

# BRAIN GAIN: TECHNOLOGY AND THE QUEST FOR DIGITAL WISDOM

## Introduction: Mind Evolution in Our Time

By Marc Prensky

**I**n the twenty-first century, humans need better minds—and we are getting them.

Contrary to what you may have heard, the gains are not just coming—or even mostly coming—from the rapid advances we are making in neuroscience in understanding the brain’s physical workings. We are, of course, learning many wonderful things from neuroscientists. We are now certain, for example, that human brains change physically in response to their environment. In fact, in the twenty-first century that is no longer “new” news, although we are still learning how and where it happens.

What is new news—and much bigger news for humanity—is that our brain’s power is growing externally, though a new symbiosis with our technology. Because of this new symbiosis, the human mind, that is, the brain we use every day, is gaining rapidly in power and ability.

What I try to show in this book is that if both “brain,” and “mind” are taken in a bigger (and perhaps more metaphorical) sense than just the physical-biological-chemical-electrical structure in our bodies—that is, if we take them as the interaction of what is in our heads with the technologies that surround us—then what is expanding our brains in the early twenty-first century is, essentially, technology.

Technology’s evolution and rapid advance is tightly linked to brain and mind evolution; it is the symbiotic integration of technology with our minds that is producing “brain gain.”

To state this book’s thesis as simply as possible: Human culture and context is exponentially changing for almost everyone. To adapt to and thrive in that context, we all need to extend our abilities. Today’s technology is making this happen, and is extending and “liberating”

our minds in many helpful and valuable ways. Our technology will continue to make us freer and better—but only if we develop and use it wisely.

Because we do not know exactly how the brain works, or how it generates our expanding mind, “brain gain,” as I use it in this book, is something of a metaphor.<sup>1</sup> Most of the technologies that produce the gain are not, for the moment, physically wired to, or implanted in our heads (although some, as we shall see, are already moving in that direction). Nor are the mechanisms by which the physical brain adapts to connect us to these technologies completely understood.

You can, if you wish, think about “brain gain” as a more alliterative term for “mind gain.” It is the human mind—our brain in action—that is quickly and vastly expanding to meet the challenges of the twenty-first century as a result of the great advances of technology. Since mind and brain are of a whole, any gain in one is a gain in the other—in extending our minds, technology extends our brains.

### Technology?

The technology I am talking about here is pretty much all of it—I see technology as everything that humans have invented or appropriated from the external world to help us. Technology comes in many forms—physical, electrical, digital, even pharmacological—and covers a wide spectrum of human activity, from speech, to writing, to clothing, to tools, to modern digital tools.

Technology has always improved humans in the long run, despite occasional setbacks; it is how we have come to where we are, and to be who we are. And technology has always done this by enhancing our human capabilities. Today, more and more of the capabilities that technology enhances are in our minds.

What is happening with increasing speed in the twenty-first century is that a large number of new technologies external to our physical brain—technologies invented not by nature’s evolution but by humans—are now able to work with the human brain and enhance its power. This is happening in a great many areas, and far more quickly than most are aware of. Humans can now concentrate more, calculate more, analyze more, connect more, communicate more, and create more than ever before—all because of technology. And it is this phenomenon of connecting ourselves to technology—and not old-fashioned evolution—that is making the huge positive difference in our lives today.

By incorporating these external technologies into our brains and minds, we have entered a period of intense “brain gain.” Rather than harming humans, as many fear, the power of technology is already enhancing our entire species in ways that I believe are almost entirely positive. A host of technologies are freeing our minds to know more, to do more, and to interact with more of the people that we want to in more and more ways. In Chapter 3, I

offer 50 examples of how human minds are being enhanced, leveraged, and improved by technology. Even more importantly, I show that people, on their own, are recognizing these new capabilities and adopting them.

We are now, as a result, far better humans than ever before. This book is about all the ways these many technological changes are improving our minds, and about peoples' attempts—and urgent need—to harness them and to use them wisely.

### **The Germ That Got Me Thinking**

The journey that led to this volume, and to my own clearly positive attitudes toward the possibilities and power of enhancing our minds through technology, began almost 25 years ago. I can even remember the exact moment, although I couldn't give you an exact date. But it all started one day when, while driving to work, I heard on my 1985 Volvo's radio a conundrum posed by a computer scientist working with intensive care units in hospitals. The speaker (his name now long forgotten by me) explained that the number of beds in most intensive care units is limited by design, because such units are expensive. The number of beds is therefore often smaller than the number of patients whose doctors suggest they go or remain there. So in order to assure that the available beds are filled by those patients most likely to be helped by those facilities, decisions must continually be made about which patients enter or stay in the ICU and which leave. Up until then, the speaker explained, such decisions were made only by individual doctors (or groups of doctors), based entirely on their own accumulated experience and judgment about each individual ICU patient. That seemed reasonable to most. But that approach, the computer scientist argued, often led to bad results. He therefore concluded it was not the wisest way to make those decisions. I shall never forget his explanation of why.

Doctors, this scientist said, tend to focus, by their nature as humans, on two kinds of data: the recent and the unusual. For many things in medicine, this works well, and is an acceptable way to decide. But in cases like the ICU decision, in order to make the decisions wisely and correctly, the focus needs to be on what occurred statistically, to all patients ever to have been in an ICU with the same presentations as the current patients. This is something, the scientist pointed out, that human brains, on their own, are just incapable of doing. They just cannot collect, store, or analyze all of that data.

But machines, of course, can—and can do it very well. Given even massive amounts of data, computers, with proper programming, can easily compute the statistics and calculate the probabilities of each patient's recovery. So this scientist and his colleagues had created a so-called "expert system" called Acute Physiology & Chronic Health Evaluation (APACHE) to help make these decisions. APACHE retrieved all the historical data on similar patients, performed the necessary statistical analysis, and provided a ranking of the patients' likelihood of getting well.

It turned out that the combination of this statistical ranking with the doctors' judgment provided the wisest solution. The doctors' judgment was enhanced by the addition of the machine. The APACHE system, revised and improved over time, is still in use.

APACHE was a harbinger of enormous changes to come. There are now more ways to use technology to extend human capabilities to achieve wiser solutions and make better judgments than ever before. Not only have our "old" mental capabilities been extended and amplified in the twenty-first century, but entirely new human capabilities have been created and new intellectual paths have opened up. Taking those paths, which are based on a wide range of new technologies, some physical, some virtual, some biological—and some on new combinations of all of those—is enhancing all human minds positively in a growing number of ways that were never before possible (and, in many cases, never thought possible). And this is only the beginning.

In February 2009, Bruce Bueno de Mesquita gave a talk that I attended at the annual TED conference in Long Beach, California. In the presentation he recounted how he has, for years, been using computer modeling to predict the behaviors of the world's political and economic leaders. He has predicted—with over 90 percent accuracy—many important figures' behavior in critical situations. His predictions, he told the audience, have been extremely helpful to the U.S. government, to companies, and to other organizations in the world, mostly in ways that are mostly still too secret and sensitive to talk about.

The audience—a very sophisticated group, many from technology backgrounds, who had paid \$6,000 each to be there—greeted Bueno de Mesquita's talk mostly with skepticism. They essentially didn't believe him, and rejected the notion that such accuracy of prediction via technology was possible. Many thought both he, and computers in general, had a too-rational view of human behavior to allow such prediction to be accurate.

But they were mistaken. It turns out that, independent of one's view of human rationality, such accurate prediction is possible, thanks to technology. A few months later those skeptics could see Bueno de Mesquita's picture on the cover of the *New York Times Magazine*.<sup>3</sup> They could read that similar technology helped predict Hosni Mubarak's downfall in Egypt and Moammar Gadhafi's downfall in Libya, and find where Saddam Hussein and Osama bin Laden had been hiding.<sup>4</sup> Today, others are using these kinds of technology to make never-before-possible predictions in other fields, with equal accuracy.

Because of the rapid advances in technology, notions of what is possible and, more importantly, "wise" in many situations are undergoing profound change. What causes our "old" non-digitally enhanced wisdom to no longer apply, in more and more cases, is not just the sheer volume of the changes in so many areas of our lives. It is also the speed at which the changes are accelerating and will continue to accelerate in our lifetimes and the lifetimes of our children. This combination presents us with more and more new situations where new wisdom is required—and, at the same time, with new solutions for finding it. If wisdom

lies in reaching and implementing useful and beneficial conclusions, those conclusions are rapidly changing.

It used to be wise, for example, to memorize a great deal of information when you were young that would stand you in good stead for the rest of your life. Today's wisdom is that it's far better to learn how to acquire new information.

It used to be wise to find a job, or an employer, you could hold onto for life. Today's wisdom is that the skills you will need will come from many jobs and employers.<sup>6</sup> It used to be wise for an employer to retain employees who had "learned the ropes" for as long as possible. Today the wisdom for many employers is to unleash capable employees to start-ups and even to competitors, and to hire new employees who are even more in tune with current technology.

It used to be wise to keep your strongest ties local. Today it may be wiser to have your strongest ties be around the world.

It used to be wise to hold onto an expensive device until it literally stopped working or fell apart. Today's wisdom is often to upgrade to a new device every year—or less.

It used to be wise to get as much work experience as possible before starting a business. Today many find it wiser to just create a company.

It used to be wise to "pay your dues."

It used to be wise to postpone rewards.

It used to be wise not to take drugs to improve ourselves.

It used to be wise for every kid to stay in school, rather than leave to join a startup.

It used to be wise to do all schoolwork independently, and to not allow calculators or computers on exams.

I'm sure you already see, feel, and are aware of many of the changes that have taken place in our "received wisdom," although you certainly might not agree with all of them. It once was considered unwise (i.e., rude and impolite) to have an answering machine on your phone. Now it's unwise not to. It was once considered unwise to spend extra for the maximum computer memory or the fastest Internet connection you could afford. Now it's unwise not to. It was once considered unwise to have a cell phone. Now two-thirds of the planet's people do. It was once considered unwise to send personal notes by email. Now it's expected. It was once considered unwise to give up your landline. Now over 26 percent of U.S. phone users have only a cell phone.

It was once considered unwise to answer a request before reflecting for weeks. Now a far quicker response is expected. It was once considered unwise to learn something from TV, a video, a movie, or a game, rather than from a book. Now those media have become the primary way many people learn. It was once considered unwise to read books on screens. Now I see as many Kindles as books on airplanes.

Today, our young people—and many older folks as well—see that much of our “received” wisdom no longer applies in life. We see school dropouts and kids straight out of college, such as Bill Gates of Microsoft and Mark Zuckerberg of Facebook, becoming some of the richest people in the world. We see highly successful people like Sean Combs and Steve Jobs changing jobs, and even industries, with high frequency. We see expensive purchases, such as TVs, computers, and cell phones, become totally obsolete long before they wear out. We see TV game contestants being told they can “phone a friend” or “poll the audience” to get answers. Much of the world can watch computers beating chess grandmasters and quiz champions. Our kids are being told to expect to have 10–15 different jobs in their working lives.<sup>6</sup> While many of us feel uncomfortable with all these changes, often wishing we could just go back to the “good old” or “wise old” days before all this technology arrived, we can’t and we won’t.

So we need new guidance on what is wise in our times—a “new” kind of wisdom, wisdom that takes all this technology into account: “digital wisdom.” Not that “old” wisdom never counts or applies—it often does. But we need to figure out where and when the “old” wisdom still works, and where and when it doesn’t. And, in the latter case, we need to put something new in its place. This is what I call “the quest for digital wisdom.

”I call it a “quest” because it is a difficult journey. There is no fixed destination and no “right” answer. We are all learning about the new technologies and feeling their power to affect us as they insinuate themselves, willy-nilly, into our lives. We are all surprised, at times, by the power of technology, and are all, at times, disconcerted by it. We all struggle to find what is best and wise in the various aspects of our life: home, work, recreation, relationships. We all find that many of the roads technology takes us down lead to new places, some of which we find frightening and disorienting. As part of our quest we conduct a great deal of research, but we have to be careful not to be too definitive in our conclusions because the meaning of the findings often gets re-interpreted as our understanding grows.

Ultimately, though, the search for digital wisdom is a quest because it is worthwhile—the goal of becoming wiser is hugely important to humanity. Wisdom is an ill-defined term; it involves, I believe, considering the largest possible number of factors, analyzing them appropriately and well, and reaching and implementing useful and beneficial conclusions. Digital wisdom resides in doing this for both the technologies we use and the way that we use them.

I certainly do not know everything that is digitally wise. I have my own ideas, but I will try, as much as possible, to avoid giving definitive answers or preaching a “technology gospel”

to you. My preferred methodology, rather, is to present a large number of examples, and to invite you to think about these issues and decide for yourself what you think is (or is not) brain gain and digital wisdom. I do this in Chapter 3, which is the heart of this book.

The good news, I believe, is that our quest for digital wisdom is already well under way. The goal of this volume is to expand your knowledge of this journey and exploration, and of the many places in which it is happening. My goal is to make you think in new ways about how your life is changing because of technology—changing mostly in a positive direction—and how you and all people are becoming freer and better because of this.

Ultimately, my goal is to change your mind—about your mind, about technology, and about wisdom in the twenty-first century.

### A New Madeleine

Just as a product of French cooking technology—a madeleine—was the key to unlocking Marcel Proust's childhood memories in *Remembrance of Things Past*, the products of today's and tomorrow's technologies are the keys to unlocking humanity's capabilities and hopes for the future. Everyone now lives in a very special age for humankind: an age when human capabilities are expanding explosively. Certainly, if you live in the developed world, you are very aware of many of these changes. You probably could not do your job, or run your life, without the help of a great many of them. But even people who live in that world are mostly unaware of how much technological changes are affecting their minds. They ignore, in many cases, how technology is changing—in a positive way—the ways they think and the things their minds can now do. To the extent they are aware, they often view these changes as negative. I believe this is both unfortunate and wrong.

Brain science has advanced tremendously in recent years and gotten wide press. We are now finally beginning to understand some of the neuro-physical correlates of our human behavior, that is, the mechanisms by which some things occur, particularly at the single neuron and chemical levels. More people are aware today that every change in our environment and behavior (and even thinking) affects our physical brains and bodies, through mechanisms such as neuroplasticity and epigenetics. But neuroscience is not yet providing all the answers we need. Even the experts view current research findings in a variety of ways.

Yet even so, we have all entered a new age of mind change so profound that I characterize it, metaphorically, as a kind of "mind evolution". Today's humans, when enabled by today's latest technologies, can do more, think faster, plan better, analyze more deeply, solve more difficult problems, make better decisions, and even know their own bodies, far better than ever before. This, to me, is clearly brain gain.

This brain gain is clearly not happening to everyone on the planet at once, or at the same speed. But we are all affected. All humans are on our way to becoming wiser people. That

includes the 92-year-old mom in Ohio who uses her computer daily for games, Internet searches, email, and Skype.<sup>7</sup> It includes the many kids in Africa and in other developing countries now getting laptops through the One Laptop per Child program. It includes whole villages in India that are learning to use and share a single smartphone.

We are all experiencing brain gain, and we owe all of these expanding human capabilities to the advance of technology—and, of course, to the science that produces it. Around the world, human minds are being augmented, expanded, amplified, and enhanced at a furious pace.

So much so that I argue in this book that a great many of us are already becoming, metaphorically, “new” humans and the rest of us will soon catch up. I call those of us who are already headed down this road *Homo sapiens digital*, that is, digital humans. We are people who are both human and digital, and whose minds, as a result, are both expanded and wise. (As we will see in the last chapter, some researchers are already looking even further down the evolution path. <sup>8</sup>) If you are someone whom this idea makes uncomfortable, I hope you will read on. If you disagree with some of my ideas—and particularly if you disagree strongly—I hope you won’t stop listening: I provide a great many examples to back up what I am saying, and the book might even change your mind about some things.

On the other hand, if you are a person who welcomes all the changes I am talking about, and you find them amazing and thrilling, as I do, I hope you will read on as well. I will endeavor to give you additional arguments to help bring those who disagree with you around to a different point of view.

A great deal of what is being discussed and written about technology today is negative. Technology, and its consequences often appear frightening. I agree that there are some aspects of today’s digital technology that are scary and even dangerous. I discuss them in Chapters 4 and 7. But too many voices today are suggesting that digital technology is making us worse humans: dumber, less able to think, less able to concentrate, less able to reflect, too dependent on machines, less deep, more shallow, or all of the above at once. Those critics suggest that what technology has provided us is not brain gain but rather brain loss. In their view, technology is making us less able people, making our lives less “human” and less worthwhile. And this is happening, they say, even as—and in some cases because—those technologies make many things easier.

Some claim our minds are being taken over and are affected only negatively by our modern technologies. Others worry that human intelligence is about to be, or is already being superseded by artificial intelligence, to our detriment. Some even fear that carbon-based life is on the way out, and that silicon-based life (or something even stranger) is on the way in.

They tell us to be very afraid. The dystopian takeover will happen soon— if not in our lifetimes, certainly in the lifetimes of our kids. Because of our advances in technology, claim the most extreme of these critics, life as we have enjoyed it for millennia is just about over.



Perhaps you believe this, or some of it. But it is time to also hear the other side.

### **A Change of Perspective**

This book is a counter-argument to those critics and worriers. I do not claim that what they feel is entirely wrong, rather that it is myopic. I hope to bring thinking about technology back into a wider focus.

The book is not intended to blindly praise today's technology, but rather to help you put that technology into a new and more useful perspective. I'd like to help you fully appreciate—despite the critics—that those of us who have the opportunity and decide to let modern, digital technology fully into our lives are better off.

We are not just better off because our lives are safer, easier, and more comfortable—although they certainly are that. Far more importantly, those of us who choose to fully engage with technology are becoming freer, more productive, more creative, and more capable people, and, I believe, wiser people.

But I will let you decide.

### **Brain Gain and “Mind Evolution”**

The human brain, and the mind it produces, is seen by many people—probably most people—as nature's greatest achievement. It is certainly the most complex thing on earth. Our minds have allowed humans to become everything we are; to understand, to the extent that we do, ourselves and the world; to create our cultural and artistic heritage and masterpieces; and to experience the emotions, joys, pleasures, and sorrows that make up our everyday lives. And today, if we include all the external technologies that enhance our minds and brains, humans can create even more. We can solve more difficult problems. We can modify our looks, behavior, and the planet. We can make better predictions (of weather, behavior, and politics), take better care of our bodies, and make life-enhancing choices of many kinds, such as helping modify our behavior and bad habits.

But can our minds be even better? You bet!

The “natural” or Darwinian evolution of human minds, that is, the kind in which nature, over time, adds more and more components, capabilities, and complexity to our brains, (and, in the process, creates and improves our minds) is now happening in new ways—not just through natural selection but aided by man himself. Some call this “directed” evolution. Whatever you call it, it is speeding up.

*Really? you might ask. Are we evolving that fast?*

We are. Faster, I'm sure, than most of us think.

*Are all humans going through this new evolution? Is it happening to everyone?*

It is universal, although, clearly, not everyone today receives all of technology's benefits equally or at the same time. But no matter who you are in the twenty-first century—whether a mobile-phone-using tribesperson in the developing world, or a wealthy luddite in the developed—mind enhancement is coming to you. It's now become impossible to escape many of technology's mind-enhancing benefits—even if you try.

*But is this good or bad?*

That is a question well worth asking, and that is what this book is about. My view about this is different from many observers', and this is, I believe, because it looks at a bigger picture. Overall, and on balance, technological enhancement is extremely positive for all of humankind.

*If technology is enhancing our minds so much, as you claim, then why is the world in such a mess? Why doesn't every person have a job? Why am I, and so many people, so befuddled by everything that's happening? If we're now so wise, why isn't everything perfect?*

"Better" and "positive" are relative terms. They don't mean perfect—nothing is. Unfortunately, in some cases, better and positive don't even equate to very good. It is important to remember that we can always do more.

*But isn't it true, as Marshall McLuhan suggested, that once we invent and start using a technology it starts changing us in ways we can't control?*

McLuhan was very wise to observe and write about many effects of technology that had not been widely noticed before him. But I am not—and I don't think McLuhan was—a determinist. I believe that while there are effects and biases that come with certain technologies (and I discuss a great many of them in this book), humans also have the power to shape technology and how we use it to our will—and toward positive outcomes. That is, in fact, what has always happened with our technology.

*Will technology become wiser than humans? Will machines replace us?*

The fear of this happening underlies, I believe, a great many people's objections to technology. And of course we never know. But for the foreseeable future, at least, my belief is that the symbiotic combination of what humans do well and what technology does well will produce the wisest outcomes, and the outcomes we need.

*If our minds are expanding so much, why does the world often seem so difficult to understand? Why do so many things feel like they're speeding up and getting out of control?*

Unfortunately, as our minds are expanding, the context we live in is also changing, and changing even faster. And as it does, the variability, uncertainty, chaos, and ambiguity of our world increases. We are always, to some extent, playing catch-up. Under these conditions it is terribly important that our minds do expand, because, to paraphrase Einstein, “The problems of tomorrow cannot be solved with the minds of yesterday.”

### **A Positive Point of View**

It’s time for some perspective.

It’s not, I expect, the same “perspective” you have probably been hearing or reading about in the press, or perhaps even feeling the need for. These days “getting perspective” on technology is too often a coded term for focusing on, and worrying about, technology’s negative effects and aspects. There are, of course, many concerns people have, both valid and invalid. I will discuss these—and put them into proper perspective—later in this book. But consider this: If the press and popular writers reported on sports such as football, or hockey in the same way they do about technologies like videogames or Facebook (i.e., only—and daily—negative reports of injuries, broken teeth and bones, etc.), no parent would allow their kids to play those sports. And yet we do let them play, and even encourage them to, because we also see another side.

The overall perspective I offer, therefore, is of technology as part of the larger human picture. And that is a picture of trade-offs: the trade-offs we all make as humans for overall positive results. It is a perspective of how, despite many issues, the world and people’s lives are continually improving. I do not ignore or deny that there are pockets where the world is not currently improving, or is even slipping backward—but I believe those are temporary. Mine is a picture of how all people can do more, live better, and most of all be wiser as we advance into man’s new millennium.

### **Losses?**

I do recognize that as things change some things will be lost, many of them things that were treasured.

Some of this is inevitable as human civilization and technology march on. Every generation mourns such losses. Rarely, though, do things that were once loved and important disappear entirely; they just become the province of smaller and smaller niches, or—like clipper ships—remain only in pictures on our walls.

But I believe an objective observer will agree that, when one looks at human beings on this planet, those people with the latest and best technology are, and have always been, far, far better off—in ways most of us consider important—than those without it. And I don’t just mean in terms of material possessions.

What person would want to face issues like cancer, sanitation, or climate change as a caveman, or even as a person from the nineteenth century, rather than as a twenty-first-century citizen?

Although all the positive changes being wrought by modern, digital technology are not happening everywhere at once (and forgive me for repeating this, but far too many technology critics write “we” as if everyone in the world sees too many screens or gets too many emails), the positive effects of technology are clear for all humans. Given all the issues in the world, it is now time for all of us to accept the benefits of today’s technology. We have entered a new human-machine age. Our job now, as humans, is to make it the best world we can.

Our quest, in other words, is to find digital wisdom.

### How Fast?

I am an optimist, and this is an optimistic book. But I am by no means a Pollyanna. I see, hear, and read the same reports that everyone else does. Lots of things about technology are promised and predicted, and many of them don’t come true—either as quickly as we expect, or at all. Many of today’s technology critics enjoy pointing out that we are not (yet) driving flying cars or living forever, as some twentieth-century visionaries claimed we would be by now.

But very few, if any, of the negative predictions for society have come true. And we hear and think a lot less about the positive things that have come true—such as better sanitation for so many and instant news and connectivity around the globe—because they are now so much a basic part of our lives. Our most useful technologies get quickly taken for granted. And, if we look, we can all observe that the process of technology moving from someone’s dream to a worldwide reality is speeding up (see chart).

Accelerated Speed of Adoption (Race to the Billions)*		
Cell Phone	40 yrs	4.0 B users
www	20 yrs	1.5 B users
Texting	15 yrs	8 B messages/day
Google	10 yrs	3 B searches/day
Facebook	6 yrs	1 B views/day
You Tube	5 yrs	1 B views/day
Twitter	3 yrs	1 B tweets/year
Apps	1 yr	1 B downloads

\*Rough Approximations. Source: Wikipedia © Marc Prensky 2012

It took Mark Zuckerberg, founder of Facebook, only six years to go from trying out an idea in his dorm room to being one of the most successful and richest people in the world. Zynga.com went from startup to public offering in only four years.

And they are only the visible tip of the iceberg. Every field has been enhanced by technology, often in ways we don't see. For many of us born in America in the first half of the twentieth century (I was born in 1946) much of life today is already science-fictional. Not only are we now almost universally and instantaneously connected around the globe, but scientists are able to map and manipulate our genes. We have people and machines out exploring the universe.

Much or all of this, of course, you already know. But here's what you may not know.

Our mind—that essence of humanity that we all prize so much—is becoming more capable at just as fast a pace. Not because of advances in neuroscience—although those are many and valuable—but because of technology in a much broader sense.

The breadth and depth of this, I believe, will surprise and amaze you—it did me. Once I started looking, I spotted brain gain all around me, with examples of it in the papers and magazines almost every day. Our minds are expanding, and rapidly. We are not becoming stupid, or slaves to our machines, as many fear—on the contrary. No matter who you are, your mind is already changing daily for the better—or could and should be.

Sadly, many—or most—people are not availing themselves of all their options, either out of ignorance, or fear of negative consequences, or a combination of both. Our education system is, unfortunately, a prime example of this. I discuss why this is our schools'—and our children's—great loss in Chapter 6. But a growing number of people have begun to avail themselves of these opportunities, and those people are becoming the wise among us. I will introduce you to some of them in these pages.

My hope is that you will leave the book convinced by—or if not fully convinced by, at least open to—the argument that the symbiosis of human and machine is better, and wiser, than the human (or the machine) alone. I will not argue that every use of technology is wise—people using machines can too easily be just digitally clever, or even digitally dumb (see Chapter 4). But my key point is that the unenhanced human—and the unenhanced mind—can no longer be considered the wisest thing on the planet. And if that is true, we'd better learn to make the best use of the new combination. Because it is also true that people who have the option to engage with and use technology, and choose not to—even selectively—are diminished as human beings by that choice, and lesser in their wisdom and in their humanity. The wise and human decision is no longer whether to engage with technology, but how.

Does your head hurt from today's technology? Is it spinning? Here's why

