CHAPTER

2

RUNNING THE MIRACLE MILE

Racing has always been more of a mental than a physical problem to me.[1]

—Roger Bannister

You are running on the track.

You are exhausted. You feel you can go no farther. You're short of breath. Your lungs seem about to burst. But if you can keep up this pace a little longer, you can beat your best time.

Suddenly you think about an acquaintance who had a heart attack while jogging. It's certainly not worth that just to beat your best time. So you slow your pace.

Was it your body that stopped you, or your mind? Are our greatest limitations physical or mental? Our models help us act in the world, but they also limit our actions. Like the idea of the flat Earth for early mariners, our mental models form the limits of our world. When we change them, we open up new possibilities for discovering new worlds.

Ask one of the legendary runners, Roger Bannister. He faced the seemingly impenetrable barrier of the four-minute mile, and raced past it. In this chapter we examine the power and limits of mental models.

Until 1954, the four-minute mile was something beyond human comprehension, and thus beyond human achievement. It was believed to be a real physical limit for a human being to run a mile in four minutes or less. "The four minute mile…was the goal that athletes and sportsmen had talked of and dreamt about for so many years," wrote British runner Roger Bannister. Like climbing Mount Everest before Hillary, Bannister wrote, runners "used to think it was quite impossible, and beyond the reach of any runner."[2] It seemed to be as absolute a limit as the waterfalls cascading off the edge of the Earth were to early mariners. And it proved to be just as much a mirage.

In May 1954, on an Oxford track, Bannister shattered this barrier, running the mile in 3 minutes 59.4 seconds. Two months later, in Finland, Bannister's "miracle mile" was again broken by Australian rival John Landy, who achieved a time of 3 minutes 58 seconds. Within three years, 16 other runners had also broken this record.

What happened in those three years? Was there a sudden growth spurt in human evolution? Was there a genetic engineering experiment that created a new race of super runners? No, the basic human equipment was the same. What changed was the mental model. The runners of the past had been held back by a mindset that said they could not surpass the four-minute mile. When that limit was broken, the others saw that they could do something they had previously thought impossible.

Where do the mental models come from that limit or accelerate our progress? In this case, there was a common knowledge among competitive runners about what was possible. The four-minute mile was seen as a human limit by most runners, but not by Roger Bannister. He brought something else to the table. First, he had a conviction that the four-minute mile could be broken. Second, as a medical student at Oxford University and later a neurologist, he took a scientific approach to training. He applied scientific observation and method to his own training. "Each race is an experiment," he wrote. "There are too many factors which cannot be completely controlled for two races to be the same, just

as two similar scientific experiments seldom give exactly the same result."[3]

Bannister relied more on his observations of his own performance and insights of fellow runners than on professional coaches. "Running thrives in an atmosphere of interplay of ideas about training," he wrote. "Improvement in running depends on continuous self-discipline by the athlete himself, on acute observation of his reaction to races and training, and above all on judgment, which he must learn for himself."[4]

He applied and developed new training methods to improve his speed, using interval training to run four quarter miles separated by two-minute rests. In training for his record race, he and his teammates had driven down their quarter-mile sprints to 61 seconds when they stalled in their progress. They then stopped their training for several days of slow hiking and rock climbing and returned to run the quarter miles in 59 seconds.

Bannister's approach focused as much on conditioning his mind as on conditioning his body. "The mental approach is all important, because the strength and power of the mind are without limit," he wrote. "All this energy can be harnessed by the correct attitude of mind."[5]

Just as the mindsets of runners kept them below the threshold of the four-minute mile—and the new model created by Bannister liberated them to exceed it—our mental models limit or expand our world. The challenge for Bannister, as for ourselves, is to recognize these models so that we can continue to test their limits. We also have to be able to distinguish the soft and fleshy parts of our world view that can be reshaped from the underlying bone of reality beneath. The breakthrough of the four-minute mile didn't mean that humans were capable of running a one-minute mile, even if they had the right mindset, but it opened up many new possibilities.

Where in your business and personal life are there four-minute-mile opportunities that you just have not recognized are possible? How do models expand or bound your world?

Flights of Fancy

As an example of the limits and opportunities created by mental models, consider how major global airlines have engaged in price wars that have brought many to the brink of bankruptcy (or sent them over the edge). How far could this price competition go? By conventional thinking, there has to be a limit, but not according to Ryanair Chief Executive Michael O'Leary, who envisions an age when air travel will be given away free. Building on Ryanair promotions that have offered thousands of free seats on flights, O'Leary said that by 2004, one flight in ten will be free, and the figure will continue to increase.[6]

Does O'Leary have his head in the clouds? No, he is simply breaking through the barriers of conventional thinking about pricing and the value of an airline flight. For example, one model he is pursing is the "multiplex" model, similar to how cinemas make most of their profits on drinks and popcorn at the refreshment stand rather than the movies on the big screen. The airline version of this would be to offer free seats on the flight but charge passengers for satellite television, games, Internet access and other entertainment offerings while they are buckled in. O'Leary also envisions a day when travelers will fly for free, with businesses and cities picking up the tab to promote tourism.[7]

Conventional wisdom might conclude that with all the free and discount seats it has already given away, Ryanair would be suffering. But the airline grew rapidly and actually outperforming rivals, with a 31 percent operating margin compared to 3.8 percent for British Airways and 8.6 percent for Southwest Airlines in the middle of 2003.[8]

Shifting Models

There are many opportunities to shift mental models in business, and these opportunities are not just the result of technology revolutions. Many other key parts of business are undergoing fundamental review and possible transformation, as summarized in the accompanying table. Where inventory in the warehouse was once

seen as an asset, the emergence of just-in-time delivery meant it could be considered a liability. The goal shifted from having strong inventories to keeping the supply chain as lean as possible. Where people were seen as an expense for an organization, in an age of knowledge workers people may be the most important asset. Technology assets are generally capitalized; but with change occurring so rapidly, many now think they should be expensed. Financial reporting is done quarterly or annually, but with new "virtual close" systems pioneered by Cisco Systems, it can now be done in real time. In all these cases, our models have constrained how we thought about these issues, and by shifting the model—like Bannister breaking the four-minute mile—we have been able to transform the way we think and act.

Shifting Models

Inventory is an asset	Inventory is a liability
People are an expense	People are an asset
Technology is capitalized	Technology is expensed
Reporting is quarterly or annually	Reporting is in real time

Which models listed in the table above are the right models? The answer is: It depends. During the boom years at end of the 1990s, just-in-time inventory made perfect sense in an environment of steady or increasing orders. Just-in-time supply chains allowed companies to significantly reduce the costs of storing parts and components in warehouses. But a few years later, when the economy began to falter, these same systems suffered hiccups as a result of unpredictable order flows. Because they did not have sufficient inventories to draw upon, companies experienced long delays in delivering products to customers, or they needed to pay expensive rush charges to continue to deliver.

There is no absolute right model for all time, just the right model for a certain time. Even in the space age, as we'll discuss in Chapter 4, there may be times when you'll want to saddle up your horse.

Models That Are Out of Sync with the Times

Problems occur with mental models when the environment changes in such a way that the old models no longer fit. Kenneth Olsen used a brilliant model for minicomputers to build Digital Equipment Corporation into a powerhouse in information technology. But he became so attached to this successful model that he was blindsided by the rise of the personal computer, which brought the company to its knees.

Our models are so powerful, invisible and persistent that when the old models no longer explain what is happening, we keep trying to make our experiences fit into them. These models die hard, sometimes only when the preceding generation of proponents passes away. Less often, the mindset can be changed without relying on attrition. When Bill Gates finally woke up to the potential threat of the Internet to his software business and decided to refocus, he made a videotape for his employees showing icons of business and culture such as Stephen Spielberg and Charles Schwab saying how much they loved the Internet. This made it hard for anyone to dismiss the Internet as a fad or technological plaything of a bunch of college students. It was serious, and it had arrived.

THE POWER OF MODELS

The Palm Pilot is a remarkable machine—not just because it is a wonder of technology and a phenomenal marketing success. It is most remarkable because its success represents the triumph of a new mental model.

When Apple CEO John Sculley first heralded the concept of the Personal Digital Assistant (PDA) with the introduction of the Newton in 1993, it was envisioned as the next generation of information technology—a tiny handheld computer that would serve as an assistant to keep calendars and contact information always at hand. But this captivating dream soon proved to be a technological nightmare. The technology was just not up to the hype.

The Newton handwriting recognition became such an object of ridicule that it was memorialized in a series of Gary Trudeau's popular *Doonesbury* cartoons, where the machine responded with bizarre interpretations of handwritten input. This is not the ideal way to draw attention to a new product. After spending $500 million on the Newton, Apple pulled the plug, helping set the stage for the company's subsequent near-death experience.

But Apple wasn't alone. A promising startup, GO Corporation, spent $75 million on launching a handheld before it pulled the plug. In all, companies spent an estimated $1 billion trying to bring the handheld market into being. Palm Computing was lost among the general rout with its large and overpriced flop called "Zoomer PDA" that was launched in 1994.

Palm learned important lessons from the experience, however, that allowed it to create its Pilot PDA based on a very different model. First, instead of developing complex software that would be able to interpret all kinds of different handwriting styles, Palm took another approach. Company founder Jeff Hawkins, who had spent his career studying human cognition and learning, realized that it would be easier to train the human operators to communicate with the machine than to prepare the machine to understand all the different variations of handwriting by users.

"People are smarter than appliances. They can learn," he said. "People like learning."[9]

He created Graffiti, a handwriting recognition program that requires operators to make modified characters with a single pen stroke. The alphabet can be learned quickly by humans and makes recognition much more efficient and accurate for the machines. Hawkins and his team also emphasized size and simplicity, rethinking every aspect of the device and shaving down the cost.

What is the value of mental models? Palm spent just $3 million to launch its new Pilot, less than one-hundredth of what Apple reportedly had spent on the Newton. Yet the Pilot became a product that would define and dominate the market for handhelds. In 1997, it won *Newsweek's* "High Tech Gizmo of the Year" award and *Information Week's* "Most Important Products of 1997" award.

By 2000, it was generating more than $1 billion a year in revenues for Palm. By January 2002, the company reported that more than 20 million devices using the company's operating system had been sold, accounting for some 80 percent of the market.[10]

By shifting his mental model from the technology of the machine to the interaction and learning between the machine and the human operator, Hawkins developed a breakthrough in thinking that created a breakthrough in the marketplace. Where many others had tried and failed, Palm had run the miracle mile. (And, like Bannister, the company then found itself facing many rivals with the same aspirations.)

The technology continues to evolve, and with each new generation there is a search for compelling new mental models. Companies are making attempts to merge the phone and PDA and to add features such as video. Devices with small keyboards such as the BlackBerry have extended the functionality of portable instruments in sending e-mail and other messages. These changes depend in part upon the evolution of the technology, but they also depend on our mental models. What is a phone? Is it something you talk on or something that you use to manage many forms of communication? What is a PDA? What is a computer? Each attempt to transform the way people use the technology begins with an attempt at transforming how they think about it.

PERILS OF MODELS

Just as new mental models can propel companies such as Palm forward, outdated mental models can hold other companies back. The models keep these companies from running four-minute miles. The online music business demonstrates how the mindset of the old order attempts to hold back the tide of the new. Most large music companies are concerned about protecting their intellectual property from Napster and its file-sharing clones, using lawsuits and encryption to guard the crown jewels of their intellectual property (IP).

Consumers, however, don't hold this model. They are looking for better and more convenient access to music. They want to be able to take music from home and transfer it to a portable device or share new songs with friends. From their perspective, the music companies and their heavy-handed IP attorneys are just getting in their way.

Music companies see their customers as barbarians at the gate who are waiting to storm their castle and walk away with the crown jewels, so they raise the drawbridge and throw some more alligators into the moat. They have even *sued* consumers. This defensive mental model keeps them from adopting other approaches. The result is that they succeeded in killing Napster, but the Napster concept turned out to be a "cat" with nine lives. Other sites such as KaZaA and Grokster rapidly emerged to take its place. When one attack by peasants at the gates is repulsed, it just brings more attacks from different directions. The music industry cannot fight a war against its own customers without risking the further spread of the revolution. The industry said, like Marie Antoinette, "Let them eat cake." As history shows us, this is often the quickest way to lose one's head.

While the industry recognized that a revolution was under way, its responses were feeble, held back by the fears embodied in its old mental models. The industry launched subscription-based services such as Rhapsody and pressplay, but to protect IP, the music lasted only for the duration of the subscription, and it was difficult or impossible to transfer the music to a CD or portable player. Users never had the feeling of "ownership" of a purchased CD or of music from a file-sharing service. The subscription services attracted only an estimated 350,000 subscribers combined, compared to the more than 30 million users who have shared over 1 billion files through KaZaA peer-to-peer software alone. (Although the latter numbers are self-reported, they provide a sense of the relatively small scale of the subscription services.)

Clinging to the old model can exact a high toll. A study by KPMG concluded that the industry's focus on protection resulted in an estimated $8 billion to $10 billion in lost revenues annually for

music companies. The study concluded that the industry needed to rethink its business model of encryption to thwart pirates and other restrictions and instead focus on meeting the demonstrated demand of consumers. Every new level of encryption just made it more difficult for consumers to access and transport their music and led to a new determination to crack codes, make digital copies and swap music through peer-to-peer sites. The 2002 KPMG study found that only 43 percent of the media companies made even *some* of their content available in digital form.[11] The rest made no attempt to respond to consumers. They were held back by their own mental models.

Changing the Tune

While incumbents may be troubled by models that are no longer working, a window of opportunity is opened for upstarts. In April 2003, Apple launched a service based on a completely different model with its iTunes Music Store, built around the needs of consumers rather than copyrights. Even as the music companies were launching new lawsuits against college students sharing files, Apple created a system that allowed users to download individual songs for 99 cents a title from a library of more than 200,000. Once the songs are downloaded, they can be burned onto CDs and uploaded to other devices with little hassle and few controls beyond protecting against wholesale piracy. Although the service, when launched, was available only to owners of Apple Macintosh computers, users downloaded nearly half a million tracks in the first *two days*. Within about a week, users had downloaded more tracks than the more restrictive industry-backed services had distributed in *18 months*. In its first two months of operation, iTunes sold five million songs, and Apple announced plans to offer the service to PC users later in the year.[12]

Apple (as the manufacturer of the iPod digital music player) was a marginal player in the music industry, so it might have seemed disadvantaged in tackling a problem that topped the agenda of the recording industry. Apple's outsider status, however, gave it an independence of thought and action that allowed it to do what the insiders couldn't do—see and act upon a powerful new mental

model. Apple CEO Steve Jobs realized that the old model of selling albums on CDs, which forced listeners to buy a whole package of songs to hear the one or two they liked, could be replaced with a customizable model of selling single songs. Jobs developed a model for distributing digital music that preserves the rights of owners and respects the needs of users. Apple had the ability, in the words of its advertising campaign, to "think different," and this allowed it to see profitable opportunities where others saw only new threats.

Making a Segway: The Bumpy Ride to a New Model

While the music industry found itself trapped in outdated models, the slow progress of Segway people movers—the innovative super scooters that were intended to revolutionize transportation—illustrates another peril of new models: the idea whose time has not yet come. New models are difficult to advance in the world, and their progress depends in large part upon the perceived utility for the user.

This new invention, which carried users upright along city sidewalks, responding to their subtle body movements to change speed and direction, burst on the scene in a flurry of publicity. Talk show hosts rode them around on stage on national television; the super scooters made cameos on sitcoms such as *Frasier.* Charismatic inventor Dean Kamen envisioned his new product as a breakthrough in transportation that would fill the sidewalks of cities around the world. At the time of its public launch in December 2001, as what must have been the most hyped product of all time, Kamen forecast that by the end of 2002 he would be producing 10,000 machines a week. Investor John Doerr predicted that the company would reach $1 billion in sales faster than any other firm in history.[13] It didn't happen.

Others saw it differently. In fact, most of the world did. Sales stalled. Opposition mounted. Potential users, corporate and private, quickly lost interest in its gee-whiz design and took a hard look at its cost and utility compared with other forms of transportation. Public officials did not uniformly embrace it as a boon to urban life. They saw it instead as a potential hazard. Cities such

as San Francisco banned the Segway from their sidewalks, considering the vehicle whizzing around at a top speed of 12 mph as a threat to pedestrians. Key initial adopters such as postal carriers found it heavy and expensive and complained about its short battery life. The cost was too high for all but the most avid adopters of new technology.

All these challenges are typical in the adoption of new technology, and particularly one that represents a new model for transportation. The first-generation products are always too expensive, too bulky, and too slow to be accepted. The ultimate success of a new technology, however, especially when it presents a new mental model, is its utility compared to other approaches. The Segway's slow progress raises some questions about the model upon which it is based. In addressing their transportation needs, the bicycle, scooter and travel by foot are among the most popular approaches for local travel. The automobile and airplane have greater utility for long-distance trips. The question is, among these options, where does the Segway fit? How will people make sense of it? In order to be a huge consumer product success, it needs to be seen as more than a technological toy. Can these mental models really be shifted in this way?

In Part 3, we consider some of the challenges of shifting from the existing order (such as the system of pedestrians and sidewalks) and the "adaptive disconnects" that slow the acceptance of a new model in the world. These issues affect the trajectory of a new concept such as Segway, but there are even more fundamental concerns about the utility of the model.

This case illustrates the challenges of using new models to change the world. Even stunning technology and bold vision do not always ensure a winning race. The one certainty, however, is that without the mindset that it is possible, the race cannot be run at all.

THE HUMAN SPIRIT IS INDOMITABLE

In personal life, business and society, our models constrain our actions. The power of new models can lead to successes such as

the Palm Pilot. The limits of old models can lead to lost opportunities, such as the intellectual property battles in the music business. The difficulty of changing models can constrain the spread of new ideas such as the Segway.

In our personal lives, the way we view diet, exercise and wellness can have a significant impact on our approach to the prevention and treatment of disease. The models that shape our relationships and our approach to our work have a great impact on the quality and direction of our lives. Our mental models about business issues such as growth or corporate governance will lead to very different sets of strategies for our organization. Our models about the role of government or the structure of the economy—free markets versus centrally planned, for example—can have dramatic implications for the prosperity of our citizens.

Transforming our world begins with changing the way we think about it. The more we understand the role of mental models in this process, and the better able we are to recognize these models, the better we can examine the strengths of our models and their limitations. We can sustain the models that allow us to act effectively in the world and get rid of those that constrain us unnecessarily. If Roger Bannister had accepted the barrier of the four-minute mile as a real, physical limitation, he might never have tried to surpass it.

Recognizing the models that shape our thinking is the first step in beginning to understand and, if necessary, change, our own mental models. If we can understand that the majority of what we are seeing and thinking at any given moment is coming from inside rather than from external stimuli, we make a great leap forward. As we become more conscious of our models, we can more easily recognize them for what they are. Seeing the little man behind the curtain may take away some of the mystery and magic of the Wizard of Oz, but it may also reveal new ways to provide the courage, knowledge, compassion or other qualities that we seek.

It often seems like an impossible challenge to understand our models and change them. But just as Roger Bannister overcame the mindset that prevented the four-minute mile, we have seen time and again how humans have been able to do the unthink-

able—sailing across the flat Earth to reach the New World or crossing the daunting emptiness of space to put a man on the moon. It is possible to change our mental models. Time and again, humans have proven their ability to overcome seemingly insurmountable obstacles. As Bannister writes:

> **The urge to struggle lies latent in everyone. The more restricted our society and work become, the more necessary it will be to find some outlet for this craving for freedom. No one can say, "You must not run faster than this, or jump higher than that." The human spirit is indomitable.**

IMPOSSIBLE THINKING

- What are the "four-minute miles" that hold you back in your personal and work life?
- How can you challenge them? For each limit, ask yourself: What possibilities would be opened if this barrier were no longer here? How can I get rid of it?
- Are there others who are already challenging the limits of these models, and can you follow quickly in their footsteps?
- What are the challenges and risks of adopting these new models? Is the world ready for them?

ENDNOTES

1. Bannister, Roger. *The Four-Minute Mile.* Guildford: The Lyons Press. 1981. p. 210.
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3. *Ibid.*, p. 133.
4. *Ibid.*, pp. 69–70.
5. *Ibid.*, p. 229.

6. "Ryanair to introduce free travel in radical flight plan." *The Irish Examiner*. 15 May 2001. <http://archives.tcm.ie/irishexaminer/2001/05/15/story2863.asp>.
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14. Bannister, Roger. *The Four-Minute Mile.* Guildford: The Lyons Press. 1981. p. 249.