenstein put it, “I don’t have big anxieties. I wish I did. I’d be much more interesting.”

CHAPTER 7

The Rainbow of Intelligences

How much gentleness, insight and wisdom would be lost from our cultural heritage if we were to screen out . . . “defects” and narrow the human genome. Although I anxiously await the benefits that modern genetics may bring us, I am perplexed by the thought of how little of human nature we can truly measure with superficial tools such as the Intelligence Quotient.

—ROBERT D. SHEELER, M.D.,
MAYO CLINIC

In her biography *The Strangest Song*, Gloria Lenhoff is described as a woman in her midfifties who is short in stature (four feet, ten inches), wears glasses, and has an elfin nose, puffy eyes, and an expansive mouth. When she walks, she walks on the balls of her feet. She can't make change for a dollar, can't subtract seven from fifteen, can't tell left from right, can't cross the street alone, and can't write her name legibly. She has an IQ of 55. But she can sing opera in twenty-five different languages, including Chinese. As a small child, her parents noticed her interest in music and, to encourage her, showered her with musical toys and rhythm instruments—tambourines, flutophones, drums, xylophones, and toy pianos. As she grew up, they sought and found teachers who could help her develop her musical skills. She can't read music, but she sings, plays the accordion, and has perfect pitch. She needs only to hear a piece of music once or twice to be able to remember it in its entirety. As a result, she has a repertoire of thousands of songs. Her mother, Sylvia Lenhoff, doesn't think that she is a savant. "I think she has an ability, a proclivity, that had to be developed. It took a great deal of time and hard work for Gloria to become the musician she is today."¹

Williams Syndrome: A Profile of Peaks and Valleys

Gloria has Williams syndrome, a genetic disorder that affects one in every seventy-five hundred births. It arises as a result of a missing gene on chromosome 7 (plus several missing genes on either side). This particular gene is responsible for making the protein elastin, which gives “elasticity” and flexibility to human tissue, including arteries, lungs, intestines, the brain, and skin. As a result of missing this gene, many people with Williams syndrome have heart problems, digestive difficulties, high blood pressure, early wrinkling skin, and the characteristic elfin facial features that make many of them look very similar to each other. They also have an unusual profile of cognitive abilities and disabilities. They have very poor visual-spatial skills but excellent conversational abilities. In one study, a teenager with an IQ of 49 was asked to draw a picture of an elephant, which appeared as an indecipherable collection of squiggles and scratches. However, when asked to verbally describe an elephant, he proceeded to use an almost lyrical language: “It has long gray ears, fan ears, ears that can blow in the wind . . . ”² People with Williams syndrome also have a good memory for faces and tend to be empathetic, loquacious, and sociable, although their innate trust can lead to their being taken advantage of by unscrupulous strangers.

Music, though, seems to be their most prominent ability. While Gloria Lenhoff may be exceptional in her capacity for musical expression, many people with Williams syndrome show musical gifts. In one study, children with Williams syndrome were more likely to be emotionally captivated by music than a group of regular kids. In another study, they were more likely to have perfect pitch than the average person. A further study revealed that individuals with Williams syndrome were found to be higher in musical accomplishment, engagement, and interest than normal.³ As one article on Williams syndrome put it:

Anecdotal evidence implies that some Williams people possess extraordinary musical talent. Even though their attention span for most tasks is short, many will listen to music, sing, and play instruments with astonishing persistence. Most cannot read

musical notes, yet some have perfect or nearly perfect pitch and an uncanny sense of rhythm. One boy quickly learned to play an extremely complex drumbeat in 7/4 time with one hand while drumming in 4/4 time with the other hand. A number of individuals retain complex music for years, remembering melodies and verses of long ballads. . . . Experienced Williams musicians also sing harmonies, improvise and compose lyrics readily.⁴

While the total brain volume of a person with Williams syndrome is 80 percent of normal, they appear to have a relatively enlarged neocerebellum (considered important for movement, motor skills, and language), as well as preserved frontal lobes and limbic system, and an enlarged primary auditory cortex, and larger than normal adjacent area called the planum temporale (thought to be important for language as well as music).

The Invention of Mental Retardation

Williams syndrome represents an example of what is often still called mental retardation but is now increasingly being referred to as intellectual or cognitive disabilities. An estimated 2.5 million people in the United States have an intellectual disability, approximately 1 percent of the American population. Individuals are considered to have an intellectual disability when their IQ score is below 70–75, when they have significant limitations in adaptive skills (self-care, home living, social skills, communication, functional academics, and work), and when they developed the disability before the age of eighteen. In the Middle Ages such individuals were cared for in homes or monasteries. During the Enlightenment in the eighteenth century, however, people with intellectual disabilities were increasingly placed in large publicly run institutions, sometimes housing thousands of “feeble-minded” individuals. This pattern continued into the 1970s in the United States, when a new model, partly the result of an important paper by American academic Wolf Wolfensberger, began to call for seeing the “retardate” as a developing person, and more like normal individuals than different from them. As Wolfensberger wrote, “The

developmental model takes an optimistic view of the modifiability of behavior, and usually it does not invest the differentness of the retardate with strong negative value. Retardates, even if severely retarded, are perceived as capable of growth, development, and learning.”⁵ His theory of normalization was based on the concept that people will behave normally when they are placed in “normal” settings. As a result of his work, and the work of others, many people with intellectual disabilities were taken out of institutions and placed in residential settings that had a homelike atmosphere. Despite the advances that have been made over the past forty years, however, stereotypes still endure about people with intellectual disabilities being somehow less worthy than so-called normal people.

One of the biggest reasons for the preservation of these stereotypes is that we continue today to compare people with intellectual disabilities to a statistical norm using IQ testing. People with IQ scores of 50 to 70 are considered to have mild intellectual disabilities, from 35 to 50 moderate intellectual disabilities, from 20 to 35 severe intellectual disabilities, and IQs of less than 20 profound intellectual disabilities. The defining of people’s intellectual capabilities through IQ scores has a checkered history. In 1905 psychologist Alfred Binet was asked by the Paris public school system to devise a test that would help predict which students would be in need of special education services. He developed the original test, upon which IQ scores would be based, but his belief was that students could improve their performance on the test through further development and learning. It was a German psychologist, William Stern, who actually gave the test a “score” that became the intelligence quotient of an individual.

The most significant changes in IQ testing, however, took place when American psychologist Henry Goddard brought Binet’s test and Stern’s score to the United States. In contrast to Alfred Binet, Goddard believed that the IQ test represented a single innate entity that could not be changed through training. It was Goddard who first coined the term “moron” (from the Greek word *moros*, which meant “dull”) in 1910, a word that was later applied to people who achieved an IQ score of 51 to 70. Those who scored from 26 to 50 were known as “imbeciles,” and those with an IQ of 0 to 25 were deemed to be “idiots.” These were actual scientific terms used by professionals to describe low-scoring individuals on IQ tests in the first half of the twentieth century. Goddard himself wrote in 1915, “For many generations we have

recognized and pitied the idiot. Of late we have recognized a higher type of defective, the moron, and have discovered that he is a burden; that he is a menace to society and civilization; that he is responsible to a large degree for many, if not all, of our social problems.”⁶ In 1916 Stanford psychologist Lewis Terman revised Binet’s test, and it became known as the Stanford-Binet Intelligence Scales. This test became the foundation for all future intelligence tests. What many people don’t realize is that both Terman and Goddard were eugenicists. They believed that we should control the breeding of human beings to weed out “undesirables” (including those noted above) and create a superior race. Nazi Germany would take eugenics to its ultimate, tragic, conclusion. Among the millions killed, some were people with intellectual disabilities.

It’s Not How Smart You Are, It’s How You’re Smart

One of the major reasons that people with intellectual disabilities have had difficulty integrating into the mainstream of society is that they violate a core American value: the belief that intelligence is a single innate and fixed entity that can be measured by an intelligence test. Ever since the development of the Stanford-Binet IQ test, laypeople and professionals alike have given credence to the concept of intelligence in general, and to the IQ score in particular. In public schools in the United States, IQ tests have been used as a measure of a student’s “potential” (as opposed to his or her actual achievement). It has always seemed strange that anyone could take someone’s rich potential and complexity and reduce it to a single number. It also has seemed unjust that differences in IQ scores between people (an IQ of 101 versus 69, for example) could affect an individual’s attitude toward them so profoundly. IQ scores are just numbers, yet as a nation the United States has been profoundly affected by the philosophical school of positivism, the idea that truth can be found only in numbers, statistics, or equivalent empirical data.

Fortunately, there are professionals who have challenged the sacrosanct nature of the concept of intelligence and the IQ score. One of them is Israeli psychologist Reuven Feuerstein, who rejects the term “retarded people” and substitutes instead the idea of “retarded

performance.” The problem with IQ testing, according to Feuerstein, is that it only tests what a person has already learned, but it doesn’t evaluate his or her ability to learn over time with mediation from another person. Feuerstein has developed a number of assessment instruments that involve copying geometric shapes and other content-free activities. He believes that we limit an individual’s potential when we ascribe it to heredity (he’s been quoted as saying “heredity, shmeredity!” to express his disgust with the concept of inborn abilities).⁷ The key is finding out how well a person can learn when a teacher or mentor who is assisting him helps him think through the problem at hand. In this sense, Feuerstein’s approach is a return to Alfred Binet’s belief that intelligence can be improved through training. Much of Feuerstein’s work has been with people with intellectual disabilities. In one case, Feuerstein took a four-year-old girl who had an IQ of 48 and transformed her from a person who could not concentrate and would not listen into a young girl who loved to study and could pay attention. In another case, a sixteen-year-old boy with intellectual disabilities, whom others considered “incorrigible,” went through Feuerstein’s program of “cognitive modifiability” and was placed with children who were at a much higher level than he was. Eventually, the boy worked at a carpentry shop and functions, Dr. Feuerstein says, as “one of the most well-adapted persons.” A number of studies have demonstrated the effectiveness of Feuerstein’s programs, and recent research has independently verified that intelligence is not inborn but can be increased through training on working memory.⁸

Another psychologist who has had a significant role in challenging the concept of a fixed innate intelligence is Howard Gardner, the Hobbs Professor of Cognition and Education at the Harvard School of Education. In his seminal book *Frames of Mind*, he took on the idea that there is an overarching single intelligence that represents the highest form of cognition.² Instead, he suggested that there are several intelligences, or as he puts it multiple intelligences, each roughly equivalent to the others in legitimacy. The intelligences he describes are as follows:

Linguistic intelligence: sensitivity to the sounds, structure, meanings, and functions of words and language. This is the intelligence of the writer, orator, persuasive salesperson, linguist, editor, and storyteller.

Logical-mathematical intelligence: sensitivity to and the capacity to discern logical or numerical patterns; the ability to handle long chains of reasoning. This is the intelligence of the scientist, mathematician, tax accountant, statistician, and computer programmer.

Spatial intelligence: the capacity to perceive the visual-spatial world accurately and to perform transformations on one's initial perceptions. This is the intelligence of the artist, architect, photographer, cartographer, surveyor, and inventor.

Bodily kinesthetic intelligence: the ability to control one's body movements and to handle objects skillfully. This is the intelligence of the athlete, dancer, sculptor, carpenter, and mechanic.

Musical intelligence: the ability to produce and appreciate rhythm, pitch, and timbre and to have a sensitivity to the forms of musical expressiveness. This is the intelligence of the composer, violinist, piano tuner, conductor, and music therapist.

Interpersonal intelligence: the capacity to discern and respond appropriately to the moods, temperaments, motivations, and desires of other people. This is the intelligence of the counselor, politician, administrator, manager, and public relations specialist.

Intrapersonal intelligence: access to one's own "feeling" life and the ability to discriminate among one's emotions, as well as knowledge of one's own strengths and weaknesses. This is the intelligence of the entrepreneur, psychotherapist, clergyman, and autodidact.

Naturalist intelligence: expertise in distinguishing among members of a species, recognizing the existence of other neighboring species, and charting out the relations, formally or informally, among several species. This is the intelligence of the naturalist, biologist, animal activist, zoologist, and veterinarian.

Gardner argues persuasively that each intelligence:

- has core cognitive components (described above)
- can be symbolized (e.g., letters for linguistic intelligence, musical notes for musical intelligence)
 - has unique end states (e.g., Einstein for logical-mathematical intelligence, Barack Obama for interpersonal intelligence)
- is valued by all cultures (e.g., the Israeli Knesset for interpersonal intelligence, Arabic numerals for logical-mathematical intelligence)

- can be found in the animal kingdom (e.g., birdsong for musical intelligence, bees for spatial intelligence)
- can be found in prehistoric times (e.g., the cave paintings of Lascaux for spatial intelligence, Stonehenge for logical-mathematical intelligence)

Most important for this book, Gardner argues that each intelligence is located in specific areas of the brain, providing a unique map for the field of neurodiversity. He supports his thesis by showing how selective impairment as a result of injury or illness in different areas of the brain compromises specific intelligences. For instance, he shares the story of Maurice Ravel, who had a stroke in his seventies. It affected Broca's area in the left hemisphere, an area that we've seen in the chapter on dyslexia affects language abilities. He was unable to express himself verbally, but he still could compose and conduct music, because musical intelligence expresses itself in the auditory cortex in the temporal lobe of the right and sometimes the left hemisphere, and that area was unaffected by the stroke.¹⁰

The personal intelligences (inter-and intrapersonal) seem to reside largely in the frontal lobes. One of the most famous examples demonstrating this connection occurred in the nineteenth century, when a man named Phineas P. Gage was laying railroad track, and a dynamite charge sent a metal rod through the frontal lobes of his brain. He recovered from the accident, but his personality underwent a dramatic change. Previously, he had been a very responsible worker. After the accident he became difficult to get along with, could not hold a job, and became an alcoholic. Now it's believed that this occurred because his personal intelligences were significantly impaired due to the damage to his frontal lobes.¹¹ Also important to the personal intelligences is the limbic system, or "emotional brain," made up of a number of subcortical structures such as the amygdala, hippocampus, and cingulate gyrus. As we noted in the last chapter, information from the external world is first funneled through the emotional brain before it goes on to the neocortex. That means that we have feelings about things before we think about them abstractly.

The naturalist intelligence seems to be tied to areas of the left parietal lobe that are important for discriminating "living" from "nonliving" things. There are actual aphasias (severe language disorders) in which a person is able to recognize words that represent

living things but is not able to recognize words that represent nonliving things.¹² The logical-mathematical intelligence appears to be represented in the left hemisphere by the ability to read and produce the signs of mathematics, while the right hemisphere involves the understanding of numerical relations and concepts. The bodily kinesthetic intelligence is related to the motor cortex, the cerebellum, and the basal ganglia, while spatial intelligence is correlated with activity in the occipital lobes in the back of the head.

Once we comprehend Gardner's theory, especially its neurological component, it becomes easier to understand the reasons for the different cognitive profiles of neurodiverse individuals. We can see, for example, the linguistic deficits of dyslexics, as well as their spatial and interpersonal gifts. We can understand the interpersonal shortcomings of autistic people, as well as their logical-mathematical abilities. We can realize why a child labeled with ADHD has strengths in spatial and naturalist intelligences yet difficulties with the personal intelligences. We can comprehend the uneven profile of individuals with Williams syndrome, with their spatial and logical-mathematical difficulties, as well as their musical, linguistic, and interpersonal talents. Even though the neurological underpinnings of each neurodiverse condition are still not fully understood, the cognitive map of the brain that the theory of multiple intelligences provides gives a rough-and-ready model to help us understand how someone can do so well in one area of endeavor (e.g., drawing, playing music) while having so much trouble functioning in another area (e.g., relating to others, computing numbers).

There are other forms of intellectual disabilities where we can see these uneven profiles of weaknesses and strengths. One example is Prader-Willi syndrome, which affects one in every 10,000 births. Several genes are missing or not expressed on chromosome 15 of the paternal chromosome. People with Prader-Willi syndrome are usually of short stature, obese, have small hands and feet, and tend to engage in overeating (hyperphagia) and skin picking. They have mild intellectual disabilities and have a concern with hoarding, putting things in order, and seeking symmetry. This latter trait hints at visual-spatial intelligence. In fact, psychologist Elisabeth M. Dykens reports:

Many persons with Prader-Willi syndrome have relative strengths in visual-spatial skills, especially in their remarkable abilities to solve jigsaw and word search puzzles. . . . Puzzle skills . . . may exceed the performances of same-age peers without mental retardation—they are an outstanding talent seen even in the face of significant disability. Moreover, many persons are absorbed by these activities. They might carry word-search books with them, pulling them out at every spare opportunity, or sit for hours working jigsaw puzzles that are increasingly challenging in terms of number of pieces and complexity. [Their abilities] . . . need not be limited to puzzles—some persons with the syndrome, for example, are avid readers.¹³

In addition, many people with Prader-Willi syndrome have interpersonal strengths: they possess a strong sense of nurturance, which can lead to their working in day-care centers, schools, nursing homes, and animal shelters.

The Emotional Highs of Down Syndrome

Another form of intellectual disability, and the most common one, is Down syndrome, which affects one in eight hundred births. It is caused by the presence of an extra chromosome 21 (or part of an extra chromosome), which is why the condition is sometimes called “trisomy 21” (i.e., three copies of chromosome 21). People with Down syndrome often have almond-shaped eyes, a protruding tongue, shorter limbs, poor muscle tone, and a greater risk of having congenital heart problems, recurrent ear infections, sleep apnea, and thyroid dysfunction. A specific area of the brain that is selectively impaired is the hippocampus. Research based on mouse studies suggests abnormalities in the function and structure of synapses in the hippocampus. The hippocampus is found in both hemispheres of the brain inside the medial temporal lobe and is important for learning and memory. Speech development can be delayed and may require special remedial training. Fine motor skills can be delayed, as are higher cognitive thinking processes.

While people with Down syndrome may have difficulties with linguistic and logical-mathematical intelligences (the intelligences most often assessed in IQ tests), they often shine in the personal intelligences. John Langdon Down, the physician whose name was given to the syndrome, wrote as far back as 1866 about these children: “They have considerable power of imitation, even bordering on being mimics. They are humorous, and a lively sense of the ridiculous often colours their mimicry. This faculty of imitation may be cultivated to a very great extent, and a practical direction given to the results obtained.” Psychologist Elisabeth M. Dykens writes, “Coined decades ago as the ‘Prince Charming’ syndrome, persons with Down syndrome have been consistently cast as friendly and charming, with disarming smiles. Indeed, many toddlers and children with Down syndrome smile more often than their typically developing or mentally retarded peers. . . . Parents continue to spontaneously use upbeat, happy descriptors of their children.” One study that compared preschoolers with Down syndrome and autism found that kids with Down syndrome were more likely to laugh at funny faces, socially inappropriate acts, and shared events. They were also more likely to respond to others’ laughter with attention and smiles and tried to elicit it through acts of clowning.¹⁴

Many parents have written about how, in times past, at the birth of a child with Down syndrome, the obstetrician would gloomily advise them that they should have low expectations of their child. Emily Pearl Kingsley writes, “Like many other parents, my husband Charles and I were told by the doctor, ‘Your child will be mentally retarded. He’ll never sit or stand, walk or talk. He’ll never be able to distinguish you from any other adults. He’ll never read or write or have a single meaningful thought or idea. The common practice for these children is to place them in an institution immediately.’ This doctor went so far as to say, ‘Go home and tell your friends and family that he died in childbirth.’” At the age of nineteen, this child, Jason Kingsley, had acted in a major television series, *The Fall Guy*, coauthored a book, *Count Me In*, and shared with his readers some reflections about this early prediction by his obstetrician:

Today we were talking about if I could see my obstetrician and talk to him, here are the things I would say. . . . I would say, “People with disabilities can learn!” Then I would tell the

obstetrician how smart I am. Like learning new languages, going to other foreign nations, going to teen groups and teen parties, going to cast parties, becoming independent, being . . . a lighting board operator, an actor, the backstage crew. I would talk about history, math, English, algebra, business math, global studies. . . . I will tell him that I play the violin, that I make relationships with other people, I make oil paintings, I play the piano, I can sing, I am competing in sports, in the drama group, that I have many friends and I have a full life.¹⁵

Another individual with Down syndrome whose obstetrician told his parents that he should be institutionalized is Chris Burke, actor, musician, and star of the 1990s show *Life Goes On*, the first television series to be centered around a person with Down syndrome (he acted in all eighty-three episodes of the program). As his mother observed, “He loved to perform for us, from the time he was very little. He was very musical. He had that talent early on. Before he actually verbalized, he was entertaining us.”¹⁶ In primary school Chris’s favorite time was when teachers brought out boxes of clothes for playing dress-up and acting out stories in the classroom. In junior high school he often played leading roles in organized plays. At age fourteen Chris asked a teacher to help him write a short movie script. Then, at the age of twenty, he saw Jason Kingsley’s performance in *The Fall Guy*, on television, the first time a person with Down syndrome had had a major role in a regular prime-time series. The event was a turning point, convincing him that he had a future as an actor. At the Young Adult Institute, a private nonprofit agency serving adults with disabilities, Chris took two or three courses a semester, studying filmmaking and improvisational theater, among other subjects. At home he wrote short television scripts containing characters with Down syndrome. Finally, he got his chance when Jason Kingsley’s mother recommended Chris to a casting agent. After doing a pilot episode for a show that was never picked up, his radiant performance caught the attention of producers, and eventually he was signed to play the role of Corky Thatcher in *Life Goes On*. Currently, he tours the United States with his three-piece folk band, is the goodwill ambassador for the National Down Syndrome Society, and serves as editor in chief for the society’s quarterly magazine.

Intellectual Disabilities in Other Times and Cultures

One can see in other cultures and other historical times an appreciation for people with intellectual disabilities. Western cultures tend to be “me” oriented, where individuality is prized and people are often compared to each other (as we do, for example, in giving people different IQ scores). Non-Western cultures, on the other hand, seem to be “we” cultures, where cultural cohesion is key and where an individual is seen mainly in relationship to his family, tribe, or cultural group. Anthropologist Susan Reynolds Whyte, for example, observed the Nyole people of rural Uganda and noted, “Intellectual cleverness or financial success do not of their own accord become necessary prerequisites for acceptance and respect. The total character of a person is taken into consideration, as is the situation within which a person exists and responds to the world and those around them. In this sense, a Nyole person still has the potential to have a place, a role and social value whatever their individual levels of ‘competence.’” Among the Shona of Zimbabwe and southern Mozambique, competency is defined as how individuals creatively deal with the situation they’ve been placed in. They have a proverb: “People with disabilities are clever, they have strategies, they dance whilst leaning against the wall.”¹⁷

There are indications in Western culture, as well, of a certain respect for people with intellectual disabilities. Folktales from the Grimm brothers often contain a reference to “Stupid Hans,” a boy who is regarded as an imbecile by his family but who ends up solving the riddles and winning the hand of the princess. The father of Gloria Lenhoff, Howard Lenhoff, whose story opened this chapter, suggests that people with Williams syndrome may actually have been the elves, pixies, trolls, and fairies of folktales. Lenhoff, who is a biochemist at the University of California, Irvine, wrote in the *Scientific American* that the pixielike facial traits of people with Williams syndrome match the descriptions given of the “little people” (Williams syndrome people are often short) in fairy-tale literature. The “wee” people of folktales are often storytellers and magicians who can enchant others with their stories and songs. This matches the musical capabilities of people with Williams syndrome, as well as their storytelling abilities. Also, people with Williams syndrome are loving, gregarious, trusting, caring, and sensitive to the feelings of others. In fairy-tale literature, elves and

pixies are often known as “the good people” or as “kind and gentle-hearted folks.” Finally, Lenhoff observes, “Williams individuals, much like the fairies of legend, require order and predictability. In Williams people this need shows up as rigid adherence to daily routines and a constant need to keep abreast of future plans.”¹⁸ So people with Williams syndrome may have provided significant cohesion to a culture by passing on songs and ballads from one generation to the next.

From an evolutionary point of view, psychologist Jared Edward Reser has suggested that Down syndrome may represent an adaptation to severe maternal deprivation. Since older mothers are more likely to have Down syndrome children (the chances are one in eleven among mothers over fifty) yet less able to care for them because of advancing age (age fifty among prehistoric hunter-gatherers was very old), the Down syndrome phenotype may have evolved by natural selection to include muscle hypotonia (low muscle tone), decreased cerebral metabolism, decreased hippocampal volume, a strong propensity for obesity and growth hormone, and thyroid hormone paucity. As Reser writes, “Such a ‘thrifty phenotype’ may have allowed Down syndrome individuals to become independent of their mothers at a far earlier age and allowed them to forgo the skill intensive ecological niche that non-trisomic humans are phenotypically suited for in order to take up a less cognitively and physically rigorous one.”¹⁹ In other words, the Down syndrome child would not have been as active as a so-called normal child and wouldn’t have had to undergo the rigorous training to be a hunter (requiring a substantial maternal investment), and this might therefore have saved his older mother significant amounts of energy, which she wouldn’t have had anyway.

Finding the Right Niche for Everyone

In today’s complex world people with Down syndrome and other intellectual disabilities have typically had three options—or niches—available to them as far as career pursuits are concerned. The first is the sheltered workshop, in which individuals work in self-contained settings with other disabled individuals assembling, building, filing, folding, or engaging in some other type of simple manual labor. The

second is a supported environment, where the individual works at a regular job in the real world, with the support of a job coach, who acts as an intermediary between the intellectually disabled person and his employer, providing skill training, advocating for the disabled, and mediating problems that might arise. The third type of employment is competitive, where the disabled individual works at a regular job without support. Some of the typical jobs that might be pursued include animal caretakers, laundry workers, building maintenance workers, library assistants, data-entry clerks, mail clerks, store clerks, messengers, cooks, printers, assemblers, factory workers, photocopy operators, grocery clerks, sales personnel, hospital attendants, housekeepers, statement clerks, automobile detail workers, and clerical aides.

Recently, there has been a fourth niche that has opened up for some people with intellectual disabilities: entrepreneurship. Many of these business ventures are artistic in nature. Clara Link, who has Down syndrome, is a professional photographer who travels to regional and national conferences for her work. Her photos have been published in several newsletters for national disability groups and in a brochure for the U.S. Census on disabilities. Ruth Tonack is a watercolor artist with Down syndrome whose work has taken her as far as Germany for training. Sujeet Desai is a person with Down syndrome who plays the violin, piano, clarinet, and bass clarinet and has traveled locally, nationally, and internationally sharing his musical talents with others. Susan Harrington, another Down syndrome person, works as receptionist at the Massachusetts Center for Mental Retardation, and was one of the stars of MTV's *How's Your News*, a television program that featured a team of reporters with disabilities who took a bus across the country, along the way interviewing interesting people. Other prominent individuals with intellectual disabilities who've found a special niche include artist Judith Scott; Miguel Tomasin, singer with the Argentinean avant-rock band Reynols; motivational speaker Karen Gaffney, and actors Danny Alsabbagh and Tommy Jessop.

Naturally, not every person with intellectual disabilities can be a star of radio, television, or movies. But it's possible for them to find their own niche that satisfies their desire for personal achievement and satisfaction. Thirty-one percent of people with intellectual disabilities work, but many more who would like to work are unemployed, in part due to a history of institutionalization and persistent public stereotypes

of them as unreliable, slow to learn, and possibly even violent. Yet most individuals with intellectual disabilities who work are reliable, dedicated employees. CEO Greg Heim of the company Modern Drop Forge, has employed Eddie Aguire, who has an intellectual disability. Heim says, “I wish half of my employees came to work as excited as Eddie does.” Strong company loyalty means lower turnover rates. A three-year study at Washington Mutual, Inc., found a turnover rate of 8 percent among people with developmental disabilities (a category that includes autism, cerebral palsy, and other conditions besides intellectual disability), compared with an overall rate of 45 percent.²⁰

Even among those whose mental or physical disabilities are so great that they cannot work or go to school, and who have significant struggles with daily tasks, there are still positives to be observed and even measured. Sociologist David Goode was one of the first social scientists to provide an “inside account” of a severely intellectually and physically disabled person; a six year old named Christine. While others could not understand the rationale behind Christine’s behaviors, Goode developed ways of entering Christine’s world (through imitating her behaviors, among other strategies) and discovered that she responded enthusiastically to sound stimulation, especially to the rhythm and frequency of music. She also responded to touch and any form of physical interaction, using her tongue to gain knowledge about the outside world. Anthropologist Jani Klotz notes, “Through entering Chris’ world on her own terms, Goode was able to establish a meaningful and mutual basis for their relationship. He was able to see her as the producer of meaning and culture.”²¹ One group of researchers has actually developed a “happiness index” to measure the positive affect of people with profound intellectual disabilities. This is defined by the percentage of positive affect (e.g., smiling, laughing) minus the percentage of negative affect (e.g., crying, grimacing). They discovered that the happiness index rose when the people were enrolled in fun-time leisure activities and engaged in enriched client-staff interactions.

Ultimately, anyone who wants to understand the strengths and abilities of people with intellectual disabilities needs to detach herself from “normal” methods and indexes for assessing competence in the world and embrace a wider vision of human potentialities. As Ron Jones, an educator at the Recreation Center for the Handicapped (now the Janet Pomeroy Center) in San Francisco, put it:

Participants, called mentally disabled, just don't perform in normal ways. You can feel it when walking into the Center. Every visitor notices. "The feeling." It's an openness. Participants close around you. There is no respect for the normal social distance between people. Often the visitor is simply hugged. You can feel it. Compassion. Kindness. . . . You are not evaluated by your size, sex, age, gender, weight, hair cut, or polka dot shoes. You are welcomed into this moment of life. . . . Within the mentally disabled population there is no prejudice. No racism. No bias of any kind. . . . I've always felt that if aliens from another place ever stopped at the Center they'd report home—"They are a playful, peaceful living people, they cannot add or subtract and manipulate ideas, but their capacity to feel, to be expressive, to be inclusive is something to measure life by."²²

CHAPTER 8

Thinking in a Different Key

Great Wits are sure to Madness near ally'd, And thin Partitions do their Bounds divide.

—JOHN DRYDEN,
Absolom and Achitophel

Philip K. Dick was an American novelist, short-story writer, and essayist whose work focused almost entirely on the genre of science fiction and whose novels have been made into such popular movies as *Blade Runner*, *Total Recall*, and *Minority Report*. Dick drew on his life experience in fashioning works of fiction that encompassed altered states of consciousness, monopolistic corporations, authoritarian governments, metaphysics, and theology. In one of his novels, *Clans of the Alphane Moon*, written in 1964, a small moon in another star system that had served as a psychiatric facility in times past has been abandoned by its keepers for many years. In the interim, the patients have organized themselves into “clans” based on their psychiatric diagnosis. The Deps, or depressives, live “in endless dark gloom.” The Manses, or people suffering from mania, are the warrior class. The Pares, or paranoids, live in a heavily fortified settlement called Adolfville (after Adolf Hitler). The Ob-Coms, or obsessive-compulsives, are the ritualistic functionaries of the society, with no original ideas of their own. The Skitzes, who have schizophrenia, represent the poet class, with some of its members being religious visionaries. They live in a town called Joan D’arc, which is “poor materially, but rich in eternal values.”¹

Dick himself may have been schizophrenic. He wrote, “I want to write about people I love, and put them into a fictional world spun out of my own mind, not the world we actually have, because the world we actually have does not meet my standards. . . . In my writing I even question the universe; I wonder out loud if it is real, and I wonder out

loud if all of us are real.” A drug user for much of his life, he had a pivotal experience on February 24, 1974, when, recovering from the effects of sodium Pentothal for a wisdom-tooth extraction, he answered the door to receive delivery of another painkiller, when he noticed that the delivery woman was wearing a pendant bearing early Christian symbology. He said later, “I experienced an invasion of my mind by a transcendently rational mind, as if I had been insane all my life and suddenly I had become sane.”² Throughout the next couple of months, he was confronted by a series of visions, including images of laser beams, geometric figures, and pictures of Jesus and of ancient Rome. He began to see himself as living the personality of Simon Magus, a Gnostic from the first century CE. Eventually, Dick became paranoid, imagining plots against him by the KGB and FBI. He died of a stroke on March 2, 1982, at the age of fifty-three.

Schizophrenia: Not a Romantic Illness

Dick’s confabulation of schizophrenia with mysticism and the arts may strike some as the romanticizing of a dreadful illness. Schizophrenia affects roughly one in every hundred people. Men and women are equally affected, although schizophrenia tends to strike men in their late teens and early twenties and women in their twenties and thirties (an earlier term for schizophrenia, *dementia praecox*, means “premature dementia”). While onset in childhood is rare, it does occur in children as young as five. Symptoms of schizophrenia include unusual thoughts or perceptions; hallucinations; delusions; thought disorders; a decrease in the ability to make plans, initiate actions, or feel pleasure in everyday activities; and problems with attention and memory. Despite popular opinion to the contrary, schizophrenia does not mean split personality, but rather refers to a broader fracturing of the sense of self and a disturbance in the relationship between the subjective and objective worlds in human personality. Another common stereotype about schizophrenics is that many or most are violent, while in reality violence is no more common in schizophrenics than in so-called normal people. Unfortunately, violence against the self—suicide—is a major problem in schizophrenia, with up to one in four attempting suicide, and one in ten succeeding. Schizophrenia is a

strongly heritable condition. A first-degree relative (parent, brother, or sister) of a person with schizophrenia is ten times more likely to get the disease, and an identical twin has a 40 to 65 percent chance of developing the disorder.

The underlying neurological issues surrounding schizophrenia are complex and still largely unknown. However, research suggests that schizophrenia appears not to be a focalized disease where a lesion in a specific area of the brain causes dysfunction but rather a broad-based disorder affecting connectivity between several areas of the brain. Studies show a progressive loss of gray matter in the brain, beginning with the parietal lobes (affecting sensory experiences), then spreading to the temporal lobes (affecting language and auditory experiences), and finally reaching the frontal lobes (affecting executive functioning, cognition, and restraint of impulses). The earlier the onset of schizophrenia, the more extensive the brain damage. If the onset is in the early teen years, for example, the loss of gray matter may be as much as 25 percent over several years' time.³ In particular, there is the loss of a specific category of neurons known as “basket cells” that constitute only 10 percent of the cells in the brain (and act in an inhibitory way) but control the other 90 percent of cells (which act in an excitatory way).⁴ Also, in cognitively impaired schizophrenics, there is reduced volume of white matter—the “wiring” or fatty tissue surrounding and insulating the axon of each neuron. White matter allows for the speedy processing of messages between brain cells (up to one hundred times faster). Finally, there appears to be an excess of connectivity in an area of the brain involved in self-reflection.⁵ This tends to create self-absorption even when the person is engaged in activities in the outer world. For example, while watching television an individual may perceive the announcer's voice as talking directly to him. These and other findings suggest that schizophrenia is a serious disorder of the brain.

The Schizophrenia Paradox

There is, however, a paradox related to schizophrenia. On the one hand, it's a disease that leaves its subjects unlikely to procreate and pass their genes on to the next generation (few schizophrenics have offspring).

On the other hand, the genes for schizophrenia are still in the gene pool. In fact, the rate of schizophrenia worldwide has been relatively stable at 1 percent of the population. If schizophrenia is such a terrible and nonadaptive disease, why haven't its genes (and there appear to be many) been selected out by evolution? The answer seems to be that although a full dose of these genes may be disadvantageous, at least some of these genes have value to the culture. We see this kind of a trade-off most clearly in nonpsychiatric diseases like sickle-cell anemia, where a full-blown version of the disease is often fatal but a partial version confers an immunity to malaria, or Tay-Sachs disease, which in the full-blown version destroys the nervous system in a matter of months but where a partial version provides immunity to tuberculosis. In the case of schizophrenia, there are partial versions—lesser versions along the schizophrenia spectrum—that are not as destructive as full-blown schizophrenia but confer certain advantages.

There is, for example, schizotypal personality disorder, in which individuals are generally socially isolated with odd behavior and often unconventional beliefs. These individuals have some of the eccentricity of schizophrenia but don't suffer from large-scale damage to the brain affecting executive functioning, learning, and memory. Because of their nonconformist personalities, they often show higher levels of creativity. In one study, schizotypal, schizophrenic, and normal subjects were asked to make up new functions for a variety of common household articles. The schizotypal subjects were better able to suggest new creative uses for the objects than either the schizophrenic group or the normal group. "Thought processes for individuals with schizophrenia are often very disorganized, almost to the point where they can't really be creative because they cannot get all of their thoughts coherent enough to do that," said Vanderbilt psychologist Brad Folley, one of the researchers in the study. "Schizotypes, on the other hand, are free from the severe, debilitating symptoms surrounding schizophrenia and also have an enhanced creative ability."⁶ Brain scans of all the groups during the creative tasks showed that the schizotypal group tended to activate more of the right hemisphere than either of the two other groups.

Many of these schizotypal personalities are first-degree relatives of individuals with schizophrenia. The two greatest scientific discoveries of the twentieth century, arguably—the theory of relativity and the double-helix model of DNA structure—were made by men who had

schizophrenic sons (Albert Einstein and James Watson), and perhaps the greatest writer of the twentieth century, James Joyce, had a schizophrenic daughter. Although it is not possible to state with certainty that these world-famous figures were schizotypal, one may suggest that they had some of the genes of their offspring, and were at least working close to the realms of madness. Who would believe, for example, that the shortest distance between two points is a curved line? Who would believe that time can slow down, that space can shrink, that energy is matter? Who would believe that biological life is based on the shape of a double helix? Who could accept a line like this one from Joyce's *Finnegans Wake* and not believe it was written by a crazy man? "Where the Baddelaires partisans are still out to mathmaster Malachus Micgranes and the Verdons catapulting the camibalistics out of the Whoyteboyce of Hoodie Head."⁷ In studies of the entire population of Iceland, people who scored at the top of their class in academic subjects, especially in mathematics, or who showed more creativity, were more likely to have first-degree relatives who had experienced psychosis than those who were less successful or creative.⁸

Schizophrenia and the Origins of Humanity

Some researchers have suggested that the beginnings of schizophrenia can be found in evolutionary developments that took place during the emergence of *Homo sapiens* around a hundred thousand years ago. David Horrobin, author of *The Madness of Adam and Eve: How Schizophrenia Shaped Humanity*, has hypothesized that mutations controlling the fat content of brains ultimately led to the ability to make quicker and more complex neurological connections (note, for example, the role of fat in making up the myelin sheathing that insulates neuronal pathways, thus allowing faster and more precise transmission). This meant a quantum leap in terms of the ability of human beings to think creatively, develop religions, use symbol systems, create languages, and build civilizations. But it also left the human brain vulnerable to a variety of mental disorders, including schizophrenia. "Some of us became schizophrenic, some bipolar and some psychopathic," writes Horrobin. "In each case the pathological behavior was relatively mild because the biochemical changes were

compensated for and attenuated by our water-based diet, rich in the fatty acids needed by the brain. But the change was sufficient to unleash the extraordinary surge of creativity which characterized the past 100,000 years. Instead of being uniform, we became diverse; instead of being relatively stable, we created constant change; instead of being egalitarian, we began more and more to differentiate from the rest those with special skills in technology, art, religion and psychopathic leadership. We became human.”² As the human diet changed from a hunter-gatherer diet rich in fat to an agricultural one that contained less fat, the incidence of schizophrenia increased. Current studies indicate that people with schizophrenia are deficient in some of these fatty acids, in particular omega-3, and preliminary research suggests that symptoms can be improved with the addition of omega-3 supplements to their diet.¹⁰

Support for Horrobin’s theory comes from a recent genetic study published in the *British Proceedings of the Royal Society* that examined the evolutionary patterns of certain gene variants associated with schizophrenia. After looking at DNA from several groups around the world, and examining the genomes of primates dating back to the common ancestor of humans and chimpanzees, researchers concluded that several gene variants linked to schizophrenia were actually positively selected and stayed largely unchanged over time, suggesting that there must have been some advantage in possessing them. The study focused on seventy-six gene variants most closely associated with schizophrenia. By comparing these variations with the evolution of other genes known to affect neurological development, researchers discovered that twenty-eight of the “schizophrenia genes” had been selected by evolution in recent years. One of the coauthors of the study, Bernard Crespi, an evolutionary biologist at Simon Fraser University in Canada, observed, “You can think of schizophrenics as paying the price of all the cognitive and language skills that humans have—they have too many of the alleles that taken individually . . . might have a positive effect, but together they are bad.”¹¹

Although the focus above, in terms of creativity and other positive outcomes, has been on schizotypal populations, one can look at schizophrenia itself, particularly milder versions where executive dysfunction has not been too badly compromised, and see positive elements. There are many examples of accomplished individuals from several walks of life who have had schizophrenia. The most famous

example, perhaps, is that of John Nash, the American mathematician who won the Nobel Prize in Economics in 1994 and whose life and struggles are recounted in the best-selling book and movie *A Beautiful Mind*. Although Nash did his best work before developing the symptoms associated with schizophrenia, he had been considered an odd duck even during his childhood and adolescence. Also, Nash himself has stated, “The ideas I had about supernatural beings came to me the same way my mathematical ideas did. So I took them seriously.”¹²

Another example of high achievement, this time in the midst of schizophrenia, is Elyn Saks, associate dean and Orrin B. Evans Professor of Law, Psychology, and Psychiatry and the Behavioral Sciences at the University of Southern California’s Gould School of Law. In her autobiography, *The Center Cannot Hold*, Saks details how she managed to graduate summa cum laude from Vanderbilt University, study at Oxford University on a Marshall Scholarship, and make it through Yale Law School, all the while suffering from intermittent psychotic breakdowns that from time to time totally incapacitated her. Other examples of highly accomplished individuals who have had mild to moderate schizophrenia include jazz musician Charles “Buddy” Bolden, Russian dancer Vaclav Nijinsky, artist Salvador Dalí, author Jack Kerouac, dramatist Antoin Artaud, Beach Boy superstar Brian Wilson, Broadway star Meera Popkin, and, as noted at the beginning of the chapter, science fiction writer Philip K. Dick.

Thought Disorder or Creative Act?

Even in full-blown schizophrenia, the creative impulse still makes itself evident. One can see this in the supposedly incomprehensible language, or “word salad,” expressed by some individuals with schizophrenia. Carl Jung, for example, wrote about his encounter with a woman named “Babette.” “From this case, I was able for the first time to understand the language of schizophrenics, which had hitherto been regarded as meaningless. . . . She would wail, ‘I am Socrates’ deputy.’ That, as I discovered, was intended to mean: ‘I am unjustly accused like Socrates.’ Absurd outbursts like: ‘I am the double polytechnic irreplaceable,’ or ‘I am plum cake on a corn-meal bottom,’ ‘I am

Germania and Helvetia of exclusively sweet butter,' [and] 'Naples and I must supply the world with noodles,' signified an increase in her self-valuation." Jung also suggested that schizophrenics tap into the collective unconscious more readily than so-called normal people. One illustration of this came from a man with schizophrenia who told him that with half-closed eyes he could see that the sun had a phallus and that this was the origin of the wind. Years later Jung recounts that he came across a text having to do with the liturgy of the Mithraic cult of ancient Rome that provided an almost identical version: "And likewise the so-called tube, the origin of the ministering wind. For you will see hanging down from the disc of the sun something that looks like a tube."¹³ Somehow, according to Jung, both the man and the ancient text were tapping into the same archetypal contents of the collective psyche.

A number of experimental studies have shown links between creative thinking and full-blown schizophrenia. In one, similar to the study noted above, schizophrenic subjects scored better than normal subjects by coming up with more unique and novel uses for different household objects. In another, they gave more nonconformist answers in a word-association task.¹⁴ As one artist, writer, and photographer with schizophrenia, Stuart Baker Brown, put it, "I am harnessing my creative side and now using my symptoms to work for me rather than against. This works for me in both writing and other art forms. The symptoms feed me the tools to become creative. I seem to be thinking all the time and the psychosis is not necessarily destructive. The experience of a hallucination can often be recalled in the creation of artwork or poetry, for example." Similarly, artist Timothy Foley observes, "After being diagnosed in 2001 with schizophrenia, it was easy to see where my bizarre artistic tendencies lied [*sic*]. I combine surrealistic patterns of thought, feelings and belief, along with an impressionistic view to construct my works. By mainly using internal strife and love lost, I work my means to create. Using color I compose my works to appease my current state of mind. I aim to reach beyond the obvious and instead delve into the subconscious mind's potential."¹⁵

In some cases, the creative side of schizophrenia may go unrecognized because it represents an unconventional form of creativity. Author and clinical psychologist Kay Redfield Jamison, for example, has written that "virtually all of the psychosis in creative

individuals is manic-depressive rather than schizophrenic in nature.”¹⁶ Rutgers University psychologist Louis A. Sass argues, however, that studies showing low creativity in schizophrenics are based on a romantic understanding of creativity, which measures it in terms of spontaneity, high levels of emotionality, and Dionysian passion. This form of creativity fits very well with manic-depressive individuals. Schizophrenics, on the other hand, seem best motivated by forms of creativity linked with modern and postmodern aesthetics, including a sense of alienation, hyper-self-consciousness, lack of narrative structure, pervasive social detachment, and flat affect.¹⁷ This isn’t the stormy creativity of Beethoven, Goethe, or Byron. Rather, it is the aesthetic of Andy Warhol, who said once, “I want to be a machine.”

It is also the aesthetic of Outsider Art. This genre refers to a class of art produced by individuals “outside” of the realm of professional art culture, which nevertheless possesses its own artistic merit. Many of those included within this movement were psychiatric patients and others with mental illness. One example is that of Henry Darger, a reclusive writer and artist who worked as a janitor in Chicago for many years. After his death, a great treasure trove of art and writings were discovered in his apartment, including a 15,145-page manuscript titled *The Story of the Vivian Girls, in What Is Known as the Realms of the Unreal, of the Glandeco-Angelinnian War Storm, Caused by the Child Slave Rebellion*. There were also several hundred watercolor paintings illustrating this fantasy tale of a battle between good and evil in a terrifying world wracked by war and natural disasters. Another example of Outsider Art by a schizophrenic is the work of Johann Knopf, a German baker, factory worker, and locksmith. Institutionalized after a suicide attempt, Knopf believed that he was “the Resurrection” and that nobody suffered as much as he—not even Christ. His art includes images of Christ/Knopf in simple geometric style. Bodies are transparent, revealing internal organs and objects such as knives and keys. Knopf believed he could understand the language of birds, and his art included many images of these, which in his mythology represented tragic creatures. He filled the empty space in his art with “explanatory” writing. While displaying symptoms of schizophrenic delusions in their art, these individuals nevertheless were able to couch their symbology in an aesthetic framework that caught the attention of art and literary critics who viewed the work on their own merits and not as the ravings of a bunch of lunatics.¹⁸

An important caveat to the above material is that the worse the symptoms of the schizophrenic, especially with regard to thought disorders and executive function (the ability to coordinate many cognitive tasks at one time) the worse their performance on creative tasks. As one researcher stated, “Poor executive functioning is advantageous in the ability to make a creative response, but only up to a point. Severely disruptive executive functioning is detrimental to creative performance, whereas milder levels of reduced function can be advantageous on some facets of creative cognition.”¹⁹ Both individuals with schizophrenia and creative people appear to be more open to incoming stimuli from the surrounding environment and less likely to file them into convenient categories that can be sorted and then forgotten. Thus, they are always open to new possibilities. With severe schizophrenia, however, subjects are likely to be overwhelmed by the stimuli and unable to edit, select, and choose the appropriate stimuli for creative production. As schizophrenia sufferer Elyn Saks put it:

The regulator that funnels certain information to you and filters out other information suddenly shuts off. Immediately, every sight, every sound, every smell coming at you carries equal weight; every thought, feeling, memory, and idea presents itself to you with an equally strong and demanding intensity. You’re receiving a dozen different messages in a dozen different media—phone, email, TV, CD player, friend knocking at the door, ideas inside your head—and you’re unable to choose which ones come to the front and which are related to “later.” It’s the crowd at the Super Bowl, and they’re all yelling directly at you.²⁰

Assault on Rationality

We’ve discussed in earlier chapters how each of the brain differences covered in this book tends to be regarded as a disorder because it violates some basic value of modern Western culture. For schizophrenia, this value is *rationality*. When they experience delusions

and hallucinations, schizophrenics do not display logical acumen and thus pose a threat to the basic order of things in our *reason-able* culture. In fact, schizophrenia and other forms of madness were not even recognized as a major problem until the French Enlightenment, that period in the eighteenth century when rationality became the philosophical foundation of society for the coming centuries. As psychiatrist E. Fuller Torrey explained in his book *The Invisible Plague: The Rise of Mental Illness from 1750 to the Present*, “A few observers in the seventeenth century expressed concern, but the prevalence of insanity remained low compared with what was to come. By the eighteenth century, the stream of insanity had begun to gather force, and cases appeared with increasing frequency. Members of the public now noticed and asked why. Physicians expressed concern.” French philosopher Michel Foucault observed in his book *Madness and Civilization* that before the Enlightenment, “boats conveyed their insane cargo from town to town. Madmen then led an easy wandering existence. The towns drove them outside their limits; they were allowed to wander in the open countryside, when not entrusted to a group of merchants and pilgrims.” But with the advent of the Age of Reason, the situation changed radically, according to Foucault: “Madness will no longer proceed from a point within the world to a point beyond, on its strange voyage; it will never again be that fugitive and absolute limit. Behold it moored now, made fast among things and men. Retained and maintained. No longer a ship, but a hospital.”²¹

One aspect of irrationality in schizophrenics not yet discussed is their avid interest in religion, spirituality, and mysticism. In one study of schizophrenic outpatients in Switzerland, one-third were involved with a spiritual community, while another third gave a significant role in their lives to spirituality, carrying out spiritual practices every day on their own.²² While religious delusions can sometimes be harmful to a person with schizophrenia (“One night when I was persecuted by voices, I drove a knife into my belly to kill the demons”), spiritual and mystical experiences in schizophrenia can also represent an uplifting element in their lives. As far back as ancient Greek times, Socrates praised the role of the divine in madness. In his dialogue *Phaedrus*, he observed, “There is also a madness which is a divine gift, and the source of the chiefest blessings granted to men.”²³ Socrates reported four different kinds of “blessed madness,” including those of prophecy, poetry, love, and mystical ritual. Clinical psychologist David Lukoff

illustrates this kind of divine madness through the case study of a man reported as suffering from “acute schizophrenic reaction” who experienced several phenomena that were similar to a mystical experience. The man indicated his experience was “beyond words” and described his mood using words such as “ecstasy” and “rapture.” He believed he had unlocked some deep truths of universal importance. He had visual hallucinations of yellow birds against a brilliant orange sky. Unfortunately, many clinicians fail to recognize the value of these experiences. In one study, clinicians tended to underestimate the importance of religion and spirituality to their schizophrenic clients. Psychologist Peter K. Chadwick notes, “Because of their focus on mechanism within a monistic framework, materialistic scientists may well not fully respect the spiritual and artistic values of the psychotic experience. Such realms of phenomenology certainly deserve much more research.”²⁴

Shamans, Holy Fools, and the God-Intoxicated

In other cultures, however, which are based less on rational grounds than contemporary Western culture, people with symptoms that might be regarded as schizophrenic by Western clinicians are in some cases celebrated as gifted, and their talents are utilized by the community. Such might be the case, for example, with the shamans of indigenous cultures. Mythologist Joseph Campbell suggests that the adolescent onset of schizophrenia in the Western world may be regarded as a mythical breakthrough in a shamanic culture: “The shaman is a person (either male or female) who in early adolescence underwent a severe psychological crisis, such as today would be called a psychosis. Normally the child’s apprehensive family sends for an elder shaman to bring the youngster out of it, and by appropriate measures, songs, and exercises, this experienced practitioner succeeds.”²⁵ Similarly, Hungarian explorer Vilmos Dionszegi collected many reports about shamanic “sicknesses” and wrote about a wife’s account of her shaman husband’s malady:

How did he become a shaman? Sickness seized him when he was twenty-three years old and he became a shaman at the age

of thirty. That was how he became a shaman, after the sickness, after the torture. He had been ill for seven years. While he was ailing, he had dreams: He was beaten up several times, sometimes he was taken to strange places. He had been around quite a lot in his dreams and he had seen many things. . . . He who is seized by the shaman sickness and does not begin to exercise shamanism, must suffer badly. He might lose his mind, he may even have to give up his life. Therefore he is advised, “You must take up shamanism so as not to suffer!” Some even say, “I became a shaman only to escape illness.”²⁶

Anthropologist Julian Silverman sees basic similarities in the experiences of schizophrenics and shamans. Like schizophrenics, some shamans (note that there are a wide variety of types of shamans around the world) exhibit “non-reality oriented ideation, profound emotional upheavals, and bizarre mannerisms.” Both schizophrenics and shamans, according to Silverman, go through a psychological process that includes guilt, failure, isolation, estrangement, narrowing of attention, fusing of dreamlike states with waking experiences, and a reorganized sense of reality. A major difference between the two, however, is that in indigenous cultures, this process is supported, seen as helpful to the individual, and regarded as beneficial to the collective. On the other hand, Silverman continues, “in a culture that does not provide referential guides for comprehending this kind of crisis experience, the individual (schizophrenic) typically undergoes an intensification of his suffering over and above his original anxieties.”²⁷

Other nonrational cultures also have individuals who might be regarded in our medicalized society as being psychotic or inhabiting some position along the schizophrenic spectrum. In old Russia, for example, there was a special category of saints referred to in Russian as *yurodivy* (holy fool). These religious members of the laity (outside of the organizational structure of the Eastern Orthodox Church) constantly defied the rules set by society and the church. They were often unkempt or naked, shouted insults and blasphemies, and carried out actions that might in another context be considered offensive or criminal (e.g., the taking of a shopkeeper’s merchandise), but which in old Russia were considered to be blessings. According to Russian scholar Svetlana Kobets, “[The holy fool] was in fact invariably

regarded as mad, both by those who accepted his special status and by those who refused to recognize it.”²⁸

India has a long tradition of “God-intoxicated” individuals who appear in their behavior to be psychotic but who are seen to possess special spiritual status and are taken care of and pampered by the local community. In an account of a guru’s visits to several of these “masts” (pronounced “musts”), one of them spent most of the day walking in a circle around and around a telegraph pole. He would ask people passing by for money, and when he was given it, he’d throw it away. Another mast hung around a fruit market, constantly scribbling obscure numbers and nonsensical words several feet long on roads, pavements, plinths, parapets, walls, and boards. He was supplied with as much chalk as he needed by the local shopkeepers.²⁹

Essentially, these individuals had each found a particular “niche” within which their “pathologies” were tolerated and their perceived inner talents and abilities were acknowledged and celebrated by the surrounding culture. It may be this quality of acceptance that explains a World Health Organization study, which revealed that diagnosed schizophrenics in third world countries had better outcomes than those in Western culture. The percentage of people with severe or persisting symptoms and chronic disability was much smaller in non-Western cultures than in those of industrialized nations.³⁰ The same may be said of accomplished individuals with schizophrenia: their outcomes improved when they were in environments, or “niches,” that accepted who they are, believed in them as persons with human dignity, and celebrated their individual contributions to society.

Niche Construction in Schizophrenia

One can see this particularly well in the lives of two individuals mentioned earlier, Nobel Prize winner John Nash and Associate Dean of the USC Law School Elyn Saks, both of whom struggled with schizophrenia, endured hospitalizations, underwent difficult treatments such as shock therapy and insulin coma therapy, yet were able to ultimately triumph over adversity and find their place in society. In both cases the library seemed to represent a safe haven for them, a place where they could concentrate on their intellectual specialties

relatively free from the disturbances of schizophrenia and the stigma of mental illness. During the 1970s and 1980s John Nash sought refuge in the library at Princeton University, where he was known as the Phantom of Fine Hall. Nash's odd behaviors, if not exactly understood, were at least tolerated by students and faculty at Princeton. Nash's biographer, Sylvia Nasar, writes, "Princeton functioned as a therapeutic community. It was quiet and safe; its lecture halls, libraries, and dining halls were open to him; its members were for the most part respectful; human contact was available, but not intrusive." She concludes, "To have his delusions seen not just as bizarre and unintelligible, but as having an intrinsic value, was surely one aspect of these 'lost years' that paved the way for an eventual remission." It may be, too, that the advent of computers during this same period of time served to give him a special focus that took his mind off of bizarre thoughts. He readily took to computer programming and used it to test many of his mathematical ideas, saying, "I began to study mathematical problems and to learn the computer as it existed at the time. I was helped [by mathematicians who got me computer time]."³¹

Elyn Saks also used the library as a refuge. But for her psychoactive medications and long-term psychoanalysis seemed to have the most dramatic benefits. In her autobiography, *The Center Cannot Hold*, Saks writes of her difficulty coming to grips with the fact that medications were necessary to control her symptoms. She felt that she had to overcome schizophrenia through sheer willpower, yet repeatedly deteriorated when she went off her medications. She states, "As exasperating and frightening as my years-long process of tinkering with my meds was for my friends and physicians, I understand now that it was hugely important for me to do it; it was a necessary stage of development that I needed to go through to become my full-fledged self. It was the only way I could come to terms with the illness." An essential tool for her to work through this process, however, was psychodynamically based talk therapy. Although talk therapy for schizophrenia is generally downplayed in the psychiatric community (Freud believed the patient was too narcissistic to benefit), some disciples of Freud, including Melanie Klein and Harry Stack Sullivan, saw it as an important tool in building the self-structures of the person. In Saks's case, it proved to be a godsend. Seeing her therapist several times a week enabled her to unwind all of her fragmented parts and, through the holding power of the therapist, construct a sense of

selfhood in the midst of chaos. “While medication had kept me alive,” she writes, “it had been psychoanalysis that had helped me find a life worth living.”³²

Although schizophrenics are often regarded as interpersonally distant, it seems important in constructing a niche for the individual to have a relationship with someone who accepts them as a whole human being. As British psychologist Peter Chadwick points out, “The acceptance of psychotic thought can, in specific instances, be calming and reassuring and indeed can prevent problems from escalating.” He writes of an instance when a patient suddenly uttered the words, “Is this letter a telephone?” This was a question a woman asked him after receiving a letter from a former lover who had gone to live in America. She believed that her estranged lover could actually hear her thoughts through the letter as if they were conversing on the telephone. Rather than dismissing this statement as an example of thought disorder, Chadwick instead chose to emphasize the positive dimensions of the thought by creating a poem with her. Chadwick speculates, “Perhaps a sense of closure is achieved by making something constructive out of psychotic/poetic sparks.”³³ This process of closure ultimately serves to reconnect something that has been disconnected, so that the ultimate wholeness of the individual is revealed.

It is this wholeness that makes schizophrenia such a mystery. On the one hand, schizophrenia represents a fracture of that wholeness that we generally refer to as the “self.” On the other hand, as we’ve seen in this chapter, schizophrenia has connections to realms that are themselves *imbued* with wholeness: creativity, spirituality, magic, imagination. It’s this paradox that makes understanding schizophrenia so difficult. More than perhaps any other condition covered in this book, the topic of schizophrenia leaves us puzzled, wondering how the positives and the negatives fit together. Ultimately, there may be no easy answer to this problem. However, it seems clear that schizophrenia is connected to something very profound having to do with our own evolution. As Peter Chadwick puts it, “To suffer from schizophrenia is to be human. This is partly because vulnerability to it is associated also with the workings of the creative process, with language, high sensitivity and imaginativeness generally and in many instances with enhanced spiritual sensitivity and empathy. We could not eliminate schizophrenia as we can eliminate smallpox without doing serious and irreversible damage to our species.”³⁴

CHAPTER 9

Neurodiversity in the Classroom

*He drew a circle that shut me out—
Heretic, rebel, a thing to flout.
But love and I had the wit to win:
We drew a circle that took him in.*

—EDWIN MARKHAM,
“OUTWITTED” (1915)

Katie Apostolides was a conscientious student at Mount Aloysius College in Cresson, Pennsylvania. She began preparations for midterm exams on the first day of class. She started working on term papers and class projects on the day they were assigned. She had a tutor for each of her classes and met with them weekly. She knew a lot of tips for studying more effectively, including taking study breaks and sitting at the front of the class. But what is especially remarkable about Katie is that she has Down syndrome. The common wisdom suggests that people with Down syndrome are not supposed to be able to go to college. This year, however, Katie was awarded an associate’s degree in science.¹ Katie’s mother, Paulette, says that part of the reason Katie has made so much progress in her academic learning is that she attended regular classes—rather than special education classes—at Pittsburgh-area elementary, middle school, and high schools. This enabled her to learn alongside of her nondisabled peers rather than being sequestered in an environment with only intellectually disabled kids.

Katie is one of the lucky ones. Despite the fact that neurodiverse children in the United States have far more opportunities to learn than they did a century ago, there is still a long way to go before special education merges with regular education and all kids with labels are able to learn alongside of their nonlabeled peers. One of the biggest problems is that special education has developed over the past century

as a completely separate system from regular education. The first special schools for the mentally retarded were instituted in the United States in the nineteenth century, and by the middle of the twentieth century there were special classes for kids with mental retardation in most public schools. By the 1960s parent advocacy groups had started to press for special education services for other disability categories as well, including “learning disabilities,” a term that was coined in 1963 by special education professors Samuel Kirk and William Cruikshank. The 1970s saw major special education legislation enacted with the Education of All Handicapped Children Act (PL 94–142), passed in 1975. This act mandated that children with special needs receive an appropriate education in the public schools and that they be placed in “the least-restrictive environment.” This opened the floodgates to special programs for children with learning disabilities (this group now constitutes almost half of all special education students). In the 1980s kids with behavior problems and attention deficit disorder were the focus of parent advocacy groups, and in 1991 they were included in special education programs, largely under the authority of Section 504 of the Rehabilitation Act. In 1990, PL 94–142 was reauthorized by Congress and became known as the Individuals with Disabilities Education Act (IDEA). This act added autism and traumatic brain injury to the list of disabilities eligible for special education services.

A World of Deficit, Damage, and Dysfunction

The intention of much of this advocacy and legislation was to meet the requirements of kids with special needs, and to an extent it has succeeded in doing so. However, as noted above, it has also created a monolithic structure—called special education—which has its own unique ecology separate from the regular education system. Special education has its own training programs, its own diagnostic tests, its own special instructional programs, its own special jargon for talking about educational issues (e.g., “Julie has auditory sequential memory problems as measured by the Woodcock Johnson Test of Cognitive Abilities”), and its own philosophies about educating children—largely philosophies that are based on deficit, damage, and dysfunction rather than strengths, talents, and abilities. I was acutely aware of this deficit

orientation while working as a special education teacher in Canada and the United States for five years. During my orientation to my first special education job, I was taken into a special education classroom by my supervisor and heard the special education teacher say, out loud, in front of the ten students in the class, “These are my *slow* learners.”

In the course of my five years of special education teaching, I was constantly admonished for treating my students as whole human beings and was reminded that my purpose there was to “remediate deficits.” After I finally stopped working as a special education teacher, I was relieved to find out I wasn’t the only one who felt that kids’ strengths weren’t being acknowledged in the special education system. I read an editorial in a major professional journal, the *Learning Disability Quarterly* (LDQ), where the editor wrote passionately that she was quitting her position as editor because there was too much emphasis on deficits in the field of learning disabilities. She wrote: “The horrifying truth is that in the four years I have been editor of LDQ, only one article has been submitted that sought to elaborate on the talents of the learning disabled. . . . Why do we not know if our students are talented in art, music, dance, athletics, mechanical repair, computer programming, or are creative in other nontraditional ways? . . . It is because . . . we care only about competence in its most traditional and bookish sense—reading, writing, spelling, science, social studies, and math in basal texts and worksheets.”² Recently, I examined the past ten years of issues for the *Learning Disability Quarterly* to see if things had changed. They hadn’t. None of the articles focused on the strengths, talents, or abilities of kids labeled learning disabled. It’s true that the IEPs (Individual Educational Plans) that we were required to fill out for each special education child sometimes had a box that asked us to write in what were the strengths of the child. However, this was never given much importance. Often a boilerplate answer was supplied like “tries hard”—which when you think about it is really kind of a negative statement, since it implies that if the student were brighter, she wouldn’t have to try so hard.

When kids enter the special education system, they enter a world that is easier to get into than to get out of. Yet, despite this, students in my classes were constantly asking me, “When can I get out of this retarded classroom?” For them, it was a stigma to be seen going into the special education classroom or “resource room” (a place that they visited for one or two hours a day, taking the rest of their classes with the

“regular” students). Research reveals that special education students are often bullied or called names like “stupid” or “retard.” Many of them experience emotional, social, or physical isolation as a result of being a special education student.³ As one student told his teacher: “Mrs. Albinger, if you make me keep coming to resource, I’ll just be a bum out on the street [pointing out the window]. All the bums out there went to resource.”⁴ Another student, who was part of a study examining student perceptions of special education, observed:

I know I have to be in a special ed class and I don’t like that part. But I can’t go in the regular classes because I wouldn’t make it. I was in a regular math class and I hated that. All my friends were like, “oh I’m in Algebra, what did you get?” “Oh, a low math.” . . . I didn’t like being in the resource math. I feel different. I feel left out from everybody else. But I know I could be in an all day [special education] class, so I’d be with really bad people, so I guess I’m lucky I’m not like that.⁵

A further study quoted a math teacher who fondly called a favorite “LD” (learning disability) student D. D., which was an abbreviation for “Darling Dummy.”⁶

Another major problem with special education is that it is usually not very exciting. Of course, there are exceptions to this rule. I’ve seen some special education classes that were rich in curriculum, and I’ve met special education teachers who were among the most enlightened and progressive educators in their school building. But there seems to be a kind of entropy going on in many special education classrooms. Since special education is based on deficit, there doesn’t seem to be much of anything really dynamic going on in the room. Kids aren’t creating rain forests or acting out Shakespeare. Mostly, it’s students sitting at tables or desks filling out workbooks or worksheets or doing exercises that belong to some spiffy special education program like the Orton-Gillingham method, or the Lindamood-Bell Learning Processes, highly structured programs designed to remediate specific reading and writing skills. To some extent, many special education classes still conform to what used to be called the “Cruikshank classroom”—a classroom that was designed for the “hyperkinetic” or “minimally brain-damaged” child (these were terms used in the 1950s and 1960s

for kids whom we now label ADHD). This classroom had no posters, study carrels that blocked off stimulation, a lack-luster interior design, and not much else.

There is also another, darker, side to special education that has recently come to light. This involves the hidden abuse of special education kids. Recent reports by the National Disability Rights Network and the Government Accounting Office reveal numerous cases of children in “special” classes being secluded, restrained, and paddled, often without parental consent. Cases include:

- children with disabilities who have been forced to sit in their own urine in seclusion
- children who were taped to chairs to keep them immobile
 - a child who was tied to his wheelchair, bound with Velcro, and kept in a van for two hours
- a nine-year-old Down syndrome child who was dragged across the playground, sustaining significant skin abrasions
- a child with bipolar depression and autism whose arm was broken while he was being restrained
 - a fifteen-year-old boy with autism who died while being physically restrained on his stomach with hands behind his back and shoulders and legs held down by four employees⁷

Forty-one percent of states have no laws, policies, or guidelines regarding restraint or seclusion in public schools. Almost 90 percent still allow the kind of prone restraint that killed the fifteen-year-old boy with autism. Students with mental and physical disabilities are punished at disproportionate rates. In Texas, for example, special education students constituted 18.4 percent of the total number of students who were physically punished even though they make up only 10.7 percent of the student population.⁸

Many Children Left Behind

While special education has numerous problems connected with it, as noted above, in many respects regular education is not much better. Students with disabilities are supposed to be taught in the least-restrictive environment. The trouble is that the regular classroom is

often very restrictive even for regular classroom students. All students in regular classrooms labor under requirements imposed for academic achievement based on performances measured by standardized tests. There's not much room to be a whole person—exercising one's physical, emotional, creative, cognitive, and spiritual capacities. A student's presence as a test-taking machine is generally all that is required these days. And that's very restrictive. How can one possibly hope to include all students in an environment such as that?

Over the past century, American education has seen a shift from classroom learning that once embraced the arts, physical education, civics, math, science, social science, literature, and history—in other words, the education of the whole child—to one that has become more narrowly tied to reading, math, and science as measured by standardized tests. Several factors are responsible for these developments, including the development of mass-produced standardized achievement tests in the early part of the twentieth century, the rise of post-Sputnik politics in midcentury that emphasized how the United States was losing the war in the international marketplace of ideas, and the increasing involvement of the U.S. government and corporations in determining the structure of public education during the latter part of the twentieth century. The culmination of this trend was the passage of the No Child Left Behind Act in 2001, which specified heavy penalties for schools that could not make “adequate yearly progress” in reading math and science tests and specified that *all students* must achieve proficiency in these subjects by the year 2014. David C. Berliner, past president of the American Educational Research Association, in a review of NCLB, wrote, “We note in passing that only people who have no contact with children could write legislation demanding that *every* child reach a high level of performance in three subjects, thereby denying that individual differences exist. Only those same people could also believe that *all* children would reach high levels of proficiency at precisely the same rate of speed.”²

This kind of pressure places stresses on all students but hits special education students particularly hard. Despite their disabilities, many kids with difficulties in academics are required to take the standard proficiency tests along with students in the regular classrooms. Berliner observed, “We found instances where callous disregard for student welfare had replaced compassion and humanity, as when special

education students were forced to take a test they had failed five times.” Illinois principal and school superintendent Stephen A. Harman writes, “Asking a child with dyslexia today to perform on a paper-and-pencil reading test is like asking a paraplegic to run the hurdles.” Special education teacher Lynn Reichard told U.S. Secretary of Education Arne Duncan that she works all year to improve her children’s self-esteem only to see it fall apart when test time comes around. “They feel so good about themselves, and then they look at a two-paragraph reading passage, and they know six words,” Reichard said. “I have one child here that’s a nonreader, and she’s going to have to take the test, and she’s going to cry.” In Seattle two teachers were suspended for ten days for refusing to give the test to their students with severe cognitive disabilities. The teachers were simply following the requests of parents who didn’t want their children to take the test because it was too stressful (previously the kids had scored “zeroes” on it, despite its being an “alternative assessment” to the regular test).¹⁰ This emphasis on standardized tests as the bottom line in education in addition puts pressures on special education students by forcing them to spend hours a day preparing to take these tests instead of learning to become successful neurodiverse human beings in their own right.

The Magic of Inclusion

Fortunately, there are programs around the country that have managed to avoid the negative aspects of both regular and special education and that incorporate rich learning experiences for both labeled and nonlabeled kids in a single classroom. Perhaps the best-known example is the William W. Henderson Inclusion Elementary School in Dorchester, Massachusetts. The school practices full inclusion of its special education students, which constitutes about one-third of the student body. This means that neurodiverse kids and other students with disabilities are included full-time in the regular classroom with nonlabeled students. The emphasis at William Henderson is on strengths. The entire staff is trained to encourage each child to shine. Former principal William Henderson (now retired), shares some examples of how his staff holds a positive image of each student:

- the English teacher who depicts Johnny (who has learning disabilities) as a kid who writes great stories using that special computer program
- the Teacher aide who brags about how terrific Chuck (a boy with cognitive delays) has been combining geometric shapes
- the music specialist who relates how fantastic Ashley (who has autism) sings during music performances
- the cafeteria worker who shares how helpful Diana (who has emotional disorders) has been cleaning up in the lunch room period
- the special education teacher who points out to the physics teacher how Willy (who has ADHD) can fix all kinds of car problems
- the secretary who comments on how much more clearly Irma (who has speech and language delays) is communicating when she runs an errand to the office
- Maria (a girl with Down syndrome) who informs everyone that she is a fifth grade super star because of all the books that she has read.¹¹

Henderson emphasizes the importance of high expectations for his students:

We challenge students with Down syndrome as well as our most academically advanced students to read as much as they can. We challenge our students with cerebral palsy as well as our fastest runners to exercise as much as they can. We challenge our non-verbal students as well as our most polished speakers to communicate as effectively as they can. We challenge our students with autism as well as our “social butterflies” to interact as positively as they can. The goal for every child at our school is to “get smarter, feel smarter, and act smarter.”¹²

These kinds of high expectations are very different from the unrealistically high expectations of the No Child Left Behind Act, which imagines that all children can achieve a given test score on a particular date sometime in the future. This fantasy thinking reminds me of the superintendent of schools who articulated his educational

philosophy as: “I want to see all of the kids on the same page [of their workbooks] at the same time.”

Instead, William Henderson Elementary has a rich curriculum that allows all students to achieve in academic and nonacademic subjects in their own way and at their own pace. Henderson writes:

Regardless of the cognitive ability of the child, we want them to be involved in all subjects of study. This may mean simplifying the material for students, providing accommodations, and acting creatively in order to engage the child in the learning material to the best of their ability. Most students with disabilities need additional supports and specialized instruction. However, it is my belief that under IDEA, students with developmental disabilities should receive such services in the context of the general curriculum—while they are studying subjects like reading, writing, mathematics, social studies, science, physical education, and the arts.¹³

Students study Shakespeare, for example, but in different ways. Some read with their eyes, some with their fingers; one interprets it with a drawing, while another performs a skit. A fifth-grade teacher engages her students in a lesson on the literary genre of memoir. Some will read bound books. Some will listen to an audiotape. Others will use a computer program that displays and speaks the words of a scanned book. Individual students have specific instructional enhancements added to help them master the material according to their unique gifts and needs. The speech therapist constructs a set of voice recordings and picture symbols for Betsaida (who is nonverbal) so she can communicate her needs more successfully. The biology teacher creates a chart listing ways that Joshua (who has mild cognitive delays) can take responsibility for certain activities in the lab. The art teacher keeps a box of varying grips with her so that students with fine motor difficulties can better use drawing and painting implements.

Despite the fact that this approach to learning seems so natural and relatively easy to implement (especially when compared with trying to force all children to learn in the same way at the same time), there is still a great deal of opposition to full inclusion. Many people will acknowledge that children with disabilities benefit by being in a regular

classroom *some of the time*, but few are willing to admit neurodiverse kids into the regular classroom *all of the time*. Some people think they're doing inclusion when they have a special education teacher working with special needs kids at the back of the room while the regular classroom teacher instructs the rest of the kids in the main lesson. But they're really just enforcing old habits and patterns. This situation is a little bit like the segregated schools of the Old South, where there was reluctance to fully integrate African Americans into white schools. As former director of the Department of Education's Office of Special Education Programs Thomas Hehir points out, "There are still people who react very negatively to people with disabilities, and part of that reaction is to segregate them."¹⁴ What is required is a sea change in attitude, where parents, educators, and others begin to see people with disabilities as part of the spectrum of human abilities—part of the continuum we spoke about in [chapter 1](#).

The concept of neurodiversity provides an alternative approach where we begin to break down old divisions that separate people with disabilities from so-called normal people. The "neurodiverse classroom" is another way that we can begin to speak about full-inclusion programs in public and private schools. The opportunity to work with students of all backgrounds, abilities, and diversities is itself a positive learning factor that only inclusive education can provide. You can't get that kind of experience learning in the basement of a school with only autistic kids, or only kids with learning disabilities, or only children with emotional disorders. Research suggests that students who learn in inclusive classrooms construct a more positive image of themselves compared with students who learn in "segregated" classrooms.¹⁵ In many cases, it is the nonlabeled kids who benefit greatly from the experience. The autistic daughter of anthropologist Roy Richard Grinker was fully included in the Smithsonian Early Enrichment Center, which uses the experientially rich collections of the Smithsonian Museum complex to build a diverse curriculum. According to her teachers, Sharon Shaffer and Jill Mankowitz, Isabel's presence in the program was a positive influence on the other kids. "It's not just that Isabel introduced diversity into the classroom," Shaffer recalled. "Isabel made the other children less selfish." When Isabel was absent from school, the other students seemed different. "They were more competitive with each other, they snapped at each other. They didn't fall apart, but it was like they lost their center. Then when Isabel

came back to the classroom, they got back to normal.”¹⁶ At the same time, students who have been disruptive in other environments often succeed, with appropriate supports, in the inclusive classroom. At William Henderson, for example, the aggressive impulses of one boy were channeled in a constructive direction when he was made a peer-tutor kickball coach out on the playground. And at another full-inclusion school, the Falk Elementary School in Madison, Wisconsin, Jamal, a boy who had to be escorted out of school by police and spent second grade isolated because of “violent behavior issues,” spent all day, every day, in the regular classroom the next year without significant behavioral incidents and passed the third-grade state test.¹⁷

What Does a Neurodiverse Classroom Look Like?

The worst kind of inclusive classroom is the one where “business as usual” reigns, where the teacher lectures while the students sit quietly taking notes or are silently reading textbooks and writing in workbooks or taking tests. Yet this is often the setting where inclusion is first tried, and when it fails educators blame it on the inclusion process itself and not the shabby way in which it was implemented. Fully inclusive—neurodiverse—classrooms require a retraining of all teachers, both regular and special. In fact, a retraining needs to take place wherein the special education world and the regular education world are essentially dissolved, and out of this dissolution arises a new foundation—a new type of education based on neurodiversity—where understanding of the brain, familiarity with diversities of all kinds, expertise in utilizing assistive technologies, employment of alternative education strategies, construction of differentiated curriculum, and implementation of other means of meeting the needs of all learners take precedence over the old “regular” versus “special” dichotomy. Having said this, here are some of the specific features of what a neurodiverse classroom looks like:

The neurodiverse classroom contains students with many types of diversities. The neurodiverse classroom includes students with diversities related to culture, race, gender, and sexual orientation. In addition to the forms of neurodiversity covered in this book, the neurodiverse classroom includes disabilities such as language and communication delays, cerebral palsy, epilepsy, spina bifida, cystic

fibrosis, blindness, deafness, multiple sclerosis, muscular dystrophy, stroke, and multiple disabilities. It also includes students labeled as gifted and talented.

The neurodiverse classroom uses multiple intelligences instructional strategies and other universal design for learning methods. “Universal design for learning” is a philosophy originally used by urban designers to refer to the removal of environmental barriers to functioning whereby everyone’s functional capacity is enhanced.¹⁸ A good example of this in daily life would be the curb cut that was designed to give people with wheelchairs access to the city streets but also proved to be a benefit for parents pushing strollers, teenagers on skateboards, joggers, and the elderly. In the classroom, universal design refers to removing barriers to learning for kids with disabilities in ways that also enhance everyone’s ability to learn. The theory of multiple intelligences, referred to in [chapter 7](#), is a good example of a universal design for learning tool, which offers many different approaches to learning that benefit both kids with and without labels. For example, with regard to reading, dyslexic students who are music smart can read books that have computer keyboards in them for performing and reading together, and autistic students with reading difficulties but who are picture smart can read using picture books or three-dimensional “pop-up” books. In math, kids labeled ADHD who are body smart can do their multiplication tables by jumping up and down on every third number. In history students with emotional difficulties can use miniature soldiers to tell the story of famous Civil War battles.¹⁹ The point is that these methods are good to use for nonlabeled students as well and address their needs to learn musically, spatially, or kinesthetically as accurately as they do with labeled kids. Similarly, other differentiated learning strategies, such as providing reading material on a topic like cars at different reading levels, or designing learning centers to investigate different aspects of the life cycle, allow every student to share in the same topic according to their unique abilities.

The neurodiverse classroom contains people who have been given various labels encompassing cognitive, educational, emotional, and behavioral issues, and also people who have not been given those labels. A neurodiverse classroom is not a “regular classroom” that incorporates students with disabilities. This implies that there is a “standard” classroom to which modifications will have to be made in

order to accommodate kids who can't learn through the "normal" method. In this old model, students with disabilities are "guests" in somebody else's house and must be grateful for the opportunity to "learn like other kids." There is a condescending quality to this sort of arrangement. Teachers may be thinking, "I'd prefer not to have these kids in my class, but since I'm required to, I have no other choice than to provide for their needs." A neurodiverse classroom is a classroom where students with all sorts of labels and nonlabels—disabled, gifted, average—come together as equals to form a new kind of classroom, one that represents that there is no such thing as a normal student and where each and every child is identified as a unique learner.

The neurodiverse classroom celebrates and teaches about diversities of all kinds. A neurodiverse classroom teaches about diversities of culture, race, gender, and sexual orientation in addition to neurological differences. Along with curricula that teach about these other forms of diversity, the neurodiverse classroom provides a range of experiences and activities to celebrate neurodiversity, including:

- studying the lives of eminent neurodiverse individuals who overcame adversity to achieve greatness (e.g., Abraham Lincoln, depression; John Forbes Nash, schizophrenia; Agatha Christie, dyslexia)
- inviting neurodiverse members of the community who have surmounted obstacles in their careers to come and speak about their experiences
- providing a wide range of books, films, and other material on famous neurodiverse people
- involving neurodiverse parents in classroom planning and teaching
- having a Neurodiversity Treasure Hunt (students have a list of activities—e.g., find a person who can draw a picture of a horse, find someone who can whistle Mozart—and must locate people in the classroom who can do each of these things)
- celebrating special events on the calendar related to neurodiversity (e.g., Autistic Pride Day)
- sharing information about the strengths of ADHD, dyslexia, autism, and other forms of neurodiversity covered in this book

The neurodiverse classroom possesses a rich collection of assistive technologies to enable individuals with diverse special needs to access information, engage in learning, and express themselves cognitively,

emotionally, artistically, creatively, and spiritually. In addition to the “low-tech” strategies shared above, a neurodiverse classroom uses many advanced technologies to help students access learning activities. There are spell checkers for those with dysorthographia (trouble with spelling); text-to-speech software for dyslexics; Intellikeys, which puts pictures on the keyboard for picture learners; and eye-gaze technology to allow those students whose disabilities prevent the use of their arms to use a computer. Most of the assistive technologies that have been described in the course of this book would be available in a neurodiverse classroom (or accessible through the school library or media center).

The neurodiverse classroom pays attention to the environment, the use of space, and other ecological considerations. Unlike the “regular classroom,” which all too often is just a room with desks and chairs, a blackboard, and a few posters on the walls, the neurodiverse classroom capitalizes on the space available to it to create a number of environmental enhancements and minispaces that enable kids with different instructional needs to learn more effectively. Autistic individuals with noise sensitivities may require that loud buzzers and scraping chairs be muffled (a blessing for the other students as well!) and that “niche areas” be provided where they can get away from others and explore their own private worlds (a loft area can often provide such a quiet space). On the other hand, social butterflies need group spaces where interpersonal interaction can go on, while those with emotional difficulties need access to a drama area (e.g., a puppet theater) where they can channel and express their emotions. At times, the space may need to extend beyond the classroom to include other spaces in the school, such as the outdoors for the child diagnosed with ADHD who needs some daily “green” activity or the arts-and-crafts room for those who need to express themselves emotionally. Naturally, these spaces will be available to all students regardless of labels or nonlabels.

The neurodiverse classroom contains a rich network of human relationships that support each individual’s journey of learning and development. Compared to the “regular classroom,” where often only one teacher instructs the entire group of students, the neuro-diverse classroom has many teachers, including a special and a regular education teacher who work together (an arrangement sometimes called coteaching), tutors, aides, parent volunteers, specialized

personnel to help with signing, mobility issues, and emotional management, as well as the students themselves, engaging in teaching one another (peer teaching). At William Henderson Elementary School, students would cheer together when one of them achieved a significant learning goal. This kind of atmosphere ensures that each child's needs for belonging and self-worth are supported.

The neurodiverse classroom believes in the natural, organic development of each individual. Rather than measuring each student by the “adequate yearly progress” they make on standardized test scores, the neurodiverse classroom believes that every child is on a unique journey that is not unlike the growth of a flower. It embraces the messages of great educators from the past who likewise saw child development as an ecological miracle. French philosopher Jean-Jacques Rousseau, for example, once wrote, “It is to you that I address myself, tender and foresighted mother, who are capable of keeping the nascent shrub away from the highway and securing it from the impact of human opinion! Cultivate and water the young plant before it dies. Its fruits will one day be your delights. Form an enclosure around your child's soul at an early date.” The inventor of the kindergarten, Friedrich Froebel, noted, “We grant space and time to young plants and animals because we know that, in accordance with the laws that live in them, they will develop properly and grow well; young animals and plants are given rest, and arbitrary interference with their growth is avoided, because it is known that the opposite practice would disturb their pure unfolding and sound development.” Maria Montessori observed, “The secret of good teaching is to regard the child's intelligence as a fertile field in which seeds may be sown, to grow under the heat of flaming imagination.”²⁰ So much of educational assessment these days is *normative*, that is, comparing a child to groups of students who took standardized tests sometime in the past. The neurodiverse classroom, on the other hand, is more concerned with *ipsative* progress, which is progress based on a child's own past performances. By considering each child as engaged in her own unique journey, we take the pressure off and allow natural forces, supported by enrichment from the surrounding environment, to have their positive impact.

The neurodiverse classroom will never work if the educators in the room regard students with labels as more of a liability than an asset to the classroom. It can be made to *look* like it works. The teacher can be

reminded of her responsibility to fulfill legal mandates, soothed with positive moral feelings of doing good for those “less able than ourselves,” and effectively trained to make needed accommodations to maintain an orderly and productive classroom. But unless the neurodiverse classroom reaches way down deep into the inner attitudes and beliefs of each teacher about that learner who marches, storms, limps, wheels, barges, floats, skips, or simply walks into the classroom, then it will simply be making cosmetic changes to a fundamentally flawed system. Some might argue that budgetary constraints, and the kinds of problems in education described above, make the changes I’m suggesting in this chapter “pie in the sky.” However, schools like William Henderson and Falk Elementary Schools show that it is possible to attain these goals at the public school level. In fact, the greatest change that can be made is one that costs little or nothing: changing the attitude of educators toward kids with labels. The only way that inclusion will really work is by convincing teachers that those students who have been traditionally excluded from the “regular classroom” are going to be a positive addition to their classrooms. When the teacher sees a child with dyslexia enter the classroom, she should be thinking, “potential mechanical engineer or entrepreneur”; when a child comes in with the Asperger’s label, she should envision a “potential computer programmer”; when a child with emotional difficulties enrolls, she should think, “potential artist, actor, or writer.” Not that the teacher should form stereotypes for each disability category. But by regarding each child in the neurodiverse classroom as gifted, in addition to having challenges, educators and parents can ensure that those gifts will be nurtured and supported throughout the school year and can enable children to experience multiple successes on a daily basis so that ultimately they will find the positive career and life that’s out there waiting for them.

CHAPTER 10

The Future of Neurodiversity

On the whole, for the past century, clinical neurology has looked at illnesses, diseases, damages, abnormalities. It's also looked at the lower parts of the nervous system, and is only just now beginning to address itself to questions of sensibility, talent, skill, imagination, dreaming, consciousness.

—OLIVER SACKS,
INAUGURAL LECTURE FOR THE
CENTRE FOR THE MIND,
CANBERRA, AUSTRALIA, 1998

Danish software executive Thorkil Sonne wants employers to hire the disabled, but not for the reason that you might think. He isn't trying to get companies interested in employing the disabled out of a sense of charity or goodwill. He wants them to hire the handicapped because they're better than anybody else. At his own software company, Specialisterne ("The Specialists"), 75 percent of his workers have Asperger's syndrome or some other form of autistic spectrum disorder (ASD). Their work is to test software applications. As it turns out, most software developers and programmers are very good innovators, but they're lousy testers. They enjoy novel problem-solving and uniquely challenging cases, but not the boring process of testing once the product is finished. It's tedious work for them, and they're likely to make many errors along the way. Yet good testing saves a company tons of money when bugs are caught early. Along come people on the autistic spectrum, many of whom have excellent computer skills, exceptional powers of concentration, and a knack for actually *enjoying* routine work. As one worker put it, "I like working here. I don't have to try to be anything other than myself. At times I can become obsessed with my work and that's fine. In another company I might be expected to make small talk and be flexible. Here I can just concentrate on my

work without being considered antisocial.”¹ Sonne observes, “My staff are motivated all the time. Our fault rate was 0.5 per cent, compared with five per cent from other testers. That’s an improvement by a factor of 10, which is why we can charge market rates. This is not cheap labour and it’s not occupational therapy. We simply do a better job.”²

Sonne first became aware of the awesome memory and concentration abilities of people with autism when his own autistic son, Lars, drew a complicated map of Europe from the *Book of European Road Maps*, with scores of page numbers drawn in accurately from memory. After years of involvement with the autism community, he got to know an eighteen-year-old man with Asperger’s syndrome who was exceptionally gifted with computers. “He had retired on a state pension,” says Sonne. “But I thought that was so unfair as he had valuable IT [information technology] skills that I could see would be useful for software-testing, support monitoring, programming and so on.”³ In 2004 Sonne left his position at a Danish communication company, remortgaged his home, and started Specialisterne. At present the company has sixty employees and has had contracts with Microsoft, Oracle, and LEGO, among many other companies. Microsoft, for example, touted Specialisterne’s assets in one of its ads for a Danish magazine: “We all know what it’s like to lose our concentration once in a while when our tasks become too dull. And we all know about skipping details when they become too overwhelming. However, this is not the case for Specialisterne (‘The Specialists’) who have tested Windows XP Media Centre for Microsoft. They have autism, and are therefore, especially gifted.”⁴

Our “Throwaway Culture”

This example of a forward-looking twenty-first-century company hiring the “disabled” for their abilities underlines something important about neurodiversity and human resources. In the field of biodiversity, we’ve recognized the need to become a sustainable culture, learning not to throw away objects (computers, monitors, furniture, mattresses, lamps, cameras) that can be easily recycled. However, we still need to learn this lesson in the field of human resources. Among a neurodiverse population, there are many assets and skills that are literally being

thrown away because employers have not recognized the abilities that these people have that can contribute to the success of their businesses. Only 6 percent of people with autism work full-time. Only 31 percent of those with intellectual disabilities are working, even though many more want to work. A whopping 90 percent of adults with serious mental illness are unemployed—the worst level of employment of any group with disabilities. Surveys show that many of them could work with modest assistance. Fifteen hundred years ago, a Chinese emperor from the Tang dynasty recognized the importance of valuing and utilizing *all* human resources when he wrote:

A wise emperor . . . knows how to chose the right person for the right task. He is like a skillful carpenter who knows to use straight timber to make shafts, curved timber to make wheels, long timber to make beams, and short timber to make posts. Wood of all shapes and lengths is thus fully utilized. The emperor should make use of personnel in the same way, using the wise for their resourcefulness, the ignorant for their strength, the brave for their daring, and the timid for their prudence. As a good carpenter does not discard any timber, so a wise emperor does not discard any gentleman.⁵

A wonderfully humorous example of how one can recognize an occupational gift in the midst of less promising circumstances can be seen in Fyodor Dostoyevky's classic novel *The Brothers Karamazov*:

Gregory and Martha reported to their master that Smerdyakov had suddenly become peculiarly fastidious. He would, for instance, sit in front of his plate and feel around in his soup with his spoon, as if searching for something, leaning over it, holding up spoonfuls to the light and examining them. "What have you found there, a cockroach?" Gregory would ask him. "A fly?" Martha would inquire. The fussy young man never answered. And it was the same with the bread and the meat and whatever else he ate; he would spear a piece of meat with his fork and then lift it in the air to examine it minutely in the light, giving it a microscopic examination, thoroughly and at great

length before finally deciding to put it in his mouth. “Who is this young gentleman we’re saddled with?” Gregory and Martha muttered, watching him. But when Karamazov learned of this new development in Smerdyakov, he at once decided that he was destined to be a cook and sent him off to Moscow to be trained.⁶

We’ve seen throughout this book how individuals whom others regard as problematic have inner gifts that ought to be shared with the world around them: the visual thinking of the dyslexic, the novelty seeking of the person with ADHD, the artistic gifts of some individuals with bipolar disorder, the sense of humor and mimicry of many individual with intellectual disabilities, the poetic and mystical sensibilities of the schizophrenic individual. However, we’re not just talking here about throwing neurodiverse people into the workforce without support and hoping that their abilities will serve as a life raft. An important key in ensuring their vocational success is niche construction: creating conditions in the workplace that minimize disabilities and maximize abilities. At Specialisterne, for example, according to Sonne, “We create virtual Specialisterne environments in our clients’ offices. Everyone who will be in contact with our consultants is briefed about the conditions they require. They have to be nice to our people, avoid stressing them. In Denmark, we use a lot of irony and sarcasm, but people with autism can’t decode that. We make sure that the clients know how important it is to be direct, to outline tasks precisely and to stick to routines, particularly if any queries arise.” Unfortunately, many mental health organizations, both public and private, focus more of their energies on treatment than on job placement or training. And many times the sorts of jobs that are made available to those with mental disabilities are minimum-wage jobs that deal with what advocates for the mentally ill call the three *f*’s: food, filing, and filth (e.g., custodial work). The Americans with Disabilities Act requires employers to make reasonable accommodations for people with disabilities in the workplace. And many of these accommodations are relatively easy to provide: flexible work hours, time off for therapy appointments, a quiet place to work, and job coaches, among other resources. According to Larry Abramson, vocational director of the Back to Work Program at St.

Luke's House, Inc., a psychiatric rehabilitation program in Bethesda, Maryland, "High-quality management practices that you want to use with all your employees work well for people with psychiatric disabilities."⁷

Combating "Ableism"

A deeper problem with the employment of neurodiverse individuals has to do with what some in the disability-rights field call "ableism." Much as we use "sexism" or "racism" to describe discrimination against women or people of color, "ableism" describes discrimination against people with disabilities in favor of those who are "able." Referring to ableism in childhood, former director of the U.S. Department of Education's Office of Special Education Programs Thomas Hehir writes, "From an ableist perspective, the devaluation of disability results in societal attitudes that uncritically assert that it is better for a child to walk than roll, speak than sign, read print than read Braille, spell independently than use a spell-check, and hang out with nondisabled kids as opposed to other disabled kids, etc. In short, in the eyes of many educators and society, it is preferable for disabled students to do things in the same manner as nondisabled kids."⁸ The same is true in the workforce. Workers are expected to walk, speak, read, write, and socialize just like their nondisabled peers. If they stick out, then old ugly stereotypes embodied in such words as "retard," "crip," and "psycho" are likely to assert themselves at the lower realms of awareness. One sees this kind of prejudice in this passage from Robert Lewis Stevenson's novel *Dr. Jekyll and Mr. Hyde*: "There is something wrong with his appearance; something displeasing, something down-right detestable. I never saw a man I so disliked, and yet I scarce know why. He must be deformed somewhere; he gives a strong feeling of deformity, although I couldn't specify the point."⁹ In many cases, it's this sense of invisible deformity—especially with individuals who cope with mental illnesses—that permeates the environment, making it hard for a neurodiverse individual to receive access to education and employment as an equally qualified "able" person does. In other cases, it's more an attitude of pity or condescension that serves as the agent of discrimination.

A second layer to ableism consists in its institutional enforcement through the medical model. In the medical model, neurodiverse individuals are seen as having “illness” or “disease” as opposed to health and well-being. They need to fit into the world around them, or be shut away in a treatment facility that will define them in terms of what they can’t do. Rather than viewing people in terms of their wholeness, or in terms of their natural diversity, they are seen in terms of their impairment. There is a power structure to all this whereby those with superior knowledge—medical doctors and research scientists—have dominance over the “dis-abled” in providing accurate “diagnoses,” effective “treatments,” and potential “cures.” Even in the course of this book, it has been impossible to stay away from citing these powerful figures, since their credibility is seen as crucial to understanding the nature of neuropsychological conditions. However, although ableism permeates this book in many forms, the book’s ultimate aim is to point readers toward a vision of a neurodiversity-tolerant society, where disorders will be reframed as differences and where the empowering dimensions of neurological conditions will be fully acknowledged and serve to significantly do away with fear, pity, and condescension toward those who are perceived to be “less able” than their “more able” peers.

Is Anyone Really Normal?

This argument for a neurodiversity-tolerant society raises the important question of who is *normal* anyway. If people with “disabilities” are regarded as “ab-normal,” then it becomes necessary to define what the conditions of normal are that serve as the ruling standards of appearance, behavior, and achievement. Interestingly, according to the *Oxford English Dictionary*, the word “normal” wasn’t even in common use until 1840. It derives from the Latin *norma*, which was a carpenter’s or mason’s square, hence the idea of a pattern, or rule. In the nineteenth century the concept of *normal* received numerical support from the French statistician Adolphe Quetelet, who collected data about height, weight, and other variables and came up with the mean for the “average” man (*l’homme moyen*). This methodology of averaging takes us out of the range of particular individuals and places

in their stead the idea of a pure mathematical value. The average of 12, 6, 8, 9, and 15 is 10, yet 10 isn't even represented in any of the original numbers—it's a new number, something else besides the actual reality of what is given. In the same way, there really isn't an "average" person anywhere; "average" merely represents a statistical artifact. For something that really doesn't have any tangible existence, the idea of "normal" certainly has been invested with a great deal of power in our society!

We already discussed in [chapter 1](#) that there is no example of a "normal" brain sitting in a vat somewhere at the Smithsonian Museum, the NIMH, or some other prestigious institution. The same thing can be said of the human genome. As science writer Matt Ridley points out:

The Human Genome Project is founded upon a fallacy. There is no such thing as "the human genome." Neither in space nor in time can such a definite object be defined. At hundreds of different loci, scattered throughout the twenty-three chromosomes, there are genes that differ from person to person. Nobody can say that the blood group A is "normal" and O, B, and AB are "abnormal." So when the Human Genome Project publishes the sequence of the typical human being, what will it publish for the ABO gene on chromosome 9? The project's declared aim is to publish the average or "consensus" sequence of 200 different people. But this would miss the point in the case of the ABO gene, because it is a crucial part of its function that it should not be the same in everybody. Variation is an inherent and integral part of the human—or indeed any—genome.¹⁰

The genes that have been examined in the course of this book have been associated with specific "dis-abilities," yet this is just to say that they have been found "on average" more often in those with particular diagnoses. The fallacy here is to identify "the ADHD gene" or "schizophrenic genes," when we really don't even know what the mechanisms of these genes are in creating proteins that relate to specific psychiatric conditions, and the fact that so-called normal people have these genes too makes the task of identifying "ab-normal" genes that much more difficult.

In the neurodiversity debate there has been a tendency to divide the world into two groups: “neurodiverse” and “neurotypical” (i.e., normal) people. This is a false dichotomy. The truth is that there are no neurotypical people. Each person represents a unique combination of genes and brain cells. As British writer G.K. Chesterton put it: “Man knows that there are in the soul tints more bewildering, more numberless, and more nameless than the colors of an autumn forest. . . . Yet he seriously believes that these things can every one of them, in all their tones and semitones, in all their blends and unions, be accurately represented by an arbitrary system of grunts and squeals.” Each person is a being of almost infinite particularity, according to Argentinean writer Jorge Luis Borges: “So complex is reality, and so fragmentary and simplified is history, that an omniscient observer could write an indefinite, almost infinite, number of biographies of a man, each emphasizing different facts; we would have to read many of them before we realized that the protagonist was the same.” We’ve already noted how each person exists somewhere along not one but many different continua related to sociability, literacy, intelligence, mood, attention—and these are just a very few of many spectra that make up the human condition. We’ve also implied that those who dwell along the central part of a spectrum, between the two extremes, may be best eligible, generally speaking, to the title of normal. Yet this sort of assumption, too, is flawed in that it suggests that the middle ground is the realm to be preferred when compared with the extremes of human behavior. German writer Robert Musil in his massive novel *The Man Without Qualities*, however, points out that the extremes represent a perfectly valid, and perhaps even superior, part of the human condition: “Psychiatry calls great elation ‘a hypomanic disturbance,’ which is like calling it a hilarious distress, and regards all heightened states, whether of chastity or sensuality, scrupulosity or carelessness, cruelty or compassion, as pathologically suspect—how little would a healthy life mean if its only goal were a middle condition between two extremes! How drab it would be if its ideal were really no more than the denial of the exaggeration of its ideals!”¹¹

Three Cheers for the Mutants!

Exaggerations, then, can be a good thing. We can define this scientifically and say that biological exaggerations—or mutations—of a stable gene can be beneficial. “Mutations” sounds spooky, like alien mutants coming to invade our homes. It sounds scary, like strange diseases attacking the body. But mutations may be good, may in fact be the basis of human diversity. Molecular biologist Miroslav Radman writes, “Mutagenesis has traditionally been viewed as an unavoidable consequence of imperfections in the process of DNA replication and repair. But if diversity is essential to survival, and if mutagenesis is required to generate such diversity, perhaps mutagenesis has been positively selected for throughout evolution.”¹² Mutations have been demonstrated to produce new alleles (variations of a gene) that improve an organism’s chance for survival in a given environment.¹³ Evelyn Fox Keller, professor of history and philosophy of science at MIT, explains:

We now know that mechanisms for enduring genetic stability are a product of evolution. Yet a surprising number of mutations in which at least some of these mechanisms are disabled have been found in bacteria living under natural conditions. Why do these mutants persist? Is it possible that they provide some selective advantage to the population as a whole? Might the persistence of some mutator genes in a population enhance the adaptability of that population? Apparently so. New mathematical models of bacterial populations in variable environments confirm that, under such conditions, selection favors the fixation of some mutator alleles and furthermore, that their presence accelerates the pace of evolution.¹⁴

It was believed to be a mutation that caused large segments of the European population to survive the bubonic plague in the fourteenth century and that continues to resist infections like HIV and smallpox in today’s world. Mutations can also build on one another and create new metabolic pathways for the organism. As we’ve seen in [chapter 8](#), it may be mutations that created significant changes to the brain a hundred thousand years ago that led to new forms of thinking and culture.

This suggests that we should always be on the lookout for aberrant behavior as possibly beneficial to the species. And as noted throughout this book, we have to counteract our natural tendency to see human nature with our current cultural myopia, since values change, and as they change what we view as good in human functioning may turn out to be bad, and what we view as bad may turn out to be good. There is a story that illustrates this point by H. G. Wells called “The Country of the Blind.”¹⁵ In this story a mountaineer accidentally falls down a steep cliff into a remote valley that had been cut off from the world for many generations. All the people in this civilization are blind. At first the mountaineer thinks he has struck a gold mine, for he remembers an old saying, “In the country of the blind, the one-eyed man is king.” Expecting to take advantage of the valley dwellers, he instead finds himself stymied by the fact that the culture is set up to benefit blind people (with windowless houses, elaborate networks of paths, and other features), putting sighted individuals at a distinct disadvantage. At one point the village doctors recommend that the mountaineer’s eyes be removed so he can successfully adapt to the culture. He eventually tries to flee the valley, and in one version of the story dies during his attempted escape. A similar story is found in a classic *Twilight Zone* television episode titled “The Eye of the Beholder,” where a lady is attempting radical plastic surgery to remove hideous facial deformities.¹⁶ When the bandages are removed, we see that the lady is beautiful but that the surgeon has declared the surgery a failure. As he turns around, we see that he is hideously deformed himself and that, in fact, everyone in that society is deformed except for this beautiful girl and a handsome man with the same condition who are sent away to a special colony for people with “deformities.” In that culture, what was beautiful was ugly, and what was ugly was beautiful.

These stories are fantasies, of course, But they illustrate the ways in which societies determine who is disabled and who is not, even when we’ve moved beyond the more subjective mental “deformities” into actual physical differences. It is undoubtedly true that as our society changes, new forms of neurodiversity will be identified, and old groups of disabled people will blend into the accepted norm (much as has happened, for example, with homosexuality in the past fifty years). To let our imagination roam for a moment, let’s say scientists discover in the next twenty years that reading causes cancer and that music extends the life span. Overnight, it’s likely that literacy would be regarded as a

disability, and scores of best-selling audiotapes would be published for parents and teachers giving the “warning signs” of a potential reader (e.g., “Does your child make dangerous shapes that look suspiciously like letters during free drawing?” “Does your child have a morbid fascination with the alphabet?”). Brain researchers would receive large government grants looking for “lesions” and dysfunctional patterns associated with good reading behaviors. Dyslexics would be touted as models of proper behavior, and audiotapes would appear with titles like *I Hate Reading and I’m Lovin’ It!* and *How to Make Your Child Dyslexic in 24 Easy Lessons*. On the other hand, music would be regarded as something that *everyone* had to learn. Children who had difficulty with this—who had “dysmusia”—would be labeled and put into special music remediation programs. People would become millionaires overnight by creating “teach your baby to read musical notation” programs. Those who couldn’t carry a tune would become socially isolated, stigmatized, and hampered in their ability to advance in their schooling and careers.

Making Neurodiversity Inclusive

Fantasies aside, if we want to predict the future of neurodiversity, we should probably make our definition of it as inclusive as possible. In addition to the forms of neurodiversity featured in this book, we also should include many related conditions, including dyspraxia, Tourette’s syndrome, nonverbal learning disabilities, and speech and language disorders. In addition, we should include at least some of more than six hundred neurological conditions such as cerebral palsy, Parkinson’s disease, multiple sclerosis, stroke, brain injury, epilepsy, blindness and deafness caused by brain anomalies, ALS, Alzheimer’s disease, and other dementias. Although there may be those who bristle at such overt illnesses being listed here, it’s important to recognize that they too may bring possibilities with them (as epilepsy, for example, has been regarded by other cultures as a condition of spiritual enlightenment). As Oliver Sacks puts it, “Defects, disorders, diseases can play a paradoxical role, by bringing out latent powers, developments, evolutions, forms of life, that might never be seen, or even be imaginable, in their absence.”¹⁷ By the same token, we should include

individuals without the above conditions but who possess extraordinary functioning, as can be seen in the work of scientific geniuses, mystics, psychics, great leaders, masterful artists, and others whose work has changed the nature of our world.

Finally, and perhaps this is the most difficult inclusion of all, neurodiversity should probably include a “dark side” as well. By this I don’t mean only the incredible suffering that others have gone through as a result of many of these conditions but also the *suffering they have brought to others*. My father’s depressive “neurodiversity” was certainly nothing to celebrate. Quite the contrary, it has caused me a great deal of suffering over the years, which continues even today in the memories of traumas that I experienced and in the depression that I inherited from him. Many others with mental illness or those who have relatives with mental illness know only too well that there is a terrible price to be paid for being “neurodiverse.” As Judy Singer, the originator of the term “neurodiversity,” puts it on her Web site, “If the neurodiversity movement is to mature, it cannot hide its collective head in the sand, but must look at the idea that not all Nature’s experiments are inherently good.”¹⁸

At the same time, just because neurodiversity has a darker side does not mean that we should discard it as a concept. We don’t reject biodiversity because animals happen to savagely kill other animals. We see it for its many advantages, including maintenance of air and water quality, pest control, pollination of crops, climate stabilization, provision of food and organic medicines, aesthetic value, and so on. Similarly, we don’t reject cultural diversity simply because some cultures practice genocide. We value the innovative ideas that many cultures produce, the learning that occurs between cultures, and the diversity of beliefs, traditions, practices, ideals, and arts that cultures possess. Similarly, we need to recognize that even though many people with neurodiversity suffer greatly and cause suffering to others, still, the existence of a diversity of minds in human culture is a basically good thing because it provides civilization with a multiplicity of possibilities, a variety of styles of living, a number of unique perspectives on life, and a range of human potentialities that enrich our world rather than impoverish it, as would happen if we only had a narrow spectrum of human beings represented on the planet. As autism advocate Temple Grandin points out, “Aware adults with autism and their parents are often angry about autism. They may ask why nature or

God created such horrible conditions as autism, manic depression, and schizophrenia. However, if the genes that caused these conditions were eliminated there might be a terrible price to pay. It is possible that persons with bits of these traits are more creative, or possibly even geniuses. ... If science eliminated these genes, maybe the whole world would be taken over by accountants.”¹⁹

Unfortunately, science is proceeding along a pathway that might eventually bring this sort of scenario into realization. Already, prenatal screening is available to parents for detecting Down syndrome, and when this is disclosed early in the pregnancy in the United States, 91–93 percent of pregnancies are terminated as a result. Soon, it may be possible to detect genes for ADHD, dyslexia, schizophrenia, depression, or other forms of neurodiversity in utero, or even to engage in genetic engineering to eliminate them entirely from the Human Genome. Such practices would echo and perhaps even exceed those of the eugenics movement in the first part of the twentieth century. Speaking of dyslexia, psychologist Howard Gardner warns:

With the “coming of age” of genetics, the danger magnifies. Beyond doubt we will discover genes that are important for reading alphabetic scripts; and there is already evidence that a small set of genes may be related to reading problems. As with the brain evidence, such information can be helpful for early intervention; but it could easily be used for stigmatizing purposes. Indeed, it might become relevant for marriage prospects, holding a job, securing insurance, or even eugenic purposes. And no doubt, especially in our interventionist society, individuals with a genetic predisposition for reading problems will look into various kinds of genetic engineering or therapy. It is possible that such interventions will work and have no negative side effects, but it is perhaps more likely that they will have unanticipated effects. And we might even want to consider which valued human abilities—e.g., spatial or pattern recognition skills—might be placed at risk were we to target our interventions specifically at reading disorders.²⁰

Similarly, when we review the abilities of the neurodiverse individuals highlighted in the course of this book, we might imagine

how humanity would be impoverished without them. Speaking of his sister with Down syndrome, Brian Skotko, a physician at Children’s Hospital in Boston, writes: “Every day my sister teaches me lots of life lessons—to laugh when others are mocking me, to keep on trying when obstacles are thrown my way. If there were a world with fewer people with Down syndrome, I think the world would miss all these important lessons.”²¹ A neurodiverse world is a rich world. Let’s do all we can to preserve those “aberrant” genes and keep our civilization vital, diverse, and interesting.

Resources

Neurodiversity

Books

- Antonetta, Susanne. *A Mind Apart: Travels in a Neurodiverse World*. New York: Tarcher/Penguin, 2005.
- Bragdon, Allan D., and David Gamon. *Brains That Work a Little Bit Differently*. Bass River, MA: Brainwaves Books, 2000.
- Grant, David. *Neurodiversity (NADP Technical Briefing)*. Northampton, England: National Association of Disability Practitioners, 2007.
- Hendrix, Sarah. *The Adolescent and Adult Neuro-diversity Handbook: Asperger's Syndrome, ADHD, Dyslexia, Dyspraxia, and Related Conditions*. London: Jessica Kingsley, 2009.
- Pollack, David. *Neurodiversity in Higher Education: Positive Responses to Specific Learning Differences*. Hoboken, NJ: Wiley-Blackwell, 2009.
- Sacks, Oliver. *An Anthropologist on Mars: Seven Paradoxical Tales*. New York: Vintage, 1996.
- . *The Man Who Mistook His Wife for a Hat and Other Clinical Tales*. New York: Touchstone, 1998.

Organizations, Web Sites, and Blogs

- [Brainhe.com](http://brainhe.com): Best Resources for Achievement and Intervention re Neurodiversity in Higher Education. <http://brainhe.com/>.
- Coventry Neurodiversity Group.
<http://www.geocities.com/laurentius-rex/rights/index.htm>.
- Developmental Adult Neuro-Diversity Association (DANDA).
<http://www.danda.org.uk/>.
- EvoLibri Neurodiversity Counseling, 719 Colorado Avenue, Palo Alto, CA 94303. (650) 961-7073. E-mail: info@evolibri.com. Web site: <http://www.evolibri.com/>.
- Human Neurodiversity Laboratory. <http://eckertlab.org/>.

Institute for the Study of the Neurologically Typical.

<http://isnt.autistics.org/>.

[Neurodiversity.com](http://www.neurodiversity.com/). <http://www.neurodiversity.com/main.html>.

[Neurodiversity.com](http://www.neurodiversity.com/) Weblog. <http://www.neurodiversity.com/weblog/>.

Neurodiversity International.

<http://www.neurodiversityinternational.org.uk/>.

North East Neuro Diverse Adults (NENDA).

<http://www.neurodiversity-northeast.org.uk/>.

Shift—Journal of Alternatives: Neurodiversity and Social Change (blog). <http://www.shiftjournal.com/>.

Autism

Books

Baron-Cohen, Simon. “Autism: The Extreme Male Brain.” In *The Essential Difference: The Truth About the Male and Female Brain*. New York: Basic Books, 2003.

Elder, Jennifer. *Different Like Me: My Book of Autism Heroes (Ages 9–12)*. London: Jessica Kingsley, 2005.

Grandin, Temple. *Thinking in Pictures: My Life with Autism*. New York: Vintage, 2006.

———. *The Unwritten Rules of Social Relationships: Decoding Social Mysteries Through the Unique Perspectives of Autism*. Arlington, TX: Future Horizons, 2005.

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Grandin, Temple, and Kate Duffy. *Developing Talents: Careers for Individuals with Asperger Syndrome and High-Functioning Autism*. Shawnee Mission, KS: Autism Asperger Publishing, 2008.

Grandin, Temple, and Catherine Johnson. *Animals in Translation: Using the Mysteries of Autism to Decode Animal Behavior*. Orlando: Harcourt, 2005.

Grandin, Temple, and Margaret M. Scariano. *Emergence Labeled Autistic*. New York: Warner, 1986.

Greenspan, Stanley I., and Serena Wieder. *Engaging Autism: Using the Floortime Approach to Help Children Relate, Communicate, and Think*. Cambridge, MA: Da Capo Lifelong Books, 2009.

Haddon, Mark. *The Curious Incident of the Dog in the Night Time*. New York: Doubleday, 2003.

- Hermelin, Beate. *Bright Splinters of the Mind: A Personal Story of Research with Autistic Savant*. London: Jessica Kingsley, 2001.
- Jackson, Luke. *Freaks, Geeks, and Asperger Syndrome: A User Guide to Adolescence*. London: Jessica Kingsley, 2002.
- Kluth, Paula. *Just Give Him the Whale! 20 Ways to Use Fascinations, Areas of Expertise, and Strengths to Support Students with Autism*. Baltimore: Brookes, 2008.
- Larson, Elaine Marie. *I Am Utterly Unique: Celebrating the Strengths of Children with Asperger's Syndrome and High-Functioning Autism (Ages 4–8)*. Illustrated by Vivienne Strand. Shawnee Mission, KS: Autism Asperger Publishing, 2006.
- Miller, Jean. *Women from Another Planet? Our Lives in the Universe of Autism*. Bloomington, IN: AuthorHouse, 2003.
- Mukhopadhyay, Tito. *Mind Tree: A Miraculous Child Breaks the Silence of Autism*. New York: Arcade, 2003.
- Oneill, Jasmine Lee. *Through the Eyes of Aliens: A Book About Autistic People*. London: Jessica Kingsley, 1998.
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- Stillman, William. *Autism and the God Connection*. Naperville, IL: Sourcebooks, 2006.
- . *The Soul of Autism: Looking Beyond Labels to Unveil the Spiritual Secrets of the Heart Savants*. Franklin Lakes, NJ: Career Press, 2008.
- Tammet, Daniel. *Born on a Blue Day: Inside the Extraordinary Mind of an Autistic Savant*. New York: Free Press, 2007.

Organizations, Web Sites, and Blogs

- Aspergian Pride. <http://www.aspergianpride.com/>, celebrating the accomplishments and inherent worth of autistic people.
- Aspies for Freedom. <http://www.aspiesforfreedom.com/>.
- Autism Acceptance Web Site. <http://www.taaproject.com/>.
- Autism Hub, “The Very Best in Autism Blogging.” <http://www.autism-hub.co.uk/>.
- Autism News Science and Opinion. <http://leftbrainrightbrain.co.uk/>.
- Autistic Pride Day Blog. <http://tricapd.blogspot.com/>.
- [Autistics.org](http://www.autistics.org/), “The Real Voice of Autism.” <http://www.autistics.org/>.
- Autistic Self-Advocacy Network. <http://www.autisticadvocacy.org/>.

Autreat, a retreat style conference run by autistic people, for autistic people and friends, sponsored by Autism Network International. <http://ani.autistics.org/autreat.html>.

Jessica Kingsley Publishers, publishers of positive, practical, and creative books on autism, Asperger's syndrome, and other forms of neurodiversity. 400 Market Street, Suite 400, Philadelphia PA 19106. Toll-free ordering: (866) 416-1078. Main office: (215) 922-1161. Fax: (215) 922-1474. E-mail: orders@jkgp.com.

Real Voices of Autism, "Social Networking for the Autistic Community." <http://www.thevoiceofautism.org/>.

Temple Grandin Web site: <http://www.templegrandin.com>.

Video and Films

Adam. Directed by Max Meyer. 99 minutes, 2009. Olympus Pictures. Chronicles the life of a young man with Asperger's syndrome and his relationship with an attractive and worldly woman who becomes his new neighbor.

Autism: The Musical. Directed by Tricia Regan. 93 minutes, 2008. HBO docudrama. A group of autistic children put on a theatrical event sponsored by the Los Angeles-based Miracle Project.

Baggs, Amanda. "In My Language." 9 minutes, 2007. Presents the world from an autistic point of view. <http://www.youtube.com/watch?v=JnylM1hI2jc>.

Rainman. Directed by Barry Levinson. 134 minutes, 1988. United Artists. Charts the travels across America of an autistic savant with his brother.

Assistive Technologies

FaceSay, interactive computer software program that lets children gain practice recognizing facial expressions via an "avatar" or on-screen "puppet." Produced by Symbionica. <http://www.symbionica.com>.

Mind Reading: The Interactive Guide to Emotions, an interactive DVD/CD program that teaches the viewer how to recognize more than 400 human emotions; includes Emotion Library, lessons, quizzes, games, and other learning tools. Created by Simon Baron-Cohen and produced by Jessica Kingsley Publishers, 2004. <http://www.jkgp.com/mindreading/>.

Squeeze Machine, a V-shaped device into which an individual lays for deep touch stimulation. Manufactured by the Therafin Corporation, 19747 Wolf Rd., Mokena, IL 60448. E-mail: info@therafin.com. Web site: <http://www.therafin.com>.

ADHD

Books

- Armstrong, Thomas. *The Myth of the A.D.D. Child: 50 Ways to Improve Your Child's Behavior and Attention Span Without Drugs, Labels, or Coercion*. New York: Plume, 1997.
- Breeding, John. *The Wildest Colts Make the Best Horses*. London: Chimpmonkapublishing, 2007.
- Freed, Jeffrey, and Laurie Parsons. *Right-Brained Children in a Left-Brained World: Unlocking the Potential of Your ADD Child*. New York: Simon and Schuster, 1998.
- Hallowell, Edward, and John Ratey. *Delivered from Distraction: Getting the Most Out of Life with Attention Deficit Disorder*. New York: Ballantine, 2005.
- Hartmann, Thom. *Attention Deficit Disorder: A Different Perception*. Nevada City, CA: Underwood, 1997.
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- Honos-Webb, Laura. *The Gift of ADHD: How to Transform Your Child's Problems into Strengths*. Oakland: New Harbinger, 2005.
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- Kohlberg, Judith, and Kathleen Nadeau. *ADD-Friendly Ways to Organize Your Life*. London: Routledge, 2002.
- Mooney, Jonathan, and David Cole. *Learning Outside the Lines: Two Ivy League Students with Learning Disabilities and ADHD Give You the Tools for Academic Success and Educational Revolution*. New York: Fireside, 2000.
- Nylund, David. *Treating Huckleberry Finn: A New Narrative Approach to Working with Kids Diagnosed ADD/ADHD*. New York: Jossey-Bass, 2002.
- Weiss, Lynn. *ADD and Creativity: Tapping Your Inner Muse*. Lanham, MD: Taylor Trade Publishing, 1997.

Organizations, Web Sites, and Blogs

ADDitude Magazine, “Living Well with ADD and Learning Disabilities.” <http://www.additudemag.com/>.
Adult ADD Strengths: A Blog About Adults with Attention Surplus Condition (aka ADHD) by Adult ADD Coach Pete Quily. <http://adultaddstrengths.com/>.
Born to Explore: The Other Side of ADD. <http://borntoexplore.org/adhd.htm>
Great Beginnings: The Gift of A.D.D. http://www.gr8beginnings.com/gtj_pages/betasite/index.html

Assistive Technologies

Personal Digital Assistant (PDA), handheld or palmtop computer that can be used for mobile phone, Web browser, media player, navigator (with global positioning system [GPS]), calendar, clock, daily organizer, reminder system, or other practical uses. Examples include Apple’s iPhone, RIM’s Blackberry, and Google’s Nexus One.

Dyslexia

Books

Armstrong, Thomas. *In Their Own Way: Discovering and Encouraging Your Child’s Multiple Intelligences*. New York: Tarcher/Penguin, 2000.

Corcoran, John. *The Teacher Who Couldn’t Read*. Dublin: Brehon Publishing, 2001.

Davis, Ronald D., and Eldon M. Braun. *The Gift of Dyslexia*. New York: Perigee, 1997.

Palladino, Lucy Jo. *Dreamers, Discoverers, and Dynamos: How to Help the Child Who Is Bright, Bored, and Having Problems in School*. New York: Ballantine, 1999.

Shaywitz, Sally E. *Overcoming Dyslexia: A New and Complete Science-Based Program for Reading Problems at Any Level*. New York: Vintage, 2005.

Shires Golon, Alexandra. *Raising Topsy-Turvy Kids: Successfully Parenting Your Visual-Spatial Child*. Denver: Deleon Publishers, 2004.

Silverman, Linda Kreger. *Upside Down Brilliance: The Visual-Spatial Learner*. Denver: Deleon Publishers, 2002.

Vitale, Barbara Meister. *Unicorns Are Real: A Right-Brained Approach to Learning*. Austin: Jalmar Press/Pro-Ed, 1982.

West, Thomas G. *In the Mind's Eye: Visual Thinkers, Gifted People with Dyslexia and Other Learning Difficulties, Computer Images, and the Ironies of Creativity*. Amherst, NY: Prometheus Books, 1997.

Organizations, Web Sites, and Blogs

Arts Dyslexia Trust. 14 Churchfield Way, Wye, Ashford, Kent, United Kingdom, TN25 5EQ. E-mail: adt@artsdyslexiastrust.org. Web site: <http://artsdyslexiastrust.org>.

LDOnline. <http://www.ldonline.org/>.

Yale Center for Dyslexia and Creativity. E-mail: <http://dyslexia.yale.edu/>.

Assistive Technologies

Fast ForWord Program, a family of reading intervention software products supported by clinical research to rewire the brain for efficient reading. Scientific Learning. <http://www.scilearn.com/>

knfb Reading Technology, cell phone-size “reader” that will scan printed text, and then character-recognition software in conjunction with high-quality text to speech will read the contents of the document aloud. K-NFB Reading Technology, P.O. Box 620128, Newton Lower Falls, MA 02462-0128; (877) 547-1500. <http://www.knfbreader.com/products-mobile.php>.

Depression/Bipolar

Books

Castle, Lana R. *Finding Your Bipolar Muse: How to Master Depressive Droughts and Manic Floods and Access Your Creative Power*. New York: Marlowe, 2006.

Greenberg, Michael. *Hurry Down Sunshine*. New York: Other Press, 2008.

Hershman, D. Jablow, and Julian Lieb. *Manic Depression and Creativity*. Amherst, NY: Prometheus Books, 1998.

Jamison, Kay Redfield. *Touched with Fire: Manic Depressive Illness and the Artistic Temperament*. New York: Free Press, 1996.

———. *An Unquiet Mind: A Memoir of Moods and Madness*. New York: Vintage, 1997.

- Levine, Bruce E. *Surviving America's Depression Epidemic: How to Find Morale, Energy, and Community in a World Gone Crazy*. White River Junction, VT: Chelsea Green Publishing, 2007.
- Maisel, Eric. *The Van Gogh Blues: The Creative Person's Path Through Depression*. New York: New World Library, 2007.
- Moore, Thomas. *Dark Nights of the Soul: A Guide to Finding Your Way Through Life's Ordeals*. New York: Gotham, 2005.
- Solomon, Andrew. *The Noonday Demon: An Atlas of Depression*. New York: Scribner, 2002.
- Williams, Mark, John Teasdale, Zindel Segal, and Jon Kabat-Zinn. *The Mindful Way Through Depression: Freeing Yourself from Chronic Unhappiness*. New York: Guilford Press, 2007. Includes CD of guided meditations.

Organizations, Web Sites, and Blogs

- Depression.com. <http://www.depression.com/>.
- NIMH—Depression.
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Film and Television

As Good As It Gets. Directed by James L. Brooks. 139 minutes, 1997. TriStar Pictures. Features Melvin Udall (played by Jack Nicholson), who struggles with his obsessive compulsive disorder as he attempts to form an intimate relationship with a single mother/waitress.

High Anxiety. Directed by Mel Brooks. 94 minutes, 1977. Twentieth Century-Fox. Comedy that follows the goings-on at the Psychoneurotic Institute for the Very, VERY Nervous.

Monk. Television series, 2002–2009 (60-minute episodes with commercials), USA Network. Tracks the adventures of supersleuth Adrian Monk (played by Tony Shalhoub) as he takes on different violent crimes in San Francisco and copes with his obsessive compulsive disorder along the way.

Assistive Technologies

StressEraser Portable Biofeedback Device. Measures pulse rate (by placing finger in an infrared sensor) and provides audio tone to indicate activation of parasympathetic nervous system (responsible for rest and relaxation).

ThoughtStream GSR Biofeedback Device, produced by Mind Modulations. Provides audio and visual feedback to help modulate your galvanic skin response (a measurement of the electrical resistance of the skin—the less resistance, the more anxiety). Includes carrying case, headphones, and a manual. Comes with a PC serial cable and Mental Games I and II software (serial port required for use). Battery powered, portable.

Intellectual Disabilities

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Organizations and Web Sites

- Berkshire Hills Music Academy, 48 Woodbridge Street, South Hadley, MA 01075. (413) 540-9720. <http://www.berkshirehills.org>. The only private residential postsecondary school for young adults with learning, cognitive, or developmental disabilities and a special talent for music.
- DownSyndrome.com, social networking site for people with Down syndrome. <http://downsyndrome.com/>.
- National Association for Down Syndrome. P.O. Box 206, Wilmette, IL 60091. (630) 325-9112. E-mail: info@nads.org.
- Speakers Bureau of People with Down Syndrome (Self-Advocates). http://www.ndscenter.org/selfadvo/speakers_bureau.php.
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Films

- Forest Gump*. Directed by Robert Zemeckis. 141 minutes, 1994. Paramount Pictures. Tom Hanks plays the title role as a slow-witted

but warmhearted man who appears in pivotal moments of recent American history.

I Am Sam. Directed by Jessie Nelson. 132 minutes, 2001. New Line Cinema. A man with intellectual disabilities (played by Sean Penn) struggles to regain legal custody of his seven-year-old daughter.

What's Eating Gilbert Grape. Directed by Lasse Halström. 118 minutes, 1993. J&M Entertainment. Gilbert Grape (played by Johnny Depp) takes care of his mentally handicapped brother Arnie (played by Leonardo DiCaprio) in a small Iowa town.

Schizophrenia

Books

Chadwick, Peter K. *Schizophrenia: The Positive Perspective*. 2nd ed. London: Routledge, 2009.

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Universal Pictures. This Oscar winner for Best Picture is a biopic of John Forbes Nash Jr. who won the Nobel Prize in economics despite struggling with schizophrenia.

In the Realms of the Unreal. Directed by Jessica Yu. 81 minutes, 2004.

Cherry Sky Films. A documentary on the life and works of writer/illustrator Henry Darger, whose works of Outsider Art represent the schizophrenic mind in a more positive context.

The Soloist. Directed by Joe Wright. 117 minutes, 2009. DreamWorks.

Tells the true story of *Los Angeles Times* columnist Steve Lopez and his efforts to help a schizophrenic musician, Nathaniel Ayers, who had studied at Julliard Academy, raise himself up out of his situation as a homeless street musician.

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- Sapon-Chevin, Mara. *Widening the Circle: The Power of Inclusive Classrooms*. Boston: Beacon Press, 2007.
- Schwarz, Patrick. *From Disability to Possibility: The Power of Inclusive Classrooms*. Portsmouth, NH: Heinemann, 2006.
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Organizations

Center for Applied Special Technology. 40 Harvard Mills Square, Suite 3, Wakefield, MA 01880. (781) 245-2212. E-mail: cast@cast.org. Specializes in Universal Design for Learning technologies.

Other Forms of Neurodiversity

Books

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- Ramachandran, V. S. *A Brief Tour of Human Consciousness: From Imposter Poodles to Purple Numbers*. Upper Saddle River, NJ: Pi Press, 2005.
- Ramachandran, V. S., and Sandra Blakeslee. *Phantoms in the Brain: Probing the Mysteries of the Human Mind*. New York: Harper Perennial, 1999.
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Films

- Awakenings*. Directed by Penny Marshall. 121 minutes, 1990.
Columbia Pictures. A group of hospital patients cognitively “frozen” for decades due to the effects of the 1920s encephalitis epidemic come alive as a result of L-dopa and the compassion of one doctor (Oliver Sacks, played by Robin Williams).
- Memento*. Directed by Christopher Nolan. 117 minutes, 2000.
Newmarket Capitol Group. A person with memory loss tries to figure out who murdered his wife and caused his own brain damage.
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Notes

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