the POWER of IMPOSSIBLE THINKING

TRANSFORM THE BUSINESS OF YOUR LIFE AND THE LIFE OF YOUR BUSINESS

Includes New Introduction from the Authors!

YORAM (JERRY) WIND | COLIN CROOK
WITH ROBERT GUNTHER

▶ If You Can Think Impossible Thoughts, You Can Do Impossible Things

Are you having trouble making a needed transformation?

Are you stuck in your career?

Is your organization stalled in its progress?

Are you lagging behind competitors in innovation?

Are you having trouble making your diet and exercise program work?

Are you overwhelmed by information?

It could be that you need to change your mental models.

Transforming your mental models can help you think impossible thoughts and overcome the barriers to change in your life, work and society. This book will show you how.

It's almost midnight.

You are walking down a dark city street toward your car parked several blocks away, when you hear footsteps behind you. You don't turn around, but you quicken your pace. You remember a news story from a few weeks ago about a robbery at knifepoint in the neighborhood. Your pace quickens. But the footsteps behind you are also moving very quickly.

The person is catching up to you.

At the end of the block, under the street lamp, the steps are immediately behind you. You turn suddenly. You recognize the familiar face of one of your colleagues, heading to the same parking lot. With a sigh of relief, you say hello, and you and he continue on your way together. ■

What just happened?

The reality of the situation didn't change at all, but the instant you recognized the face of your colleague, the world in your mind was transformed. The image of the pursuing attacker was transformed into that of a friend. How could so little have changed in the situation, yet so much have changed in the way you viewed it?

First of all, you had created a complete picture of what was happening based on a tiny bit of information—the sound of footsteps behind you at night. From this mere suggestion, you drew upon memories of news stories of crimes, together with your personal fears and experiences, to conjure up an image of a potential attacker. You changed your actions based on this assessment of the situation, walking faster to escape an assailant. This could be a great survival instinct, but in this case, you were fleeing an assailant who did not exist.

Then, just as quickly, in the flash of the street lamp, you gained a little more information—and the entire picture shifted. In a split second, you recognized the face of a colleague—again based on the vaguest hints. You didn't take time to stare or think deeply about it. There might have been other possibilities in the situation. Could the person have been an assailant wearing a mask to look like your colleague? Could your colleague be an assailant? These possibilities were so remote that you didn't consider them, and by the time you thought through them, you might be dead. You saw the face, and the footsteps quickly switched categories from "foe" to "friend."

Only a small part of this drama happened on the sidewalk. Most of it was created within your own mind.

Working on transformation initiatives with leaders of major global corporations, we have recognized a simple lesson with profound implications: To change your world, you first have to change your own thinking. Neuroscience research shows that your mind discards the majority of the sensory stimuli you receive. What you see is what you think. The ability to see the world differently can create significant opportunities, as companies such as Southwest Airlines, FedEx, Charles Schwab and others have demonstrated. But even successful models can ultimately become a prison if they limit your ability to make sense of a changing world, in the way that major airlines failed to fully recognize the threat of upstarts such as Ryanair or that music companies, locked into a mindset of selling CDs, failed to see the opportunities and threats of music file sharing.

From driving organizational growth to improving personal health and fitness to fighting international terrorism, your mental models shape your responses in every area of your life. How do you become better at recognizing and using mental models more effectively? This book provides specific insights and strategies to help you understand the role of mental models, and know when to change them—so you can transform your organization and your world. ■

Surely the human mind is not so malleable.
Are you saying we all have lost touch with reality?

We know what we see, right?

Why don't we ask the folks who saw Bugs Bunny in Disneyland?

The "wascally wabbit" from Warner Brothers would be turned into stew if he actually showed up to cavort with Mickey Mouse and Donald Duck in the theme park of rival entertainment company Disney. Yet when test subjects were shown mocked-up images of Bugs Bunny shaking hands with tourists in Disneyland, some 40 percent subsequently recalled a personal experience of meeting Bugs Bunny in Disneyland.[1] They "remembered" a meeting that was, in fact, impossible. It turns out that many of us are not much more astute at avoiding the rabbit's tricks than his befuddled archrival Elmer Fudd.

How often in your daily life do you find yourself shaking hands with Bugs Bunny in Disneyland? ■

OK, so we might be fooled by some sleight of hand in a theme park, but we certainly won't miss the signals that are truly important in our environment.

How about overlooking a gorilla?

Researchers asked subjects to count the number of times ball players with white shirts pitched a ball back and forth in a video. Most subjects were so thoroughly engaged in watching white shirts that they failed to notice a black gorilla that wandered across the scene and paused in the middle to beat his chest. They had their noses so buried in their work that they didn't even see the gorilla.[2]

What gorillas are moving through your field of vision while you are so hard at work that you fail to see them? Will some of these 800-pound gorillas ultimately disrupt your game? ■

What you see is what you think.

Just as we can believe we see the "impossible"—such as Bugs Bunny in Disneyland—or fail to see a gorilla striding across our field of vision, our mental models shape the opportunities and threats that we can see in our lives.

To change, you must first see the possibilities. By understanding the power of mental models and the process of changing them, you can think impossible thoughts. These thoughts can transform the way you approach the life of your business and the business of your life. On the following pages, we'll explore a process for unlocking the power of impossible thinking. ■

Rabbits and gorillas may be interesting, but why should I care about mental models?

Mental models shape every aspect of our lives. If you are stuck in your career, if your organization is stalled in its growth, an underlying mental model may be holding you back, or a new model might open opportunities for progress.

If you are lagging behind your competitors in innovation, it may be your models that are constraining your creativity. If you are overwhelmed by information, perhaps the models you are using are not up to the challenge of making sense in our information-rich world. If you are trying unsuccessfully to lose weight, increase exercise or improve your health, the mental models you use to understand these activities will have a dramatic impact on the outcomes you achieve and the quality of your life. If your personal relationships are strained, your mental models, and those of others, could be at the root. And if you want to change society or the broader world, you need to begin by looking at the mental models that shape your world and challenging them.

In any area of your life where you need to change and transform yourself, your organization or others, mental models play a central role. Yet we often have little awareness of what our models are and how they shape what we can see and do. Mental models can appear simple, and are often invisible, yet they are always there and have a significant impact on our lives. Changing the world begins with changing our own thinking. ■

The world we live in is not out there on the street. It is in our own minds.

Until we recognize this, we will always be running away from ghosts and moving toward mirages. In our business and personal lives, we often fail to see the true threats and true opportunities because of the limits of the way we make sense of the world.

This book is designed to creep up on your view of the world and shake up the way you see the world. It will help you understand how your mind uses only a small part of the outside world it perceives, filling in the rest of the picture to make sense. Your mental models shape your vision and actions. Knowing how this process works will help you challenge the way you view the world and the way you act.

This idea may seem quite simple and self-evident, and it is. But if you truly consider the implications, as we will on the following pages, it is a powerful idea. This transformation of thinking is where all the transformations of our personal lives, our organizations and our society begin. That's the power of impossible thinking. ■

Do you hear footsteps behind you?

(AN ASIDE) IS THIS ANY WAY TO START A BOOK?

Some of the early reviewers of the manuscript liked the way this book opens, because they thought it drew the reader into the core issues. Others, operating from a different "mental model" (the way we make sense of the world), wanted instead a concise summary of where the book was headed and a diagram showing all the key points we'll be making. Others wanted more of an academic description, relating the discussion to what has been written in this area.

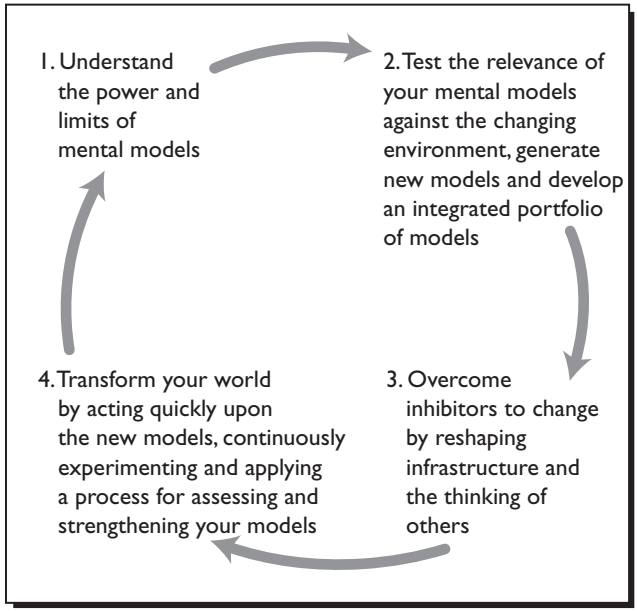
This is probably a good time to point out that your own reaction and experience is probably due as much to the mindset you bring to these pages as to what is written on them. The concept of a "book" is quite different when it refers to an extensively footnoted academic work versus a popular novel. Peter Drucker and Stephen King both write "books," but beyond the fact that they both use words, what they mean by "book" is completely different.

What did you expect when you picked up this book? Because it is coauthored by a university professor, were you expecting something more academic? Because it is coauthored by a former chief technology officer at a major corporation, were you expecting to see some opening tales from the trenches of business? Both these elements appear later on, but the opening is designed specifically to challenge your current thinking and perhaps make you more receptive to the ideas you will encounter here.

A fundamental message of this book is that what you see in any situation depends in very large part upon what you bring to the table. What you see in this book is no exception. You are involved as much as we are in the process of making sense of the ideas presented. More than what we have written here, your own experiences and mindsets will shape what you get out of this process.

If you think this *isn't* the way to start a book, we ask that you set aside your existing model and give us a little time to win you over. We also invite you to let us know your reactions so we can challenge ourselves and our own mental models (contact the authors at contact@impossiblethinking.com).

By the way, if you were looking for a roadmap of where we are headed, here is a diagram:



ENDNOTES

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2. Taylor, John G. "From Matter to Mind." *Journal of Consciousness Studie*s. 9:4 (2002). pp. 3–22. This experiment has also been mentioned in various other papers.

PRAISE FOR
THE POWER OF IMPOSSIBLE THINKING

"This is an important book that 'makes sense of how we make sense.' The authors provide a thorough, fresh, and compelling exploration into the dimensions of mental models. All leaders who want to be more effective in their actions would be served well to leverage the principles in this book to learn about how they think and make sense of the world around them."

Nick Pudar
Director of Strategic Initiatives, General Motors

"This is a really great piece of work. It is 'immersion into the process of insight.' Truly a valuable addition to any forward-thinking person's library in light of the rapid change we face in today's world—business and personal."

J.Allen Kosowksy, CPA
Forensic Accountant and Director, 0N2 Technologies

"A masterfully written book that is sure to capture the attention of every thinking person who's willing to look at the world of business through new lenses. *The Power of Impossible Thinking* is both timely and intriguing."

Kathy Levinson, Ph.D. Author of The 60-Second Commute

"Tough-minded managers like to think they see the world as it is. Wind and Crook, drawing on recent neuroscience research, demonstrate that none of us, tough-minded or not, do anything of the sort. What we perceive as 'the world' is as much inside our heads as outside. By realizing that and making choices about how we see things, we can become much more effective managers."

Rob Austin, Ph.D.
Harvard Business School and co-author of Artful Making

"While most of us may recognize that the world we respond to is more in our mind than in any physical reality, often we don't have a clue why this is so. This very important book clearly explains how our mental models work to construct these distinct inner worlds. And more importantly it offers empowering advice on how we can use this knowledge to work for us rather than against us in creating a better outer world for ourselves, our organizations, and our societies."

Charles C. Manz
Best-selling author of SuperLeadership, Fit to Lead, *and* Temporary Sanity

"Today, life moves at hyperspeed. Hence, the age-old human skill of pattern recognition is more essential to our health and happiness than ever before in history. *The Power of Impossible Thinking* is a wonderful guide to help you understand the patterns you recognize and—critically—when those patterns serve you well, when they don't, and what you can do about it."

Douglas K. Smith
Co-author of The Wisdom of Teams *and author of* On Value and Values

"I have been trying to explain why Japan has fallen into a pitfall and cannot come out of even the simplest problems. One can call it an innovators dilemma, but that does not solve the problem. This book suggests we have to go back to the basics of reviewing our underlying 'mental models' now and then, and only then, have to construct a new model, perhaps plural, and move onto exploring the new terrain."

Kenichi Ohmae
Author of the international bestseller, The Borderless World

"Jerry Wind and Colin Crook have one of the most powerful messages there is about dealing with the present changing world. Perspectives are prisons, they say. The only way to thrive in the coming environment is to cultivate the ability to sense the new patterns and relationships as (and before) they emerge—otherwise you'll be locked in the past. This book can get you out of that jail."

John L. Petersen
President and founder of The Arlington Institute and author of Out of the Blue: How to Anticipate Wild Cards and Other Big Surprises

"*The Power of Impossible Thinking* is a health spa for the executive brain. Poor mental models can do more than ruin your reputation, your organization, or your team. How many times do we ignore market changes because of personal bias? Thanks to Wind and Crook we have a new vast insight into 'making sense' to help global leaders master the models needed for successful leadership behavior."

Cathy L. Greenberg, Ph.D
Executive Director, Institute for Strategic Leadership,
LeBow College of Business, Drexel University

"Everyone is familiar with exhortations for mindset change, attitudinal change and paradigm shift. But slogans are not solutions and words are not deeds. What is missing is a 'how to' book. Wind and Cook have brilliantly filled this chasm of need with an extraordinary book that revolutionizes businesses, individual lives and society."

Dr. Y Y Wong
Chairman and Founder, The Wywy Group of Companies

"Wind and Crook have written a marvelous book that can teach you how to think more effectively in personal and business settings. Read it and learn!"

Drea Zigarmi
Author of The Leader Inside: Learning Enough About Yourself To Lead Others *and co-author of* Leadership and the One Minute Manager

"We like to say, 'See it with your mind's eye.' Wind and Crook show us that our mind is our eye. What we think is what we see, and what we see directs how we act. Not only do the authors make this paradigm clear, but they offer concrete and practical ways to change our mind's eye and as a consequence change our actions and the results we get. The value of that is hard to top."

J. Stewart Black, Ph.D.
co-author of Leading Strategic Change *and Professor, University of Michigan Business School*

"This is a very important book. It deals with truly fundamental issues—both for practitioners as well as academicians—relating to making sense out of a variety of complex events in the real world, and how to keep an open mind regarding all of this. We often become 'prisoners' of set routines and behaviors, and thus gradually grow less and less effective. This book points the way out of this dilemma—in a most convincing sense. Models, properly focused around the best in human minds, are key here. These can help us understand paradigm shifts, maintain relevance, and keep momentum. To see things differently becomes central. The book makes seminal contributions here. It provides a strong, rigorous—and practical—conceptual base for this! I am equally impressed with the book's focus on implementation, both in terms of setting out an agenda for transforming one's world, as well as in terms of pointing out how action can be achieved—quickly and naturally—following the prescriptions of the book. All in all, I find the book to be a true seminal contribution, with a strong conceptual underpinning, convincing empirical verification, and realistic implementational focus. This book will become a must for practitioners and academicians alike."

Dr. Peter Lorange
President IMD, The Nestlé Professor

"The authors have done a masterful job examining the power and limits of our mental models and how to better accomplish change in the complex world ahead.... This book offers a road map with a real set of attributes that can help us make the tough choices in a time of transition.... I would put this book at the top of my 'keeper' list for those on the front lines of change management and mission accomplishment."

Ken Minihan
Lt. General, U.S. Air Force, Retired

"This book addresses some of the central challenges of management: How do you make sense of your situation? How do you probe alternative realities? What is your mental model? Understanding these issues is critical to each of us and central to key decisions that shape our professional and personal lives. Jerry Wind and Colin Crook offer a much-needed process for probing these issues in a structured way."

John S. Reed
Chairman, New York Stock Exchange,
and former Chairman and CEO, Citigroup

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Yoram (Jerry) Wind • Colin Crook
with Robert Gunther

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PREFACE

HIJACKING OUR MINDS

At first glance, mental models may seem abstract and inconsequential. But they cannot be dismissed as optical illusions, parlor games or academic curiosities—all in our head. Our models affect the quality and direction of our lives. They have profit-and-loss and even life-and-death implications.

The debate about U.S. intelligence following the September 11 terrorist attacks illustrates the difficulty of making sense in today's complex environment. Congressional post-mortems focused on who knew what when—on the information—but not on the more critical mental models that shaped how that information was processed. As is almost always the case in our information age, what led to the tragedy was not primarily a shortage of data. Plenty of data points indicated that an attack using an aircraft as a missile was possible, and there was even information pointing to potential members of the conspiracy. While more specific information could have been gathered and shared among different agencies, the failure was only partially one of data gathering. This was not a failure of intelligence per se. It was, at least in part, much more a failure *to make sense*.

Information was filtered through existing mental models related to terrorism and hijackings. For example, middle-class, clean-cut young working men with everything to live for did not fit the profile of the stereotypical wild-eyed young fanatics who became suicide bombers. So when these apparently more stable men began studying in flight school or asking about crop dusters, the possibility of terrorism was filtered out. Hijackings also followed a certain well-established pattern. The plane and its crew typically were taken hostage and flown to some remote location, where the hijackers made demands. Pilots were instructed that the best course of action for passengers and crew was not to resist. During the September 11 attacks, the information was filtered through a set of mental models that made it hard to see what was really happening until it was too late.

The events of September 11 also dramatically illustrate the power of shifting mental models. When passengers on the fourth plane, United Flight 93, received reports by cell phone from friends and family about the attack on the World Trade Center, several quickly realized that this was not a typical hijacking. They could see that their own aircraft would be used as a missile against another target. In a matter of minutes, they were able to transform their mental models and take heroic actions to stop the hijackers. As a result, the last plane failed to reach its target, crashing in a field in western Pennsylvania, a tragedy that could have been much worse if some of its passengers hadn't been able to make sense of what was going on and move to stop it. The passengers and crew of Flight 93 were presented with a picture that was similar to the hijackings earlier that day. What they suddenly developed, however, was a different mental model. They were able to quickly make sense of what was happening and to act on this new understanding. And that made all the difference.

Mental Models

One of our most enduring—and perhaps limiting—illusions is our belief that the world we see is the real world. We rarely question

Romancing the Internet: The picture didn't change dramatically, but first we saw an attractive young woman, then an old crone. W. E. Hill, "My Wife and My Mother-in-Law."

our own models of the world until we are forced to. One day, the Internet was infinitely attractive. It could do no wrong. It was magnificent and beautiful. The next day, it was overhyped and ugly. It could do nothing right. Nothing had changed about the picture, yet in one instant we saw it as a seductive young woman and the next minute we rejected it. What happened?

This is called a "gestalt flip." The lines and data points are the same, but the picture is dramatically different. What has changed? Not the picture, but our making sense. What is in front of our eyes is the same. What is behind our eyes has changed. The same sight produces a very different *perception.*

We use the phrase "mental models" (or "mindsets") to describe the brain processes we use to make sense of our world. In recent decades, science and technology have progressed to the point where we can undertake direct observation of the brain. This is starting to transform philosophy and neuroscience. Instead of just thinking about thinking, we can now directly monitor brain processes as we think and observe. This research is generating a vast amount of experimental data. Confronting the incredible complexity of the brain, a range of neuroscience theories have

emerged to explain what is going on inside our heads. In business and other organizations, these interactions become even more complex, as individuals with their own mental models interact through group decision making or negotiation, and they are susceptible to biases such as "group think" that can limit flexibility and constrict options.

As we were leading transformation initiatives at the Wharton School and Citicorp, and helping other executives transform their organizations, we began to realize how important these mental models are to the process of change. We have written this book to explore the implications of mental models for transforming our businesses, personal lives and society. This book does not support a specific interpretation of the neuroscience evidence, but it does recognize that the brain has a complex internal structure that is determined genetically and shaped by experience.

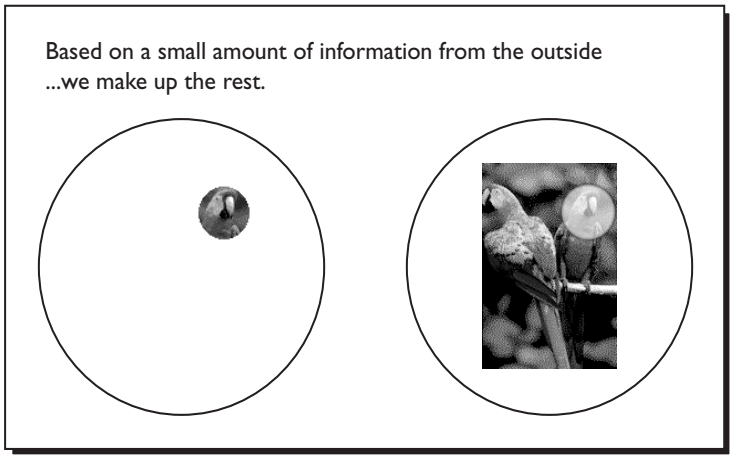
The ways we make sense of our world are determined to a large extent by our internal mind and to a lesser extent by the external world. It is this internal world of neurons, synapses, neurochemicals and electrical activity, with its incredibly complex structure—functioning in ways we have only a vague sense of—that we call the "mental model." This model inside our individual brains is our representation of our world and ourselves. (The appendix provides a more detailed explanation of developments in neuroscience that have influenced the thinking behind this book.)

Mental models are broader than technological innovations or business models. Mental models represent the way we look at the world. These models, or mindsets, can sometimes be reflected in technology or business innovations, but not every minor innovation represents a truly new mental model. For example, the shift to diet soft drinks was a tremendous innovation in the marketplace, but it represents only a minor change in mental models. Our mental models are much deeper, often so deep that they are invisible.

As a core component of our perception and thinking, mental models come up often in discussions of decision making, organizational learning and creative thinking. In particular, Ian Mitroff

has explored their impact in creative business thinking in several books, including *The Unbounded Mind* with Harold Linstone.[1] These authors examine the need to challenge key assumptions, particularly in moving from "old thinking" to new "unbounded systems thinking." Peter Senge discusses how mental models limit or contribute to organizational learning in *The Fifth Discipline* and other works, and John Seely Brown examines the need to "unlearn" as the world changes.[2] J. Edward Russo and Paul J.H. Schoemaker emphasize the role of framing and overconfidence in decision making in *Decision Traps* and, more recently, in *Winning Decisions.*[3] Russell Ackoff, in *Creating the Corporate Future*[4] and other works, stresses the importance of approaching planning by challenging fundamental models through a process of "idealized design," starting with the desired end and working backward to the goals and objectives in reaching it. There have also been more rigorous academic considerations of these topics, such as *Decision Sciences* by Paul Kleindorfer, Howard Kunreuther and Paul Schoemaker,[5] and research on organizational learning by Chris Argyris.[6] Many other books and articles have touched in some way on mental models.

With so much having already been written on the topic, why another book? First, research in neuroscience is now supporting what we may have recognized intuitively in the past. This research makes mental models more substantial and, for us, more convincing, especially considering their inherent invisibility. Second, this book examines the impact of mental models more broadly, not just how they affect organizational decision making or learning, but the way they work and their implications for transformation—personal, organizational and societal. Finally, despite all that has been written about our mental models, the failure to see how they shape how we think and act is still leading to serious errors and missed opportunities. This is a lesson we can keep learning. This book represents an original take on the subject and an exploration of how these insights apply to personal and business life.



What We See Is What We Think

Whether considering a business move or a personal decision, what we "see" is not what we *see* (see sidebar, "The Difference Between Sight and Sense"). What we "see" is what we *think*. We usually trust what we see with our own eyes or perceive with our other senses. But research shows that we often use very little of the sensory information we take in from the outside world; most of it is discarded. Though we experience the process as seeing the external world, what the incoming stream of images actually does is to evoke other experiences from our internal world. This does not mean that the external world does not exist (although philosophers have argued this point), but only that we ignore much of it.

Most of what we see is in our minds.

The power of the mind in creating reality is demonstrated in the experiencing of a "phantom limb" by people who have lost a real limb through accident or surgery. The physical limb is no longer there, but the person continues to feel it. In a famous experiment, neurologist Dr. Ramachandran of the Salk Institute used Q-Tips® to touch a patient's face, evoking the reaction that he had just touched the patient's nonexistent hand. It turns out that the body map inside our brain has the hand and the face located in adjacent areas. When the hand was lost in an accident, the associated hand-

mapping neurons moved into the adjacent face area for sensory input. The brain could now experience having its nonexistent hand touched. The person's experience of this touch was completely real. As Dr. Ramachandran observed in a series of lectures on the BBC, our brains are "model-making machines," and we construct "virtual reality simulations" of the world and then act upon them.[7]

While most of us have never experienced a "phantom limb," we have all had the experience of believing something and finding out suddenly that we were mistaken. This is the pivot upon which a magician's tricks often turn, as we are led to see a particular thing when, in fact, something quite different is actually taking place. Many of the great dramas and mysteries of fiction and of our own experience involve such twists. We are surprised and amazed by the shifts in how we make sense of the world.

THE DIFFERENCE BETWEEN SIGHT AND SENSE

The ability to make sense is different from the ability to see. Mike May, an accomplished downhill skier who had been blind since the age of three recovered some sight through an operation at the age of 46. In his diary, he describes the experience of seeing the world for the first time.[8]

On his first airplane flight with his newfound vision, he looked out the window but couldn't figure out what he was seeing. He thought the white lines he saw against the brown and green of the ground were mountains. He turned to the passenger in the seat beside him and explained his situation and asked: "Could you help me figure out what I am seeing?"

The woman sitting next to him explained that the white lines were haze, and then proceeded to point out the valleys, fields and roads in the scene below. When he later looked at the night sky with his new sight, he experienced the stars as "all these white dots, so many white dots" before truly recognizing them as stars.

The process of recovering his physical sight was just the beginning of the process of learning how to make sense of this new visual information.

The Importance of Mental Models

Mental models affect every aspect of our personal and professional lives and our broader society. Consider a few examples:

- **Personal—Wellness.** Every day, we are bombarded with new medical studies and other information. Some studies find that certain foods or activities have harmful or beneficial consequences. Some of these reports are contradictory. Even studies in respected medical journals are sometimes later overturned or found to be less conclusive than first touted to be in the media. We also receive other information about potential threats from diseases such as AIDS, mad cow disease, West Nile virus and SARS. How do we assess the danger and take appropriate action? We also face some more fundamental questions about our approach to health. For example, we can adopt the traditional Western focus on treatment of disease after it occurs, or we can focus on prevention of disease through diet, supplements and exercise. Or we can combine the two approaches. We can put our faith in allopaths, homeopaths, osteopaths or naturopaths. Our decisions in this area have a lot to do with how we make sense of the world. If we choose to adopt a diet to lose weight, we confront a cacophony of conflicting diets to choose from. The way we make sense of this picture has significant implications for our length and quality of life. How can we make sense of all these options? How can we become better at assessing the options and making decisions about our personal wellness?

- **Corporate—Growth.** Many companies have built their strategies around a traditional model of growth. Companies such as McDonald's, Coca-Cola and Starbucks have achieved growth in domestic markets and then sustained it by looking at overseas

opportunities or new distribution channels. Other companies have grown through rollups and acquisitions. But the drive for growth has the potential to dilute the value of the brand—Starbucks coffee has a completely different meaning when served in gas stations and supermarkets. Yet the commitment to investors often keeps these companies addicted to growth. How can companies create healthy growth strategies, which either enhance the brand (reduce churn, maximize lifetime value of customers, capture market share, enter new markets, add new distribution options, etc.), extend the brand to new product/markets, or create new brands (new growth engines)? What other models have companies used to build and sustain successful businesses? Could you apply them to your business?

- **Society—Diversity and Affirmative Action.** Mental models also play a key role in debates on challenges for our society. For example, what is the best way to address historical inequities in the treatment of ethnic minorities or other populations (such as women) that have faced discrimination? One model, embodied in U.S. Affirmative Action programs, creates a formal structure designed to compensate for historical discrimination. As President Lyndon Johnson explained in a speech at Howard University: "You do not take a person who for years has been hobbled by chains and liberate him…and then say 'You're free to compete with all the others' and still justly believe that you have been completely fair." But opponents of these strategies hold a different model—that programs such as Affirmative Action are in themselves discriminatory and tend to emphasize and thus perpetuate the very racism they are designed to counter. President George W. Bush called an Affirmative Action program at the University of Michigan, "divisive, unfair, and impossible to square with the U.S. Constitution."[9] The choice of these models has serious implications for legislation and society—and individuals. The competing views have played out in a series of high-profile court cases.

In each of these examples, mental models play a crucial role in our thinking and actions. Our models shape what we see, and this opens or limits our possibilities for action. We will explore

some specific dilemmas of personal life, business and society in Chapter 11.

Thinking the Impossible

How do we engage in impossible thinking? The parts of the book that follow provide an overview of a process (see the sidebar, "Choices for Change").

First, we need to recognize the importance of models and the way they create limits and opportunities, as discussed in Part I. Then we have to find ways to keep our mental models relevant, deciding when to change to a new model (while adding the old to our portfolio of models), where to find ways of seeing, how to zoom in and out to make sense of a complex environment, and how to conduct continuous experimentation, as considered in Part II. Even if we are willing to change our thinking, we also need to recognize the walls that keep us in the old models, the confining influence both of the infrastructure and processes of our lives and of the slowly adapting models of those around us. In Part III we consider these obstacles to change and strategies for addressing them. Finally, we recognize that models are used in order to act quickly, and in the last part of the book we explore ways to access models quickly through intuition to transform our world.

CHOICES FOR CHANGE

RECOGNIZE THE POWER AND LIMITS OF MENTAL MODELS

- Understand how models shape your world
- Recognize how models limit or expand your scope of actions

KEEP YOUR MENTAL MODELS RELEVANT

- Know when to shift horses
- Recognize that paradigm shifts are a two-way street
- See a new way of seeing
- Zoom in and out to make sense from complexity
- Engage in experiments

OVERCOME INHIBITORS TO CHANGE

- Dismantle the old order
- Find common ground to bridge adaptive disconnects

TRANSFORM YOUR WORLD

- Develop and refine your intuition
- Transform your actions

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INTRODUCTION TO THE PAPERBACK EDITION

Since the original publication of *The Power of Impossible Thinking,* the world has continued to demonstrate the extraordinary malleability of our mental models—and their importance. We have seen this in diverse domains, from the paradigm-breaking shifts that create new market space in business described by Kim and Mauborgne in *Blue Ocean Strategy* (Harvard Business School Press, 2005), to the global technological and political transformations explored by Thomas Friedman in *The World is Flat: A Brief History of the Twenty-first Century* (Farrar, Straus, and Giroux, 2005). Mental models are at the core of understanding these and other changes—from work to personal life to addressing broader societal issues. Those who have been able to see the opportunities in these changes have been able to take advantage of them—from blogger-journalists to open-source programmers to Indian outsourcers. The world is changing in fundamental ways. It has many more degrees of freedom than it had in the past. But we need more flexible minds to see and act upon the freedom.

THE END OF THE 30-SECOND COMMERCIAL

The changes in our world can have significant implications for individuals and entire industries. For example, the entire advertising industry was built around the 30-second commercial. Where would Budweiser be without its Clydesdale horses and slapstick frogs? Where would Pepsi be without its gyrating rock stars? But the importance of these short ad spots is now dissolving. The TV remote has already taken its toll on advertising. A study of the 15 largest U.S. television markets by CNW Marketing Research, Inc., found that more than 43 percent of viewers were actively ignoring advertising. Additionally, more than 71 percent of viewers with TiVo and other personal video recorders skipped advertisements altogether. In some ad categories, such as credit cards and mortgage financing, more than 90 percent of commercials were being skipped over by viewers with TiVo. How can advertisers continue to spend millions on 30-second spots that will be ignored by all but 10 percent of the entire audience?

While this is a disturbing picture, there is a silver lining. Companies that have adopted new ways of thinking about the world have been able to find tremendous opportunities. For example, two web sites, Google and Yahoo!, now account for more advertising revenues than the prime time schedules of the three traditional television networks (ABC, CBS, and NBC) combined. Google is now the largest media company, overtaking Time Warner in market capitalization. This would have been unbelievable just a few years ago. This is truly impossible thinking.

The decline of the 30-second commercial has been met by other innovations from managers who are not limited by the blinders of the old model. Companies are turning to other approaches, such as hosting events, creating buzz, and using product placement. For example, in launching its new Scion brand, which targeted youth markets, Toyota shunned traditional advertising, spending 70 percent of its promotion on street events. The remaining ad spending

was mostly directed toward the Internet. In another example of innovative advertising, players of *Tony Hawk's Underground* video game cannot move up to the third level until they drink a Pepsi. As Robert Kotick, Chairman and CEO of video game maker Activision, Inc., commented during the Milken Institute's Global Forum, "In our medium, people cannot skip the advertising." Companies are also working on ads integrated into digital television broadcasts, so viewers might be cued to pause the action in a scene to find out about a Dell computer on the table or be shown targeted "smart ads" tailored to their specific interests. The decline of one mental model opens the way for others.

A GLOBAL BRAIN

The changes in advertising are insignificant compared to broader shifts driven by technology, globalization, and other forces. We are on the cusp of breakthrough events in the Web which will have profound implications for individuals, businesses, and society. Networks are increasingly working like global brains in which individuals have become synapses that can fire in different patterns to create fresh ideas. Individuals are connecting with other individuals in incredible ways. The sheer scale, connectivity, and speed of these connections are unprecedented, stretching our old ways of thinking about the world to the breaking point. These changes challenge our mental models and our decisions about how we will organize and structure companies. How can we get our heads around these shifts? How should companies look at new product development? Is the IT department a help or an obstacle in a networked world?

How we think about these changes will shape how we perceive the opportunities and threats. The world is reorganizing itself on the fly. More than ever, we need a systematic approach to recognizing, assessing, and applying our mental models. This is the approach offered by our book.

In an interlinked world, ideas can come from anywhere and go to anywhere. For example, we received an e-mail message from a reader in Singapore with a note about an aspect of our book. The note concerned a study we discuss in the opening of the book in which subjects were shown pictures of tourists shaking hands with Bugs Bunny in Disneyland. Many subjects subsequently recalled a personal experience of meeting the rabbit in the Disney theme park. We point out that the Warner character wouldn't be caught dead at the Disney property. But in his e-mail to us, Cornelius Reiman of Singapore noted that in the 1988 film, *Who Framed Roger Rabbit,* Warner and Disney characters did appear side by side. It required a bevy of lawyers to make it possible, of course, and the producers had to assure the temperamental Bugs Bunny and Mickey Mouse that they had equal screen time.

The tourists in the study still could not have had the experience that they recalled, but we were surprised by how we received the information about the film. *Who Framed Roger Rabbit* was made more than a decade ago in the U.S, but the note came from an individual on the other side of the world. This is the way knowledge flows in our world. It is challenging our mental models and changing the way we think and work.

UNINTENDED CONSEQUENCES

This is just one of the ways that the world is being turned on its head. Company-led models are being replaced by customer-led models. Top-down is being overwhelmed by bottom-up. But this shift is more than giving "power to the people," just as democracy was more than turning monarchy on its crown. It is a different way of looking at the world, a different mindset. We are seeing self-organizing systems for collaboration that challenge our conventional models. Complexity theory is moving from an arcane scientific topic to an ever-present reality. Mainstream news broadcasters such as Dan Rather have been humbled by independent bloggers engaging in "personal syndication." Programmers who are creating software such as Linux and Apache through

open-source networks are challenging powerful companies such as Microsoft. In addition, encyclopedias such as Wikipedia are being created through collaboration by non-experts. This is giving new meaning to Jung's concept of tapping into the "collective unconscious."

The implications of these shifts are just beginning to dawn upon us. The Internet has been around for decades and has been in the public consciousness for many years. But its potential was not widely realized until recently because of prevailing mindsets. Initially it was used only in military defense and academic circles. Then, it was adopted for one-to-one communications such as sending e-mail. It then moved to one-to-many communications with web browsers and finally to many-to-many interactions through filesharing, blogs, and other networks. Pioneers such as eBay, Amazon, and Google could see its potential before anyone else and created businesses to act upon it. Other companies had access to the same technology, but did not have the same flexibility in thinking about it. This was where the real opportunities were created.

eBay, Amazon, and Google have all gone through continuous changes in their mental models and business models throughout their brief but profitable existences. eBay has added fixed-price sales to auctions and is selling products such as cars and houses. Second-hand cars now account for 30 percent of eBay's sales. In addition, 30 percent of sales on the world's best-known *auction* site are at fixed prices. Amazon has moved beyond books and now sells many other products. It also brokers used books for individuals. Google has leaped from searching the web to searching desktops, taking it into Microsoft's backyard. Google has also become a leader in online advertising. Many of these innovations were driven by the market rather than the companies themselves. At each step in the growth of these companies, managers have had the flexibility in thinking to recognize the next opportunities and seize them.

We live in a world in which the people who make equipment often cannot anticipate how it will be used. When Apple invented

the iPod, for example, the creators saw opportunities that were not apparent to incumbents in the music industry. But once consumers had the hardware and software in their hands, they came up with their own innovations. One of these is the rise of "podcasting," independent radio programs broadcast on the web and downloaded to individual iPods. There is no need for a broadcasting studio, no need for an FCC license, no need to purchase a specific frequency. The program can go directly from the producer to the listener, although often through an intervening blog.

The spread of broadband Internet access also has had other unintended consequences. The emergence of Internet-based, voice-over IP systems as a viable alternative to traditional telephone land lines has shaken the foundations of telecommunications, driving the price nearly to zero with services such as Skype.com. Now cable companies and other players have entered the competition for telephone service. Ubiquitous wireless Internet connections are changing the way we live and work. Lawsuits against file sharing have led to more creative workaround systems, as innovation is driven by a sense of injustice. These shifts have created tremendous opportunities for emerging companies and threats for incumbents. But to see these impossible attacks or impossible new advantages, we first need to be able to engage in impossible thinking.

A bottom-up, consumer-driven approach can unlock the creativity necessary to produce dramatic results. For example, a study at 3M found that product ideas from lead users generated eight times the sales of ideas generated internally—$146 million versus $18 million a year—in part because lead users were more likely to come up with ideas for entire new product lines rather than minor improvements on old products. This is a transformational approach to innovation and collaboration based upon the emergence of a unique mental model. As the 3M study shows, the potential benefits for companies that embrace this new model can be huge. There is great power in this impossible thinking.

ROSE-COLORED GLASSES

The return of the Internet is all the more surprising after the dot-com bust. By the end of the 1990s, it had seemed to some that it was all over. We saw the apparent triumph of the Microsoft Internet Explorer browser over Netscape. We witnessed the success of record companies in shutting down Napster. There was a general perception that the Internet had lived through its glory days. As return on investment (ROI) reasserted itself with a vengeance, there was little talk about eyeballs. There was a feeling that the original innovation and breakthrough thinking of the Internet had been spent.

But, as Mark Twain might say, the rumors of its death were greatly exaggerated. Just as the euphoria of the dot-com bubble blinded people to its risks, the pessimism about the Internet was blinding people to its potential. The rose-colored glasses were replaced with dark glasses. What we need to recognize is that we see everything around us through the filter of our mental models. These filters may make things rosy or dark, but until we recognize the lenses we use—our mental models—we can't begin to understand the possibilities for changing our views. When we see these filters, we have the power to change them. This is the power of impossible thinking.

We don't have to choose either one set of spectacles or the other. As Ben Franklin discovered, sometimes the best solution is bifocals, to see the world through different lenses simultaneously. The new mental models for collaboration haven't eliminated the old. They exist side by side. As we point out in the book, "paradigm shifts are a two-way street." We still have network news, proprietary software, and Encarta, along with blogs, open source, and Wikipedia. Revolutions are not absolute, so we need to keep a portfolio of models and choose the one that works best for a given situation.

POWER OF INTUITION

Since the original publication of our book, additional attention also has been given to intuition. As we noted, intuition informed by experience can be a powerful way of accessing mental models. Malcolm Gladwell's recent book *Blink!* (Little, Brown, 2005) highlighted the power of such intuition by art experts who can instantly spot a fake that months of research hadn't revealed, and researchers who can predict fairly reliably that a marriage will fail by watching a few minutes of videotaped conversation between spouses. As we note, these insights often cannot be articulated (which can make them difficult to transfer to others), but they can tap into deep experience very quickly. We need to be careful that our intuition still fits with the realities of a rapidly changing world. By recognizing the mental models that underpin our intuition, we can better make this assessment. But intuition supplies an important mechanism for accessing and applying our mental models quickly. This is more important than ever as we live in a world of compressed cycle times.

The world continues to move in fast-forward. To take advantage of changes, we need to be prepared to think differently. This involves more than keeping an open mind. We need to actively identify our mental models, challenge them, and act on these new ways of seeing the world. We need to understand the usefulness and limitations of our mental models. We need to be able to creatively explore alternatives. Understanding and managing our mental models is more important than ever.

CHALLENGING OUR THINKING

We have been grateful for the strong response to the publication of *The Power of Impossible Thinking.* We have had an opportunity to discuss these ideas in many sessions in different parts of the world. We also have heard from many readers about how the book helped change the way they thought about not only business but their personal lives—from making a career choice to

selecting a partner for life to improving a golf game. With each new headline, we also see the implications of mental models for broader challenges facing society, from rethinking intelligence gathering for recognizing terrorists to seeing opportunities in serving the poorest of the poor, as discussed in CK Prahalad's *The Fortune at the Bottom of the Pyramid* (Prentice Hall, 2004). Different mental models change the way we look at and address these challenges. We have learned from our interactions with readers. They have helped to test and challenge our own mental models. These readers continue to confirm the central importance of understanding mental models in order to make transformations in business, personal life, and society.

We are now very pleased to be able to share our insights on mental models and the power of impossible thinking with a broader group of readers through this paperback edition. We hope it will help you *think* the impossible so you can *do* the impossible in your own life and work.

Yoram (Jerry) Wind

Colin Crook

CHAPTER

1

OUR MODELS DEFINE OUR WORLD

In the old world, managers make products. In the new world, managers make sense of things.

—**John Seely Brown**[1]

It's midnight, and you hear a loud radio in the apartment downstairs.

Last week the quiet old man who lived there passed away, and you've been concerned about the arrival of the next tenant. You never know who might move in, and you've heard some real horror stories from your college friends. In an apartment house, the wrong neighbors can make your life miserable.

Now your worst fears have come true. The rock music plays on and on. You toss and turn, looking at the clock. At 12:30 a.m., you decide to wait just a little longer. Even if your new neighbor is a jerk, you are reluctant to turn your first meeting into a fight. At 1:00 a.m., the radio is blaring just as loud. What kind of party are they throwing down there? You've got to get up for work tomorrow. How can a person be so ignorant? So you walk down to lecture this idiot on common courtesy. You knock heavily on the door, and it swings open.

You are surprised to find the apartment completely bare. There is no sign of your new neighbor. There isn't even a sign of furniture. So you walk in. In the back room you find some drop cloths and paint cans. Plugged into one wall, you see a boom box cranked up full.

There is no neighbor, just a careless painter who left the radio on when he left for the day. The new tenant hasn't even arrived yet. The ignorant neighbor that you invented based on the noise vanishes into air, but the anger and other emotions you felt are still very real. You have trouble settling

down and going back to sleep because you are still angry at this neighbor, a neighbor who exists only in your mind. You created this evil figure to explain the loud music, and he took on a life of his own. If you hadn't gone down and knocked on the door, you might have lived with this illusion for days.

Your mental models shape the way you see the world. They help you to quickly make sense of the noises that filter in from outside, but they can also limit your ability to see the true picture. They are with you always and, like your neighbors, can be a great help or can keep you up at night without reason.

What are mental models, and how do they shape your understanding and define the world you live in?

Can the wrong mental model kill you? Over the past quarter century, more than 150 children have died in the United States after their parents chose not to provide medical treatment because of their religious beliefs.[2] The parents belonged to one of some 20 religious groups whose teachings deny the use of traditional medical care, relying instead on faith healing. The results are often tragic.

In April 1986, two-year-old Robyn Twitchell died of a bowel obstruction in Boston, Massachusetts. His parents, Christian Scientists, took the boy to a church practitioner who prescribed only prayer. The child's condition worsened. He had difficulty eating and sleeping. He was shaking and vomiting. Five days after the onset of the illness, he became unresponsive. The parents and the practitioner continued to trust in prayer up to the time of his death. The parents were convicted in July 1990 of manslaughter.

Experts testified that the condition could have been treated with a simple operation to remove the twisting of the bowel, an operation that would have very likely saved the child's life. This procedure, based on a surgical model of treating disease, was not considered by the boy's parents because of the mental model they held about the causes and treatment of disease. In a certain sense, the boy's death was due to the way they made sense of the world.

This story is not presented to pass judgment on the parents for their tragic decision or criticize their religious beliefs. It does offer an example of a single decision that is viewed through divergent models—the parents' beliefs and the medical perspective that the courts used in ruling on the case. In the court's opinion, the outcome of following the parents' model was very likely much worse than the outcome that could have been achieved from following a medical model.

While their impact is rarely so sharply defined as in this case, our mental models can affect our lives, careers and relationships; the prosperity of our businesses; and the quality of life in our societies. Almost every aspect of our lives is shaped in some way by how we make sense of the world. Our thinking and our actions are affected by the mental models we hold. These models define our limits or open our opportunities. Despite their power and pervasiveness, these models are usually virtually invisible to us. We don't realize they are there at all.

We believe that what we see is reality rather than something we create inside our heads. The parents of Robyn Twitchell believed that prayer alone was going to cure him. For them, this was reality. The surgeons who could have treated the child saw the case through a completely different set of eyes, as did the criminal justice system. We might think of mental models as something abstract or academic—to be studied and explained like optical illusions—but in this case and many others these models clearly are anything but academic. They not only shape what we see and how we understand the world but also how we act in it. In a real sense, what we think is what we see, and what we see is what we think.

How do the models you use to understand your life keep you locked in certain patterns of thought or prevent you from seeing solutions that are right in front of you? What are the potentially negative effects of your current models? How could you change your models to improve the quality of your life?

Rethinking IBM's Research Model

Models also limit or open new opportunities in business. In the early 1990s, the head of research at IBM, Jim McGroddy, came to

visit one of the authors (Colin Crook), who was then chief technology officer at Citicorp. McGroddy faced a serious challenge. IBM was losing billions of dollars every year. How could the research program help turn this situation around?

Crook discussed the information-technology value chain that was guiding IT development at Citibank. This value chain had three basic levels: at the bottom were atoms and basic math; in the middle was technology, such as storage, displays and chips; and at the top were customer solutions. What was really important, he said, was the work on these customer solutions, and that was where Citicorp was differentiating itself from rivals.

McGroddy realized that this focus on customer solutions had been largely ignored by IBM Research. Most of the company's attention was on basic research at the bottom level or on technology in the middle. The company had become insular and product-focused, losing touch with its customers. This realization led to a reorganization of IBM Research and the creation of a new strategic area focusing on services, applications and solutions. IBM's successful turnaround was driven by research in that category, which increased from nearly zero in 1990 to more than 25 percent in 2001. This dovetailed nicely with the launch of new chairman Lou Gerstner's global services initiative, which became the fastest growing area for IBM.[3]

IBM may not have recognized it, but its research had been driven by a technocentric mental model. When this model was recognized and challenged, new opportunities could be seen, the organization could be redesigned and the business could be transformed (a transformation that was, of course, much broader than R&D). What looked like an R&D problem could be rethought from the perspective of the market. What looked like a difficult technological problem could be reconsidered as a challenge of business design.

Compartmentalization of Business and Personal Life

We recently spoke with a successful manager who remarked that when she needs to hire a new employee, she inevitably turns to a

headhunter. But in her personal life, she trusts to chance to find a life partner. It is a similar challenge of finding the right person with the right characteristics and chemistry, but she applies a completely different approach because she has a different mental model for her personal and business life. She would never think about going into a single's bar and hoping to stumble across the perfect vice president of marketing, but she will in her personal life. Because of this artificial wall, she was much less creative in thinking about her personal life (and less successful in filling the position for a life partner) than in her business life where she routinely found great people to fill key positions.

One of the limiting frames we have is the separation of business and personal life, even as these two worlds are merging together. Look at how many TV entertainment programs have a work setting for portraying stories of personal lives. As the lines between business and personal lives blur, there are opportunities for shifting our thinking within business and personal life and across the two. We can borrow mental models from one area and apply them to the other to change the way we see both aspects of our lives.

Domestic Emerging Markets

To take another example, consider how most companies view inner-city markets. These markets tend to be areas with low incomes, high crime rates and other risks or costs—in short, they are seen as a marketer's nightmare. Even as major companies are waking up to the potential of emerging markets around the world, inner-city markets are still largely neglected. Yet, as Michael Porter has pointed out, these markets have distinctive advantages and hidden opportunities if we look more closely.[4] While income may be lower, population density is much higher so "spending power per acre" is comparable to more affluent parts of the city. These markets are in strategic locations and often present demographics segments that are crucial to future market growth.

If we were to reframe the inner city as "domestic emerging markets," what new possibilities would this open? What strategies that are being used to address emerging markets in China and

India might be applied in the cities of the United States and other developed nations with good effect? This simple shift in the way we view these markets could open new possibilities for strategies and new potential for growth.

How do your models for your industry and business prevent you from recognizing opportunities and realizing the full value of your organization?

THE PARALLEL UNIVERSES IN OUR MINDS

The brain, weighing on average just around three pounds, has a complexity of structure and function that we are only just beginning to understand. Estimates vary, but we have around 100 billion neurons, which communicate via perhaps several hundred trillion synapses. The whole brain is awash in a swirl of neurochemicals, and lightning storms of electrical activity flicker across it, as millions of sensory signals from the eyes, ears, nose, mouth and skin are thrown into the mix.

It is a wonder we can even think. And yet we do. A linear processing machine bombarded with this flood of stimulation would probably shut right down. The brain is quite different. It somehow makes sense out of the welter of flashing signals. The human mind engages in daily magic tricks that make David Copperfield look like a parlor act. Studies in neuroscience indicate that the sense we make of external things is based in small part on what we see outside and in large part on the patterns located in our minds.

MKANIG SNESE FROM NSOSNESE

As Lewis Carroll demonstrated in the "brillig" and "slithy toves" of his poem *Jabberwocky*, it takes only a little bit of context for our marvelous sense-making abilities to draw meaning from absolute gibberish. With a little effort, the following statement, circulating online, should

make this point clear. While neither the study nor the university are formally identified, the words, however garbled, speak for themselves:

> Aoccdrnig to rscheearch at an Elingsh uinervtisy, it deosn't mttaer in waht oredr the ltteers in a wrod are, olny taht the frist and lsat ltteres are at the rghit pcleas. The rset can be a toatl mses and you can sitll raed it wouthit a porbelm. Tihs is bcuseae we do not raed ervey lteter by ilstef, but the wrod as a wlohe.

Ask yourself: Does the rest of your life have this many holes that you are not seeing?

The mind appears to do this, in part, *by choosing to ignore some of the external world*. American neurophysiologist Walter Freeman discovered that the neural activity due to sensory stimuli disappears in the cortex. Our eyes and ears are constantly gathering information, but our mind is not really processing all of it (see sidebar, "Mkanig Snese from Nsosnese"). This stimulation flows into the brain, where what seems to be an internally related pattern appears, which the brain uses to represent the external situation.

The brain takes in the information about the world through the senses and then discards most of it, using it principally to evoke a parallel world of its own. Each brain creates its own world, which is internally consistent and complete. Perception is not a linear process of information reception, processing, storage and recall. Instead it is a very complex, interactive, subjective and evocative process.

It is as if a visitor came to the front door and rang the bell, and the person inside, by a quick glance through the fisheye peephole, formed a complete profile of the person outside, without opening the door. We know from experience that we have the ability to form snap judgments about people immediately—and that these judgments are sometimes wrong. Yet this process is extraordinarily efficient and effective, which is why there are peepholes in doors in the first place. Unlike a baby first learning about the world, we don't have to try to make sense of every new

piece of information. Given a few lines, we can fill in the entire image. This ability to respond intuitively to what we see is crucial to quick thinking and action. (In Chapter 10 we discuss the power and limitations of intuition.)

Building Our Brains

The brain has developed and changed throughout human evolution, and its layered structure clearly shows this, starting deep within with the oldest "reptilian" part and moving out through the "limbic" system to the "neocortex," the seat of rational behavior.

Our own brains change and evolve over time, with neurons constantly dying and being recreated, synapses being destroyed and created anew. The brain selects and reinforces or weakens certain synapses to forge the complex neural structures that determine our thinking. Then we reshape these neural "models" through experience, education and training.

The newborn child has a fundamental but only rudimentary capacity to make sense of the signals, probably derived from genetic instructions. Subsequent experience works upon this genetic foundation. The child's first, urgent task is to quickly develop the capacity to make sense of all these confusing signals. Within the first two years, most children appear to develop this capability. The process involved is to understand where the stimulus comes from and then categorize the signal as some specific case of a more general pattern. A mix of shadows and colors is recognized as a ball. The face hovering above the baby is recognized as the mother—but then all similar faces are also seen as mother until the model is refined. The child is able to form a holistic sense without getting bogged down in the details. This categorization is key. These experiences are also retained in the form of memory—complex patterns spread across the brain that are not representational but are evoked by other patterns and external stimuli.

As the internal worlds in the child's mind become richer, the external world recedes. Freeman's experiments show that the balance tips from the outside to the inside. The brain's own models replace the input signals from external sources. When the brain

confronts a new experience, it calls up a complex neural activity or "mental model" that seems to be its nearest equivalent. We see the absence of these models in the child's wonder at the simplest of experiences. We feel their presence when we express regret about the familiar routines and ruts that sometimes determine our lives in adulthood. The development of mental models is, in a certain sense, a demarcation line between childhood and maturity. We increasingly live in a familiar world that can be considered as a benign illusion—benign, because it helps us move through the world efficiently, but an illusion nonetheless.

We eventually lose all awareness that these "models" are in fact internal illusions. We accept them as external reality and act on them as if they were. If they are good models, in most circumstances they more than adequately permit the mind to handle external reality. But here a danger creeps in. When the world changes in important ways, we can find ourselves with a model that is completely irrelevant to the current situation. We find ourselves wearing our street clothes when we are thrown off the deck of a ship. What we need at that point is a wet suit and lifejacket.

WHERE "MODELS" COME FROM

Constant training shapes and refines our "models." A jazz musician or modern artist probably has a very different view of many aspects of the world than, say, a scientist or engineer. Even training doesn't fully explain our models. Not every musician or engineer will look at the world in the same way. A breakthrough thinker like Albert Einstein might have much more in common with a modern artist than with some of his colleagues in science. Some individual scientists may creatively push the limits; others may work in a well-defined area of study. Some CFOs may be risk averse while others are daring to the point of danger. Their approaches are shaped by their personality (genetics), education, training, influence of others and other experiences.

We can gain insights into our "mental models" by looking at where they came from. There has been a long debate about the

influence of nature versus nurture in shaping our thinking. At the moment, it appears increasingly likely that nature, in the form of genetics, plays a significant role in determining who we are. Many of the basic capabilities of the brain, such as language, appear to be predetermined at birth by virtue of the genetics we inherit.

Clearly we are born with some hardware and hard wiring that influences the way we see the world. Mood disorders offer an extreme example of how these chemical and genetic differences can color the way we see the world. While genetic research and pharmaceutical interventions are offering new ways to change the structure and chemicals of our thinking, their exact impact on mental models is unclear. As much as we might like to find one, there is no pill or genetic therapy for changing our mental models, although at some point in the future development of science it may fall within the realm of possibility. There also seems to be considerable flexibility in the human mind in overcoming the limitations of nature.

Genetics appear to provide the fundamental basis of who we are and what we can do, and then experience plays a major role in shaping these capabilities, strengthening some and weakening others. Thus a number of forces of "nurture" shape and reshape our "mental models," including:

- ***Education.*** Our education shapes our mental models very broadly and forms a foundation that molds our world view. A scientist learns to approach the world in a different way than a jazz musician. This broad education is often the least visible force shaping our mindset. We surround ourselves with people of similar background. A liberal arts education aims in many ways to give people a common language and world view from which to operate, so it is very easy for this educational foundation to blend into the environment like a chameleon on a rock. While deepening knowledge in a subject area is one kind of learning, learning about mental models represents a second kind of learning (see sidebar, "A Second Kind of Learning").
- ***Training.*** Related to education is the specific training we receive to deal with transitions or handle new tasks. A com-

puter programmer might learn a programming language, or an artist might learn to work in metal sculpture. This training is more specific and more visible than education, and more easily changed. Still, we often get into a rut in our training that is very difficult to break out of, even when the world around us has changed significantly.

- ***Influence of others.*** We are all influenced by mentors, experts, family and friends. These individuals, their philosophy of life and approach to problems affect us deeply in how we approach our own challenges. We are also influenced by the books we've read. For example, a child who grows up reading all of H. G. Wells' novels might be influenced by this experience to become a scientist. We are influenced by people in our immediate environment—first by parents, friends and teachers and later by supervisors and coworkers—who push us in new directions or encourage us to achieve more, challenging our own views of ourselves. We also are influenced by broader trends in society, as were many people who grew up in the 1960s. Finally, we are influenced by mass culture in a world in which MTV can transfer fashion trends around the globe in a matter of hours.
- ***Rewards and incentives.*** Our mental models and actions are shaped by the rewards we receive for holding them. These rewards can be tangible, such as direct financial gain, or less tangible ones, such as social approval.
- ***Personal experience.*** Some artists and scientists are self-taught. They create their own style through personal experience, which makes it easier to think outside the mainstream. The tradition of apprenticeship is also based on a process of combining learning from both experience and a mentor or expert craftsman.

In addition to the specifics of what we learn in our education, we also develop capabilities for *learning how to learn* that help us to make sense of our experiences. Our own successes and failures can dramatically shape our view of the world. Personal encounters can have a major impact on how we view life overall or in specific areas. How we cope with mistakes and learn from our successes affects how we approach every new challenge. Severe

ordeals, such as imprisonment in a concentration camp or traumatic childhood abuse, may affect our world view throughout our lives. Some people find their worlds crushed and limited by these misfortunes. Others respond by developing a determination and drive that carries them not only across their present hurdles but also to new levels of success.

Today's experience quickly becomes tomorrow's theology. This is why generals are often fighting the last war. They have shaped their policies based on their past equipment and military strategy, carefully learning lessons from debriefings on the last battlefield that may no longer be relevant on the current one (although post-mortems can be a valuable source of insights as long as we recognize that the world may change). Experience can be a double-edged sword.

Models for the Moment

Some of our models are very broad, held by members of an entire nation, political party or religious group, while others are very localized and specific. A broader model such as a belief in democracy or communism affects the mental models of followers, influencing their beliefs and behavior as well as the entire structure of society and economic life. Not all our models are on such a grand scale. Our background and philosophical beliefs often affect how we see the world, but we also apply situation-specific models. A fire drill or airplane evacuation routine is an example of a situation-specific model. Whatever our backgrounds, training and experience, we all look for the nearest exit, put on our oxygen mask if it is deployed from the ceiling or inflate our life vests.

In this case, the goal is to give everyone a common model that seems to be best practice in responding to a particular emergency. But when passengers on the flights of 9/11 were faced with a situation that was not on the cards in the seatbacks, they needed to improvise and create a model based on their experience, drawing upon past experiences such as sports, military training, stories or movies.

In many cases, our background and experience determine how we will respond in a particular situation. When Johnson & Johnson made its famous decision to pull its product off the shelves in response to the Tylenol scare in 1982 (when an unknown tamperer laced the capsules with cyanide, killing seven people in Chicago), the company's actions were based on a firmly embedded set of values embodied in the corporate "credo." It set a course of action that was consistent with its core mental model—that if it put its customers and other stakeholders first, returns to shareholders would naturally follow.

Sometimes our responses to specific challenges ultimately transform our broader models. Consider the long-held opposition to big government by the U.S. Republican party. In the face of terrorist attacks and scandals on Wall Street early in the new millennium, the Republican administration expanded government staffing, budgets and powers to meet these new threats to national economic stability. The proponents of reducing government had actually expanded it. The specific actions, designed to meet the challenges of the moment, ultimately undermined the broader model.

This view of the application of models for the moment is in contrast to approaches such as Meyers-Briggs, which attempts to define a specific individual style of approaching decisions. While the recognition of the different cognitive styles (such as perceptive/receptive, or systematic/intuitive) is an important one, we are not necessarily static in how we apply these approaches. An individual may work through a variety of styles in addressing specific challenges or responding to specific situations.

A SECOND KIND OF LEARNING

There is a lot of discussion about the importance of creating what Peter Senge and others have called a "learning organization." We recognize the importance in personal development of continuing to engage in what Stephen Covey refers to as "sharpening the saw."

But in the application of these ideas to our business and personal lives, we often fail to make a distinction about two kinds of learning.

The first kind of learning, which is far more common and more easily achieved, is to deepen our knowledge within an existing mental model or discipline.

The second kind of learning is focused on new mental models and on shifting from one to another. It is does not deepen knowledge in a specific model but rather looks at the world outside the model and adopts or develops new models to make sense of this broader world. Sometimes we don't need to merely "sharpen" the saw; we need to throw it out to pick up a power tool. If we are focused only on sharpening, then we might not see the opportunity to apply new technology that can radically change the way we approach the task. The sharpest saw in the tool box may be no match for a powerful new approach based on a new way of looking at the world.

This book focuses primarily on this second kind of learning. It is not just doing a better job at the current task but asking whether it is the right approach and how we might be able to change it. It is not the kind of learning that results from an engineer's taking the 100th course in engineering, but rather the kind that comes from her taking a first course in jazz, which allows her to look at engineering problems from a completely new perspective. Learning about new mental models is much more challenging and complex, but crucial in an environment of rapid change and uncertainty.

AVOIDING OBSOLESCENCE

During the painful layoffs and restructuring at Citicorp in the early 1990s, we witnessed the following uncomfortable scene: A talented computer programmer in his forties, facing the loss of his position, was shocked to find that he was no longer needed

because his skills in COBOL programming were obsolete. This bolt came totally out of the blue, because he was a good programmer. He just hadn't kept up. Not only this, but as he worked through outplacement, he discovered to his horror that his skills were no longer valuable to *anyone.* He had been cruising along in his career, unaware of the changes around him, and now he found that the road he was traveling led right off a cliff.

Could this programmer have been better prepared if he hadn't been locked in an outdated mindset? Even if he couldn't have prevented his dismissal, could he at least have been better able to move forward afterward?

If the world remained static, we might be able to remain blissfully unaware of our models. Like our primitive hunter-gatherer ancestors, our basic instinct and experience would serve us well from childhood throughout our relatively short lives. But today the world changes ever more rapidly, and we need to be able to recognize our own models, to know whether and how to change them, to act quickly, and to influence the models of others.

Like the programmer in the example above, we often don't see the need to change until we experience the pink slip, the divorce, the lawsuit or the heart attack. Then, if it is not too late, we wake up to see that our old mental models no longer work. (Surprisingly, even these shocks sometimes are not enough.)

It doesn't have to be this way. You can consciously change your mental models before the world forces you to do so. Some of the people at Citicorp, including many who ultimately survived the job cuts, made a conscious effort to immerse themselves in the outside world. They explored different aspects of technology, such as new programming languages and techniques, and brought these new perspectives to their work. They actively challenged their own mental models and those around them. They continued to develop new and useful mindsets that were valuable to the organization. They became leaders of the transformations that were needed to turn the company around.

At any given point, we have a choice in how we view the world. But we are not always aware of these choices. The models we

have developed through our education and experience are often invisible to us until it is too late.

In a changing environment, we can either transform ourselves or be transformed. Every day individuals in their work and personal lives prove that it is possible to change before life itself gives them a painful wakeup call. But to transform our lives, we have to first transform our minds. Our mental models determine what we are able to see and do.

THE CONSEQUENCES OF MODELS

We live in a world of great risk and great possibilities. We have unprecedented opportunities to blend the best of the old and new, to open up new perspectives and connect to different fields of knowledge, like sampling from a buffet. Yet it is a risky business to abandon our old views of the world. We have seen the traditional views of religion, family, institutions and belief in capitalism eroded in recent years, with some positive consequences but also some degree of chaos rushing into the vacuum. When we depart from the dry land in business or personal life, we are subject to the crosswinds and crosscurrents of whatever crackpot ideas and fads come toward us. If we can navigate this passage to new mindsets, we will have opportunities to discover new worlds with rich potential.

Our true work, as John Seely Brown points out in the quote that opens this chapter, is making sense. It is not just for managers in business but for everyone in business, politics and personal life. As in a detective story, we are in a race against time, against clever rivals who deliberately or inadvertently create decoy trails to throw us off the scent. In a world of deep complexity and extensive information, this work of making sense has never been harder—or more important. Unlike most detective stories, this one does not have a simple (The butler did it!) answer at the end, unless we discover it or create it. It does not even have an ending.

The world we see today could undergo a gestalt flip tomorrow. We can get better at this process of making sense—and the first step is recognizing that there is a process at all.

Some will argue that the world is already far too complicated for us to make sense of it. They act as if we need to just keep our heads down, focus on the track in front of our feet and keep moving. That may work for a limited time (until some freight train comes barreling down the track we're walking on). But our strength as human beings is our power to make sense, adapt to a fabulously complex world and quickly decide on a practical course of action. This is how we have survived and progressed since the age of the sabertooth tiger. It is how we can succeed in today's complex world.

In today's complicated and uncertain environment, the greatest dangers are not from beasts prowling around outside. More often than not they are in our own minds, our inability to see our own limits and to see things differently. It is these internal beasts that we seek to better understand—and learn to live with, if not to tame—in the pages of this book.

IMPOSSIBLE THINKING

- What are your mental models that shape your thinking? How are your models different from those of others?
- What are a few recent decisions, personal or professional, in which you can identify the role of mental models in how you framed the problem or developed your solution?
- How has your own education and experience affected your mental models?
- What are the potential blindspots of your models and experience?
- How can you seek out new perspectives and experience to help challenge or change your current models?

ENDNOTES

1. Address to Complexity Conference in Phoenix, Arizona, February 1997.
2. "Death by Religious Exemption." *Massachusetts Citizens for Children.* January 1992. <http://www.masskids.org/pcama/religion_1cases.html>.
3. Thanks to Robert Buderi for reviving this example in "The Once and Future Industrial Research." *26th Annual Colloquium on Science and Technology Policy*. Washington, DC. 3–4 May 2001.
4. Porter, Michael E. "The Competitive Advantage of the Inner City," *Harvard Business Review* (May–June 1995), pp. 55–71.

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