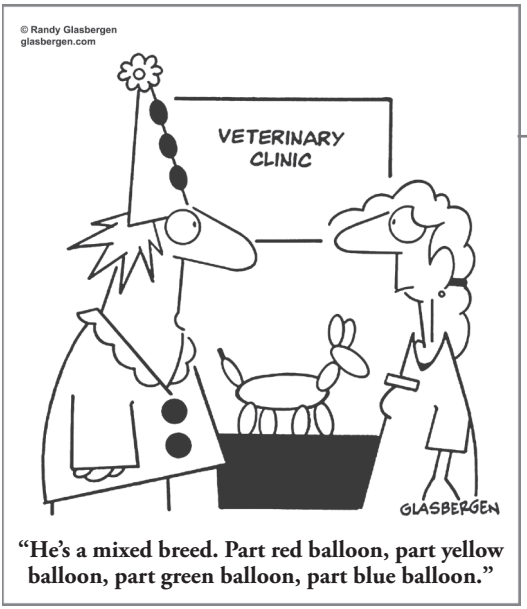

"He's a mixed breed. Part red balloon, part yellow balloon, part green balloon, part blue balloon."

CHAPTER 2

Making Sense of Thinking: A Practical Organizing Principle for Business

CHAPTER HIGHLIGHTS

- Through the power of understanding your thinking and how others think, you will develop new insights that can have a profound impact on everything you do.
- The Whole Brain Model identifies four quadrants of thinking preferences, providing an easy-to-understand, practical, and visual metaphor for the specialized thinking clusters of the brain.
- Whole Brain Thinking is the key to applying what we know about the brain to business.

This book is going to get you thinking about better ways to use your brain, but first, I want you to think about something else: the way you listen to music.

When you have a choice in the matter, how often do you go for the random option and just listen to whatever happens to come along, whether it's rock and roll, country, classical, or talk radio?

More likely, you have favorite artists, stations, genres, or playlists that you've programmed in, and those are the ones you go to when you have the choice. You have access to a world of options across all the different styles, but you save and return most often to the ones you like best.

Maybe your playlists are strictly rock music because that's your strong favorite, or perhaps you have more eclectic tastes, so you've programmed in a combination of Top 40, classical, and oldies stations. Or maybe, because you prefer a wide variety of genres, you're always scanning and reprogramming

your selections. No matter what they are, your preferences affect the way you listen to music.

So what does all this have to do with the way you use your brain? Our preferences affect what we access most.

> The greatest thing by far is to have a command of metaphor.
>
> —Aristotle

Whole Brain Thinking helps you understand your thinking preferences. At the core of Whole Brain Thinking is the Whole Brain Model, a metaphor for how we tend to use our brain and, more important, how our thinking works. The model is based on brain research I initially conducted using EEG equipment, along with observable evidence and, later, psychometric validity studies. In the Whole Brain Model, thinking falls into four preference clusters that we each have access to as follows:

The A quadrant: The Analyzer. Logical thinking, analysis of facts, processing numbers

The B quadrant: The Organizer. Planning approaches, organizing facts, detailed review

The C quadrant: The Personalizer. Interpersonal, intuitive, expressive

The D quadrant: The Strategizer. Imaginative, big-picture thinking, conceptualizing

These four different clusters can be thought of as your thinking system, comprised of four different thinking "selves." You have a team of these four thinking selves available to you, yet if you're like most of us, you probably prefer some of these selves over others. Like a sports team, you have some of the selves "in play" more frequently, while others sit on the bench.

After learning about Whole Brain Thinking, a senior executive at a Fortune 500 company made an insightful comparison between the way we use our brains and the way we listen to music:

> When it comes to music, each of us can and does tune into our favorites whenever we like. If we don't listen to a given station or genre very often, we may forget it's there, or it may take us more effort to get to it, but it is there, and it's there for us to access.
>
> Herrmann's four-quadrant model of how the brain works helps us get a read on what "favorites" we may have preferences for in our ways of thinking. While we all have access to all four quadrants, some of us have a very strong preference for one quadrant, while others have stronger preferences

for two, three, or even all four quadrants. It's not right, it's not wrong; it's just different. And just because we prefer certain thinking "favorites" over others doesn't mean that we can't access all of them.

As you read through this book, you will begin to get an understanding of what your preferred "stations" are.

It was during my career at General Electric that I developed the Whole Brain Model and the Herrmann Brain Dominance Instrument® (HBDI)®, an assessment tool that quantifies the degree of a person's preference for each of the four thinking preferences. More than 2 million individual HBDI Profiles are part of the ongoing research that provides the data upon which the conclusions of this book are based.

I designed it with a goal of helping businesspeople solve business problems and be more effective leaders, while also answering many of the questions I'd had about myself over the course of my life and career.

> The empires of the future are empires of the mind.
>
> **—Winston Churchill**

What "stations" or "playlists" are the favorites in your thinking and work preferences? Go online to www.wholebrainbusinessbook.com for access to the HBDI Assessment.

In this chapter and the next, I will share my personal story of the brain-related research that is the basis of HBDI and the metaphorical Whole Brain Model, the organizing principle of how the specialized systems of our interconnected brain—and more important, the resulting day-to-day thinking preferences—work. As you read through the chapters that follow, think about how the events of your life have been influenced by your thinking preferences and the thinking preferences of those around you, and ultimately, how that shapes your worldview.

This story of my journey may help inspire your own self-discovery.

Research on Creativity Led Me to the Brain

Although a traumatic midlife illness put an end to the performing and singing that I had done since my college years, this unfortunate reality had a silver lining: while I was recovering, I was able to unleash my latent artistic creativity. Though I had always wanted to draw and paint, I could never get past my

> In this head the all-baffling brain; in it and below it, the makings of heroes.
>
> —Walt Whitman

feelings of inadequacy and self-doubt. When I was bedridden by my illness, I reached the point where my self-imposed barriers were replaced by boredom and frustration. My wife bought me an inexpensive paint set. I selected a scene and started, then chose another and another. It seemed that suddenly I was able to draw and paint, and ultimately even to sculpt! Over the years, I produced hundreds of paintings and sculptures, won numerous awards, and sold most of my work. I was employed full time by GE as manager of management education, but painting and sculpting had become my second occupation.

I was often asked how I had uncovered this creative talent, and I wondered: Was this available to everyone? My professional interest in learning, combined with my newly discovered talent, motivated me to research and understand the nature and source of this creativity. And then I had the perfect opportunity to pursue this interest further. The Stamford (Connecticut) Art Association, of which I was president at the time, asked me to moderate a panel on the nature and sources of creativity. As I did research on this subject in preparation for the event, I discovered how the brain plays the central role in our ability to be creative. While this concept may seem obvious today, the revelation was like a thunderclap of instant understanding at the time. Creativity was mental, and our ability to control our creative flow could come through understanding the brain. This personal Aha! was shortly followed by a second: if there was something about creativity that could be discovered from the brain, then clearly there was important information about our learning process as well. Again, these conclusions, which seem so obvious now, were considered breakthrough concepts at that time.

The "Right-Brain/Left-Brain" Trap

My continued research about the brain and its connection to creativity and learning led quickly to the work of Roger Sperry,[1] who had shown through his experiments that the brain was divided into two hemispheres that were specialized in function. Robert Ornstein[2] was also writing about the psychology of consciousness in terms of the specialized brain. Numerous experiments carried out by these researchers and others provided convincing evidence that the brain was indeed specialized and that the differences in specialization were located in each half-brain. It wasn't long before this idea that the brain was made up of just two specialized hemispheres had become part of the popular lore of the day (a misconception that still lingers today, in fact).

> One is not born a genius; one becomes a genius.
>
> —Simone de Beauvoir

At the time, Paul MacLean[3] of the National Institutes of Health had developed the triune brain model, which allocated the specialized functions of the brain based on human evolution—that is, the human brain developed sequentially as the reptilian brain (or the brain stem), then the limbic system, and finally, the neocortex.

All of these researchers were making significant contributions to our knowledge of brain functioning. Sperry's research, for example, shows that although the brain is massively interconnected and works as a whole, specialization exists, and different parts of the brain serve different purposes. The premise of specialization was a crucial finding. However, the focus on the left/right dichotomy became oversimplified and completely overlooked the notion of the whole, including other brain systems, most notably the limbic system, as highlighted by MacLean's model.

Even today, you probably still hear the familiar right-brain/left-brain descriptions of the brain. The world has had a long love affair with dichotomies: right/wrong, good/bad, sweet/sour, up/down, right/left. Separating something into just two categories is a simple, easy, and satisfying approach to categorizing differences. The problem is, this simple dichotomy falls short of accurately describing the way the brain actually works.

While the brain is indeed specialized at the neuronal level, the specialized neurons have relevance only as part of the neuronal network, which functions through the interconnectedness of these neurons. Thus the oversimplified left-brain/right-brain notion betrays the very essence of our brain's design, which relies on interconnections between specialized areas to function, because it implies separateness. The brain is, by design, whole.

When it comes to business, being able to access and leverage the whole brain is the biggest and most important challenge we face, especially as we're dealing with more complexity, greater uncertainty, and rapid change. The good news is that our interconnectedness allows for it. Let's take a closer look at that interconnectedness and why it is so significant from a business standpoint.

The Whole Is More than the Sum of the Parts

The limbic part of the brain is a relatively small, complicated structure that is divided into two interconnected halves, each nestled within one of the cerebral hemispheres (see Figure 2-1). While somewhat primitive compared to the neocortex of the cerebral hemispheres, the limbic cortex is neural, synaptic,

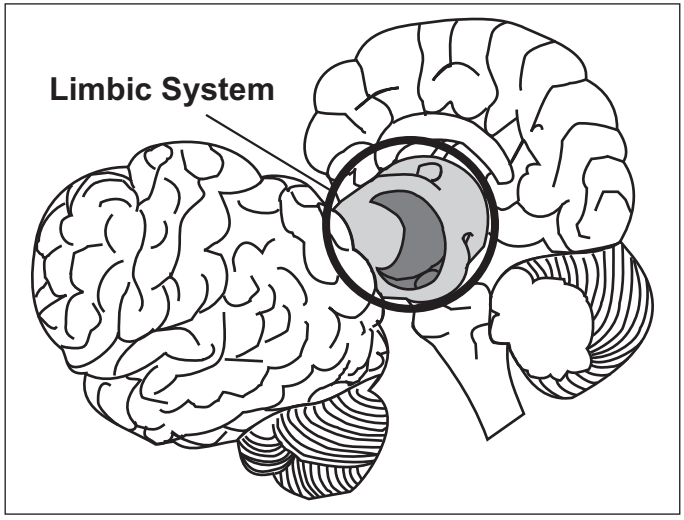

FIGURE 2-1 The limbic system. The cortices of the limbic system nestle in and underneath the cerebral cortices.

and chemical, and therefore capable of thinking in the same way as its cerebral cousin. However, at the time of my research, its role had been basically either overlooked or ignored.

My own experimentation and my analysis of MacLean's and Sperry's work led me to combine elements of the two separate theories into a four-part model representing the interconnected yet specialized *whole thinking* brain. This four-quadrant model serves as a powerful metaphor for the brain and an organizing principle of our thinking preferences (see Figure 2-2): there are four thinking preferences that are massively interconnected and function as a whole, with the idea of quadrants being used to differentiate the different clusters of specialization that I have discovered from my research.

The more work I did, the more I realized that it was the *interconnectedness* of the different specialized clusters of neurons in the brain that really mattered. Understanding the thinking parts of the brain was part of the process of this discovery, but *wholeness* was the ultimate takeaway. Thus, the name Whole Brain Model captured that well.

In fact, one of the best ways to think about the brain is as a network. Think about the Internet: without a connection, any single point cannot function, and the greater the number of contact points available, the greater the viability and flexibility of that network. There are major routers, or nodes, where many

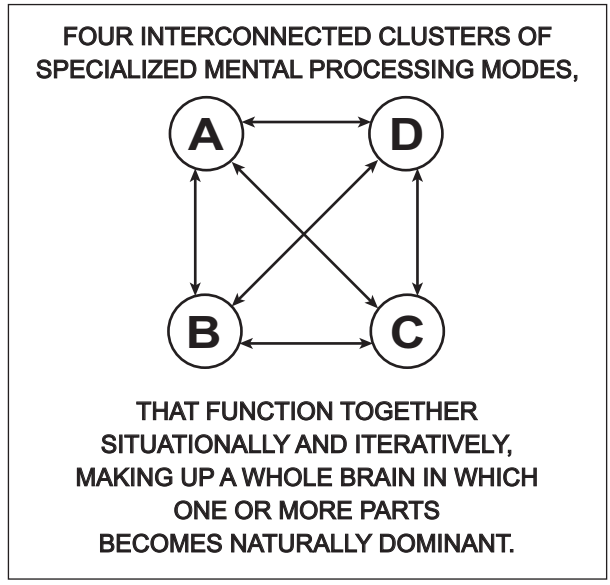

FIGURE 2-2 The organizing principle. Herrmann's organizing principle, the basic premise behind his metaphoric model of brain function, defines what is included when speaking of the whole brain.

of the connections converge, and those can be bypassed if one of them fails. At a very high metaphorical level, the brain's "plasticity" or malleability works in much the same way, adjusting over time as the needs of the system change while still maintaining connectedness.

The brain naturally seeks patterns and organizes around patterns. Through hundreds of millions of interconnections, the working brain provides pathways for specialized activities, which often involve many different areas of the brain, to take place. Although my initial research and creation of the Whole Brain Model was inspired by the idea of a mapping different specialized areas in the brain, I came to realize that understanding our preferred patterns of thinking was more relevant and important than determining location, so the model is entirely a metaphor. It became clear that because of the inherent way the brain is designed, no specialized location ever works in a vacuum, so function became more important than location. But placing the quadrants in the four positions helped people understand the concepts and use them easily and quickly. The circular display represents the whole thinking brain, which is then divided into four conscious modes of knowing, each with its own set of behaviors demonstrably associated with it.

A common misconception in the left-brain/right-brain trap is that our thinking preferences result from *one single physical part of the brain* being more connected, stronger, preferred, or more active. This is *not* the case. Thinking requires activation of multiple specialized, complex networks that are shaped by experience and become stronger over time. Further, these richly interconnected networks "learn" by adjusting the degree of interconnection, strengthening or pruning it as needed over time. A great example of this is an unused skill that you might have developed at an earlier time in your life but have since completely stopped using. It might be a foreign language, a sports activity, or a work skill. When those areas cease to be used and activity is directed elsewhere in the brain, they still remain, but they are not as strong as they might once have been. When you reengage those areas, like picking up a musical instrument that you played years ago or a language that you have not spoken for a very long time, you can almost feel the struggle to reconnect those weaker links. If you practiced over time, you could regain your acuity, but doing so would take effort and conscious mental activity. In contrast, those skills that you have continued to use over the course of your life are more solid and better connected—and you can feel that as you engage in those activities.

By understanding and describing these preferred thinking networks in the brain, we can quantify their relationship to one another in the form of this four-quadrant model (see Figure 2-3) and the implications that the quadrants have for our day-to-day thinking and behavior.

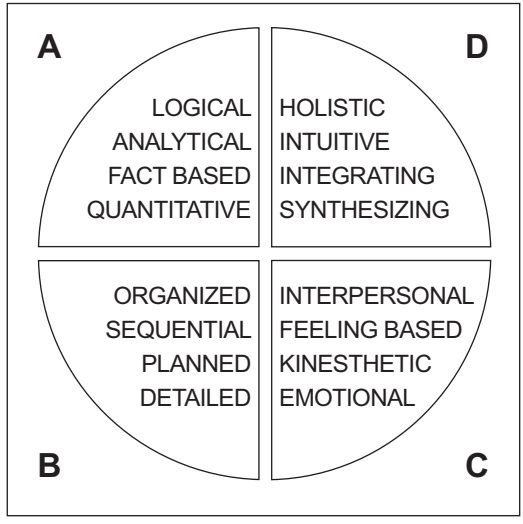

FIGURE 2-3 The Whole Brain Model.

Specialized Thinking and Preferred Patterns

Throughout this book, we'll be exploring the implications and applications of our preferred patterns of thinking in business, including the ways in which a person's thinking preferences affect his or her behaviors, interests, decision-making processes, communication style, and all other aspects of performance. But first we need to define preferred patterns.

> The brain is as strong as its weakest think.
>
> —Eleanor Doan

One of the easiest ways to understand the concept of preferred patterns (what I originally called "brain dominance") is to use an analogy to our preferred, or dominant, hand. If you are right-handed, your right hand and arm will develop to a higher level because they're used more frequently. The situation with the specialized thinking preferences that we each have in the brain is similar. Through increased use as a result of our preference, certain patterns of specialized thinking come to be preferred over others, developing to a higher level than the nonpreferred patterns. And as they develop over time as a result of our life experiences, those patterns become evident from the mental preferences that we exhibit. Try this: take a pen or pencil in your nondominant hand and write your full name. Can you do it? Most certainly yes. Is it awkward? Probably. Could it be developed with more practice and concentration? Certainly, but motivation and conscious effort will be required if you are to engage differently from your norm.

From Dominance to Preference

The HBDI assessment, which I referred to earlier in the chapter, measures degrees of preference for each of the four quadrants. Here's a little background on how it and the Whole Brain Model were developed.

> If everyone is thinking alike, then somebody isn't thinking.
>
> —George S. Patton

The Whole Brain Model is the product of numerous studies using electroencephalographic (EEG) data from the brains of test subjects responding to a battery of psychological tests and performing specific activities. The electrical activity that takes place in the cerebral hemispheres can be measured by placing electrodes around the scalp. However, this technique cannot be used to measure the electrical output from the limbic system, as it is located too far below the surface. (These tests were conducted prior to the introduction of

positron emission tomography, or PET scans, and subsequently magnetic resonance imaging, or MRI scans, which have given researchers a chance to see the inner structures of the brain at work.)

Despite this measurement limitation, the results of these studies combined with other subsequent research provided enough information to allow me to build a scaffolding for the thinking style clusters, the architecture of the organizing principle just described. Although some of these experiments were carried out at GE's Management Development Institute at Crotonville, it became very clear early on that wiring up GE managers and executives with EEG apparatuses was not a practical method of gathering data for the development of my model. What was needed was a *metaphorical* model, one that would metaphorically represent the highly interconnected yet specialized thinking clusters of the human brain to allow for quantification of an individual's relative preferences for specialized thinking across one or more of the four quadrants of the model. Thus was born the Herrmann Brain Dominance Instrument (HBDI). The month was August 1979. The place was GE's Management Development Institute, where I hosted the first Whole Brain Symposium.

Years later, the metaphorical Whole Brain Model continues to provide a useful and valid basis for determining thinking style preferences leading to application—in other words, their impact on how we interact with the world.

Ann Herrmann-Nehdi on What We Know About the Brain Today

Since the first edition of the *Whole Brain Business Book* was published in 1996, our understanding of the brain has continued to advance while confirming the initial findings of the late 1970s that the 100 billion neurons in the brain are indeed specialized. The findings of this new research have also underscored the tenets of my father's initial studies, reinforcing the point that he emphasizes here and addresses more specifically in Chapter 4, "What You Need to Know So You Can Grow." The degree of specialization in the brain affects how we think and what we pay attention to. We do not function with "half a brain," as the terms "left-brained" and "right-brained" imply. In fact, the brain's very design gives us the opportunity to think in terms of *and* instead of *or*.

Technological advances since the 1990s have also opened the door to faster and more in-depth research than was possible when the early studies were conducted. As he mentions here, to perform his initial experiments demonstrating specialization, my dad wired people up to an EEG for testing. I know this firsthand: as an adolescent, I was among those early test subjects. Today's much

less invasive technology has enabled us to learn significantly more about how the brain works.

The wide range of diagnostic devices now available to us can monitor brain activity in new ways. In addition, open-source projects such as the Whole Brain Catalog are enhancing our ability to view the brain in depth and find solutions to even the most complex challenges in brain research through cooperation and crowdsourcing. This project provides rich 3D views that allow researchers to zoom in, out, and around structures deep in a multiscale spatial framework of the mouse brain. The Human Connectome Project,[4] funded by the National Institutes of Health, is an ambitious effort to map the neural pathways that underlie human brain function, with a goal of acquiring and sharing data about the structural and functional connectivity of the human brain. The BRAIN Initiative[5], which was announced by President Obama in April 2013, is expected to teach us even more about brain function, with $300 million in public and private investments dedicated to supporting innovative technologies that will help researchers uncover the mysteries of brain disorders such as Alzheimer's, schizophrenia, autism, epilepsy, and traumatic brain injury.

Research conducted by Daniel Goleman[6] (the author of books on emotional and social intelligence) and others has led to new insights into how people are affected by the chemistry and design of the brain. As acclaimed author and Harvard researcher Clayton Christensen[7] points out, from this research, we know that "people learn in different ways—some of this is encoded in our brains at birth; other differences emerge based on what we experience in life."

> Nobody realizes that some people expend tremendous energy merely to be normal.
>
> **—Albert Camus**

Yet in spite of 2,500 years of continuous study and research on the brain, there is still a lot that we don't know. It is often reported that our knowledge of the brain doubles every 10 years; the recent explosion of new research, technology, and methods means that we may be learning much more, much faster, but considering the complexity of the brain, it's unlikely we will ever know everything about it. In any case, the good news is that the brain continues to receive such well-deserved attention. The explosion of neurological research has also give rise to healthy "neuroskepticism," much of which I agree with. What will be most critical in coming years is dealing with the "one study syndrome" that provides insight so narrow that it is not generalizable.

My father was ahead of his time. His early research into the specialized brain that functions as a whole through the massive interconnectedness of the physical structure helps explain how we develop our thinking styles over time,

and of course how those thinking styles affect every aspect of our lives, especially in business. In that spirit, this book is focused on *what matters most about our gray matter.*

Research and technology continue to advance our understanding of the brain, which changes almost daily. To discover the latest relevant developments in brain research, go online to www.wholebrainbusinessbook.com.

SO WHAT?

- The popular left-brain/right-brain dichotomy is too simplistic and incomplete to serve as a model of how we think and learn. The massive interconnectedness of the brain's design is evidence of our *wholeness*, not our *separateness.*
- The Whole Brain framework evolved from initial EEG testing at GE combined with experience and research in a business setting; this gives it a practical workplace context, in contrast to other models or psychological constructs.
- Creating a metaphorical model of the four thinking preferences of the brain facilitates the application of current knowledge of brain function and serves as an organizing principle that emphasizes wholeness.
- The natural phenomenon of dominance between paired structures of the body, like handedness, applies to the preference patterning we develop in our thinking as we use our brains throughout the course of our lives, and is the basis of the theory of the preferred thinking patterns that we measure in the HBDI.