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THE LEADING BRAIN

NEUROSCIENCE HACKS TO Work Smarter, Better, Happier

FRIEDERIKE FABRITIUS, MS,
AND HANS W. HAGEMANN, PHD

THE LEADING BRAIN

POWERFUL SCIENCE-BASED STRATEGIES for ACHIEVING PEAK PERFORMANCE

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AND HANS W. HAGEMANN, PhD

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INTRODUCTION:
THE SCIENCE OF LEADERSHIP

LEADERSHIP has long been treated as an art, a fuzzy philosophy based more on fads than on facts. That accounts for the endless stream of "game-changing" management books that seem to come and go almost as rapidly as Paris fashions. It also explains why today's leadership guru, so much in demand, is often tomorrow's forgotten footnote.

But effective leadership isn't an art. It's a science. It shouldn't be dependent on buzzwords or slogans. It should be based on a bedrock foundation of our understanding of the brain. The ways we act, react, and interact are all products of distinct cognitive processes. What motivates us, what bores us, how we respond to threats and rewards, both as individuals and as groups, are dependent on the elaborate and seemingly miraculous neuronal networks that operate just behind our foreheads and above our ears.

Until recently, the brain was sort of a black box. Much of what goes on inside it was a mystery. But thanks to breakthroughs in neuroscience, such as functional magnetic resonance imaging, or fMRI, we no longer have to merely speculate on the behavior of our brains. We can actually watch them in action. What we've learned from rigorous sci-

entific studies has the potential to radically change the way we lead and succeed.

Suddenly, news about neuroscience is booming. What's been known and discussed at the laboratory level for years is finally making its way into best-selling books. Nearly everyone, it seems, is curious to learn more about how our brains work and what that knowledge can do to improve life both at home and at work.

It hasn't always been that way. Just a few years ago, when one of us was working at a big traditional management consultancy, nobody there seemed the least bit interested to hear about neuroscience. This lack of enthusiasm worked both ways. When we asked some leading brain researchers to look for business applications for their findings, most of them seemed either unwilling or unable to search for any links.

As a result, when we first started to integrate these exciting discoveries into business seminars and coaching sessions, we were among just a handful of consultants who were making this crucial connection. After presenting our brain-based business approach to companies all over the world, we received a response from senior executives that was almost uniformly enthusiastic.

Given the audience, this was surprising and extremely rewarding. After all, senior executives can be a pretty tough crowd. They are often understandably skeptical about coaching and leadership development because they perceive these fields as too "soft." Our science-based approach really filled a gap. It has been amazing and highly gratifying to witness the positive transformation of individuals and organizations since we started applying the knowledge from cutting-edge research and establishing what in retrospect seems like a natural bridge between neuroscience and business. Clients who

have attended our seminars have described them as "highly applicable" and even "life changing."

One question we were asked over and over again at the end of our seminars was whether we could recommend a business-world-compatible book that elaborated on the neuroscience topics we discussed in our presentations. At the time we were unable to recommend such a book. But now we can.

In its nine chapters, *The Leading Brain* takes you on a journey that starts with using brain science to consistently achieve individual peak performance and concludes by helping you apply these findings to create high-performing teams.

Part 1, "Reaching Your Peak," explains not only how to achieve optimal performance but also how to sustain it. Chapter 1, "Find Your Sweet Spot," provides the ingredients for the neurochemical cocktail that produces peak performance and explains why that recipe will often be different from one executive to the next. Chapter 2, "Regulate Your Emotions," explores the X factor that can make or break that performance, depending on how you use it. Chapter 3, "Sharpen Your Focus," offers a brain-based solution for a growing problem, effectively maintaining and sustaining your attention in a world awash in information.

Part 2, "Changing Your Brain," explodes the myth that our mental processes are largely locked in and hardwired. Chapter 4, "Manage Habits," tells you how to do just that. By learning the neuroscience of how habits operate, you'll gain an upper hand on adopting good routines and eliminating bad ones. Chapter 5, "Unleash Your Unconscious," takes things a tantalizing step further, by showing you how to tap into the impressive strength and efficiency of a part of your brain that, by definition, you are unaware of. Chapter 6, "Foster Learning," introduces the exciting concept of neuro-

plasticity, which shows how you can keep rewiring your brain and improving your abilities throughout your entire life.

Part 3, "Building Dream Teams," combines and expands the brain-based insights from the previous chapters into a group context. Chapter 7, "Thrive on Diversity," redefines the concept of diversity, maps out the brain chemicals that make people different, and offers ways to assemble the best combinations of coworkers. Chapter 8, "Cultivate Trust," focuses on one of the most important and yet largely underappreciated aspects of effective teams and outlines the crucial levers that can either draw people together or drive them apart. Finally, in chapter 9, "Develop the Team of the Future," we show you how to do just that. We explore the science behind finding and training top talent and describe the factors that can enable teams to achieve a remarkable level of energy, productivity, and satisfaction.

During the time that we've spent researching and writing this book as well as the hours and hours of training that we've done with senior executives throughout the world, we have grown even stronger in our original conviction that brain science can have a dramatic effect on the way in which we do business. We firmly believe that neuroscientific research results will change the way we lead, communicate, and interact in companies. The insights in this book aren't simply based on science but have been successfully applied in a remarkable variety of business environments and have led to increased satisfaction and performance. We can see a new era of leadership emerging that will fundamentally transform the ways we deal with each other, taking communication in companies to an exciting new level.

Munich, February 2017

FRIEDERIKE FABRITIUS AND HANS W. HAGEMANN

PART 1
REACHING YOUR PEAK

CHAPTER 1

FIND YOUR SWEET SPOT

How Do You Gain the Right Mix of Neurochemicals to Perform at Your Very Best When You Need To?

ON May 15, shortly before dawn, Leroy Gordon Cooper Jr., wearing a new suit and carrying a metal box about the size of a large briefcase, took an elevator up ten stories,[1] got off, and was promptly strapped into a padded chair by waiting attendants who were dressed in white coats. The area around him was extremely cramped, similar to what you'd find in a typical commercial airline restroom. But Cooper, known as Gordo by his friends, wasn't sitting in an airline bathroom. He was sealed inside a cone-shaped aluminum space capsule that was perched atop 200,000 pounds of extremely flammable liquid oxygen and was about to embark on a journey of 546,167 miles.[2]

The year was 1963, and astronaut Gordo Cooper was scheduled to be just the sixth American to venture into outer space. This was no joy ride. Several of the previous flights had encountered problems. Serious problems. A little more than a year earlier, Cooper's colleague John Glenn narrowly missed

being incinerated in the Earth's atmosphere after his spacecraft's heat shield had come loose.[3] Despite the fact that the astronauts were all experienced pilots who had been chosen for their mental toughness, Cooper's mission was bound to place even the hardiest fighter pilot under significant stress.

A series of holds in the mission's countdown were agonizing even for the control room's seasoned technicians. As Cooper was forced to endure yet another delay, doctors on the ground were closely monitoring his biomedical telemetry. What they saw from their readouts shocked them to the point of disbelief. Although it seemed almost inconceivable, astronaut Gordo Cooper was actually taking a nap![4]

OUTSIDE a modest laboratory in Lille, France, hours after the workday had officially ended and more than a century before Gordo Cooper traveled into space, a solitary bearded man, dressed in a dark vest and jacket, could be seen pacing up and down a long corridor, deep in thought, betraying a noticeable limp, and occasionally jingling the keys in his pocket to provide a kind of rhythm to his ruminations.[5]

The man was Louis Pasteur, and his steadfast dedication to science and study revolutionized practices in both medicine and industry. Working with extreme caution, he never left anything to chance.[6] For Pasteur, hitting his performance sweet spot required incredible patience and sustained concentration. A thoughtful, reflective man, he was well aware of the secret of his success: "My strength," he explained, "lies solely in my tenacity."[7]

THE PURSUIT OF PEAK PERFORMANCE

No one would have confused cocky, clean-shaven Gordo Cooper with bearded, contemplative Louis Pasteur; nor could they have ever swapped jobs. Yet both were masters at reaching a level of excellence that we commonly refer to as peak performance. Pasteur's peak performance led to groundbreaking discoveries in science and medicine. Cooper's peak performance didn't come while he was sleeping. The fact that he could sleep through the preparations for a dangerous journey underscored the wide range of differences in the conditions for when people perform at their best. Whereas Gordo had the temperament of a sprinter, Pasteur had the mind-set of a marathoner. Although Cooper slept peacefully inside the cramped confines of his capsule, which he'd named *Faith 7*, before his *Atlas 9* rocket left the launchpad, his challenge and his crucial moment of peak performance were still to come.

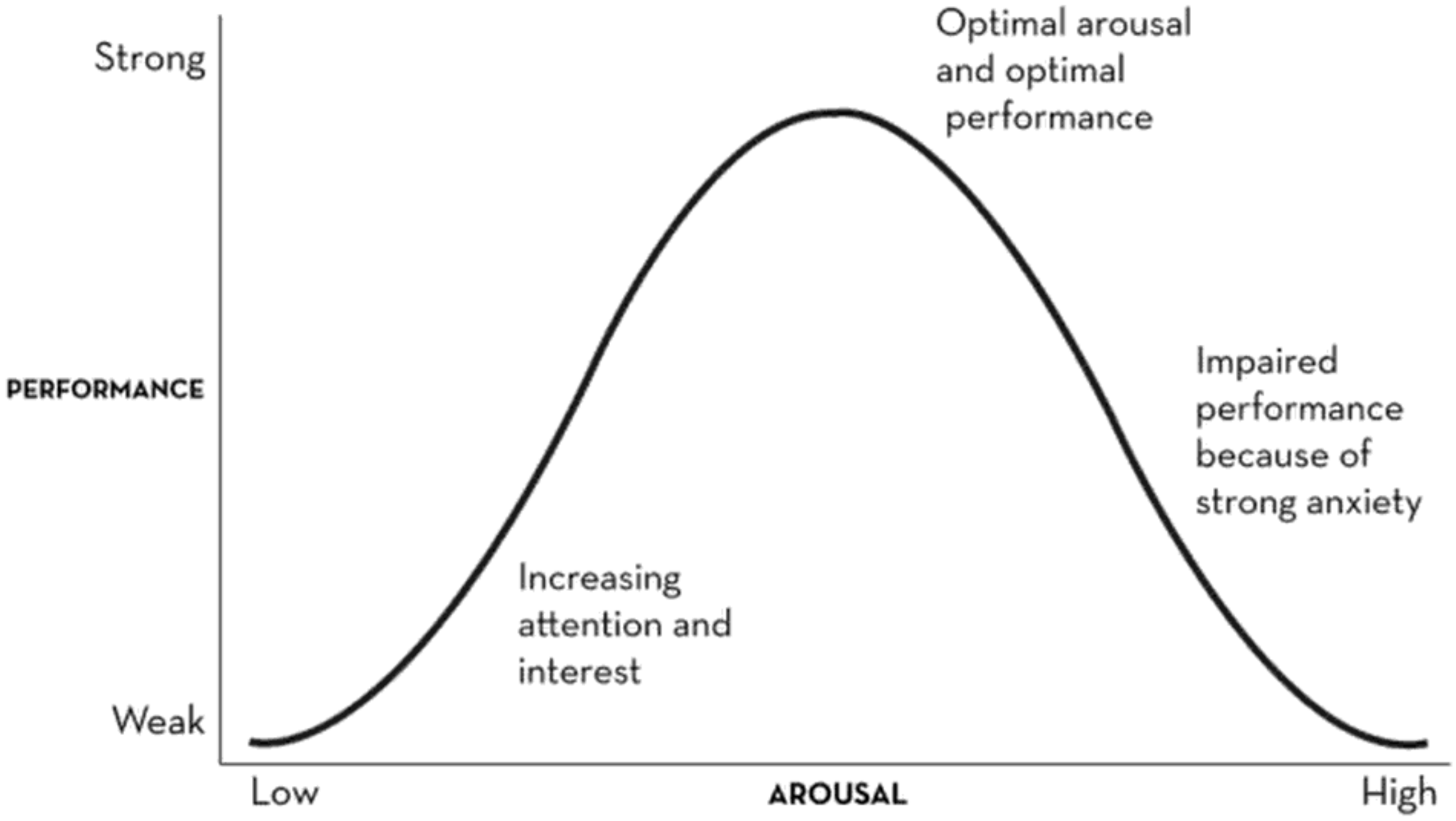
THE U THAT MOTIVATES YOU

Anyone who has ever held a tennis racket, wielded a baseball bat, or swung a golf club knows about the sweet spot, the place where the ball responds in the best possible way. All of us strive to find our sweet spot of performance, that zone where we're at our most productive and our most effective. What's more, most of us know it when we get there. But *how* do we get there? What does it take? Without knowledge about the brain and the ability to use this knowledge, opportunities to perform at our best are squandered and the potential for great achievements remains unfulfilled. The good news: The skills it takes to improve one's mental game in business and in life can be learned, trained, and improved.

In 1908, two psychologists, Robert Yerkes and John Dill-

ingham Dodson, found that subjecting rats to mild electric shocks actually improved the animals' performance in navigating a maze. But if the shocks were increased beyond a certain point, the rats' ability to travel through the maze degraded rapidly. Instead of being focused and alert, the rodents would grow increasingly panicked and attempt to escape. Yerkes and Dodson referred to the electric shocks as "arousal." We commonly call this "stress."

The two psychologists were able to illustrate the relationship between arousal and performance on a remarkably simple graph that has come to be known as the Inverted U (see fig. 1). Peak performance comes at the top of the graph, the spot where the level of arousal is sufficient to provide optimal focus and attention. Without adequate arousal, we're likely to feel bored or apathetic. And when arousal's too high? Those are the instances in which our focus deteriorates into a situa-



Source: Robert M. Yerkes and John D. Dodson

Figure 1. Peak performance curve

tion of stress—or even worse, panic. Our pursuit of peak performance is a little like Goldilocks's tasting of the Three Bears' porridge. Our goal is to find a level that is neither too cold nor too hot but just right.

Although it's useful to be able to have a way of visualizing peak performance, that's obviously not the same as achieving it. To gain a better grasp of just what it takes to find and reach your sweet spot, it helps to understand how the brain is operating when you're performing at your best—and at your worst.

THE ANATOMY OF AROUSAL

The wiring in your brain isn't really wiring at all but a series of signals that hop from one cell to another. Working together, these microscopic messengers are responsible for every action, reaction, and emotion that you experience, including the condition that Yerkes and Dodson called arousal.

NEUROTRANSMITTERS

There are approximately 1 trillion nerve cells in your brain, each of which measures about one-hundredth of a millimeter.[8] Physically, each nerve cell, known as a neuron, looks a bit like a splatter on your kitchen counter. There's a blob in the middle with tiny tentacles of neuronal matter radiating from the center. Different neurons may have slightly different shapes and functions, but the basic kitchen splatter design is the same from one neuron to the next. Although these billions of neurons are tightly crowded inside your brain, their tentacles don't physically connect. They maintain microscopic gaps called synapses and employ chemical messengers called neurotransmitters to cross the remaining distance. Like tiny cell

phones, neurons are capable of both sending and receiving signals.

Where the Axon Is

The senders are known as axons, and each neuron comes with only one. Yet it has plenty of dendrites, which, although they sound like members of an obscure religious sect, are actually neuronal receivers. The fact that the nerves don't physically connect is a plus. This gives them a remarkable ability to create brand-new circuitry known as neuronal pathways without the need to get out a soldering iron or call an electrician. And like the path you make when you leave the sidewalk and cut the corner by crossing through a neighbor's lawn, these neuronal pathways, although they don't kill any grass, become increasingly well defined the more they are used.

This aspect of nerves isn't limited to performance. It also explains how we learn and how habits, good ones and bad ones alike, ultimately become actions we engage in without even thinking. The path becomes so well defined over time that the neurotransmitters can almost make the journey with their eyes closed. Or, as the saying goes among cognitive scientists: Neurons that fire together wire together. And, once again, this wiring isn't permanent, just as a path isn't permanent. But if you keep using it, it becomes as passable as a paved road. By the same token, if you stop going that way, the route gradually becomes fainter over time. That explains in part why you can recall your own phone number with relative ease but can't remember any of your high school French.

Although more than one hundred neurotransmitters have been identified, from the standpoint of peak performance, only three are truly important: *d*opamine, *n*oradrenaline, and *a*cetylcholine. We call them the "DNA of Peak Performance."

DOPAMINE

Dopamine, as one journalist suggests, has become "the Kim Kardashian of neurotransmitters" for the way in which it has spiced up the science pages with tales of pleasure, addiction, and reward.[9] It seems to have captured the public's interest and imagination, probably because of its association with excitement, novelty, and risk.

Dopamine is involved in your ability to update information in memory and also affects your ability to focus on the task at hand.[10] It provides a druglike reward that makes you want more. And, as with many drugs, the high wears off and you often need more the next time to get the same effect. That's why dopamine is known as a novelty neurotransmitter. Its effects are strongest when the stimulus that generates it is new. This explains in part the enthusiasm you may feel when you start a new project and why the thrill isn't usually as strong after you've been working on it for a while.

Dopamine plays a number of roles in the body, including aiding motor control. But in the context of the brain and peak performance, it's the fun chemical. To truly be performing at peak level, you should be having fun. The experience should feel rewarding. If you aren't feeling this way, you may still be performing better than usual, but you probably haven't reached your peak.

WHAT'S ALL THE RUSH? NORADRENALINE!

Almost everyone is familiar with noradrenaline (also known as norepinephrine), or at least thinks they are. It's the rush we get both when we bungee jump and when we react in surprise to the sudden lunge of a neighbor's "friendly" dog. Noradrenaline's primary purpose is to ensure your survival. It was evolutionarily designed to help you respond quickly to any threat,

real or perceived. It does so by regulating your attention and alertness. Studies indicate that higher levels of noradrenaline lead to greater accuracy when detecting errors in a visual error-detecting task when we are awake, alert, and up to the task.

Noradrenaline is at an optimal level when you feel slightly overchallenged; it leads to a "this is tricky but I think I can handle it" feeling. It is also released when you push yourself to perform a difficult task better, faster, or with fewer resources.

FROM SPOTLIGHT TO LASER: ACETYLCHOLINE

The third of the three neurochemicals that make up the DNA of Peak Performance is acetylcholine, which is found in abundance in a surprising segment of the population. In fact, there's a very special group of human beings that can probably teach you a great deal about peak performance. Look around and you'll find that they seem to be practically everywhere. Are they dedicated research chemists? World-class professional athletes? Risk-taking entrepreneurs? Chess grandmasters? Award-winning sales reps? Politicians? Not even close. And yet, you might even have one of them living under your very roof. And no, it isn't your mother-in-law. Or that sullen twentysomething who still lives at home and has mistaken your house for a combination all-you-can-eat restaurant and Laundromat. It's an infant. That's right: babies!

If you've ever spent any amount of time with babies, then you probably recognize that they're some of the most alert and observant little people on the planet. Although they may be excreting a lot of unpleasant stuff, they're simultaneously

soaking up sights, sounds, tastes, and smells like high-powered, turbocharged, diaper-wearing cognitive vacuum cleaners. The same mechanism you use to achieve peak performance every now and then, a baby is operating practically nonstop for the first few years of her life. And the chemical behind this extraordinary performance is acetylcholine.

Acetylcholine comes from a part of the brain called the nucleus basalis. Babies release acetylcholine without even trying. Neuroscientists refer to this as the "critical period of neuroplasticity," a time when brand-new brains are extremely receptive to new information and are constantly establishing neuronal pathways. As neuroscientist Michael Merzenich explains it, during critical plasticity "the learning machinery is continuously on."[11] As adults we're not so lucky. The automatic mechanism for extraordinary focus shuts down when we're still quite young and must be operated manually from then on.

So how do we as adults flip the switch that turns on acetylcholine? Once this critical period is over, there are only a handful of ways we can do it: when we make a conscious effort to pay attention, when we get physical exercise, or when we are exposed to something important, surprising, or novel—in other words, when our brain releases dopamine.

Another way to look at the DNA of Peak Performance is to think of it as a prizewinning photograph. Noradrenaline prompts you to point your camera in just the right direction, dopamine helps you to zoom in until you have a pleasing composition, and finally there's acetylcholine, which enables you to sharpen your focus until it's picture-perfect. Get only one or two of these elements just right and what you have is a snapshot. Add the third and suddenly it's a work of art.

ONE SIZE DOESN'T FIT ALL

The depiction of the performance curve as a simple inverted U provides a clear and concise explanation for how performance works. But as you may have already noticed, the graph doesn't have any units. How do you measure arousal? In inches? In ergs? In Scoville units?* In other words, exactly how much arousal is required to reach peak performance? The short answer is that we can't really say. The longer answer is that it can vary dramatically from person to person and from one task or situation to another. There's no universal standard for optimum arousal. In that respect, arousal has a lot in common with spicy food.

There's no universal standard for optimum arousal.

SPICY, BUT NOT AS SPICY AS HERS

Put yourself for a moment in the role of a server at a Thai restaurant in California. A well-dressed couple stroll in and sit down in a booth just below the framed pictures of the king and queen. When you come over to take their order, she orders "Thai basil with pork, very spicy," while he asks for the same dish, but with chicken, adding, almost as an afterthought, "but not as spicy as hers." What are you going to tell the chef? You have a hunch that if he makes the dishes "very spicy" according to the standards of the small village outside

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* Scoville units are used to measure the spicy heat of chili peppers. Whereas a perky jalapeño pepper has a Scoville range of 3,500–10,000 units, the red-hot habanero can be anywhere from 10 to 100 times as hot, with a range of 100,000–350,000 Scoville units.

Bangkok where he grew up, your customers may single-handedly worsen one of the state's periodic droughts by constantly asking to have their water glasses refilled. Who knows? They may even sue.

The definition of spicy in a Thai restaurant is a bit like the definition of arousal in a Yerkes-Dodson graph. One person's standards for what constitutes arousal can vary widely from another's. Some of us are "right-side performers" like Gordo Cooper. Others are "left-side performers" like Louis Pasteur. Still others lie somewhere in between. Luckily, we have a kind of spiciness test that we administer to our seminar attendees to gauge each one's optimum level of arousal.

THE LAST-MINUTE ASSIGNMENT

Imagine yourself in the following predicament. You and your colleagues have been attending one of our peak performance seminars. So far you've been having a great time. You've found the sessions to be intriguing, informative, entertaining, and useful. But not long after we've divided you into groups, the announcement comes: Your boss will be making a surprise appearance at the seminar, and each group will have a little more than an hour to prepare a presentation to deliver in the evening while he's here.

How would you feel? Well, when we delivered this news, some of the groups were positively terrified by the prospect, while others seemed completely energized and actually appeared to be looking forward to the evening's events.

We could've predicted those reactions.

That's because, unbeknownst to the participants, we had divided up the seminar attendees according to how they scored on the State Trait Anxiety Index, a test that assessed their requirements for arousal to achieve peak performance.

We put the right-side performers in one group and the left-side performers in another, and grouped others who landed in similar spots along the performance continuum.

Not surprisingly, the group on the left side felt under considerable pressure and didn't believe they had enough time to have the presentation ready. The group on the right seemed to relish the challenge. They weren't bothered at all by the short turnaround.

Then we let the other shoe drop.

Our announcement of their boss's impending appearance had been a hoax. The boss wasn't coming, and there was no need to prepare a presentation.

You could hear a huge sigh of relief emanating from one part of the room and sense some genuine disappointment coming from the other. And yes, there was some grumbling. But, luckily for us, no group grabbed torches and pitchforks and attempted to run us out of town.

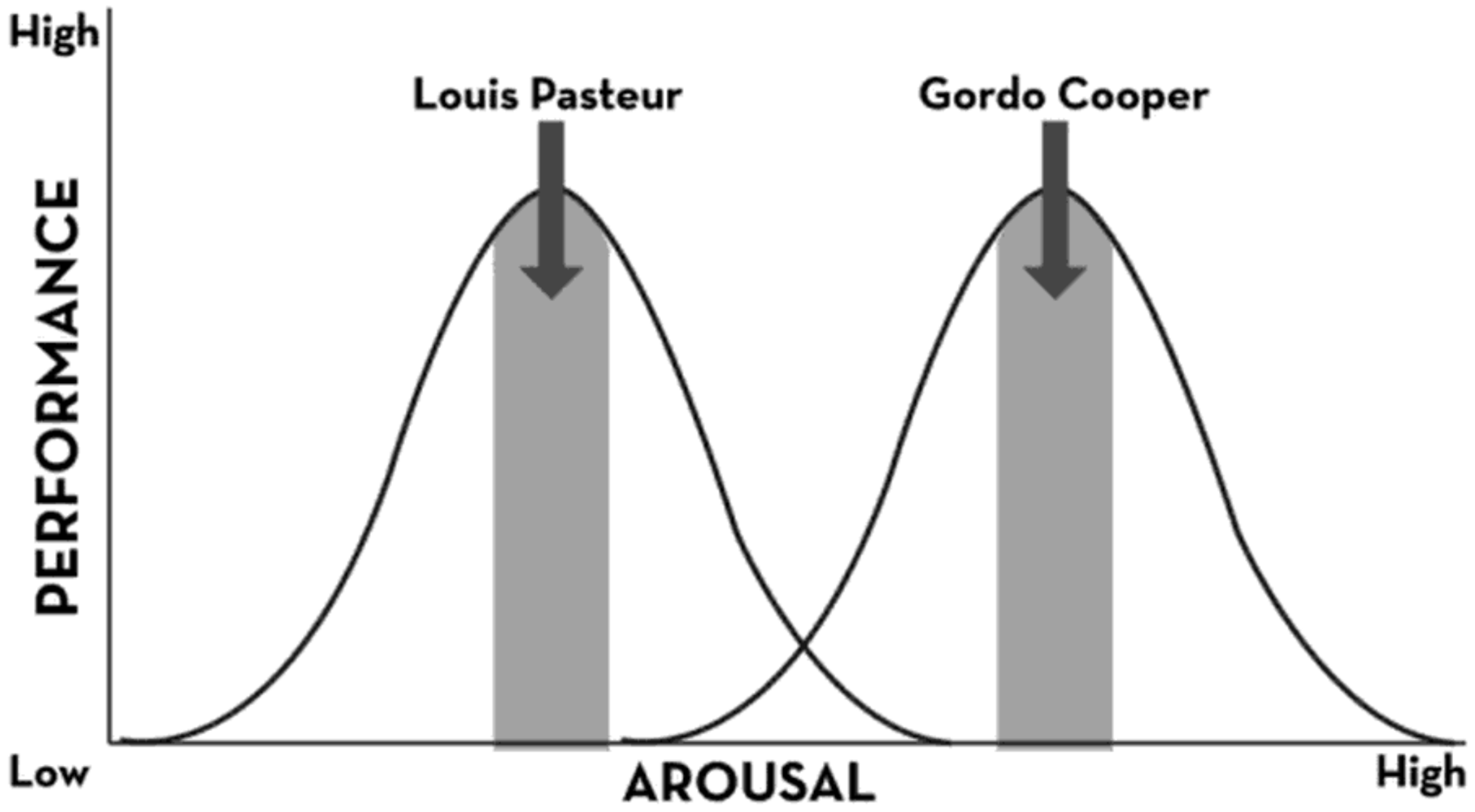

Figure 2. Both Louis Pasteur and Gordo Cooper achieved optimal performance but with markedly different levels of arousal.

We all survived the exercise, and an important point was made: Peak performance isn't the same for everyone. There are great individual differences in the degree of emotional arousal leading to peak performance (see fig. 2).

PEOPLE ON THE RIGHT

The further to the right on the curve you are, the easier it is for you to access a state of peak performance under pressure. You may be bored on a normal day at the office, but whenever there is a crisis, you are the person to call. (Gordo Cooper provides a classic example.)

In many companies, people who fall on the right side of the arousal scale are treated as corporate heroes. Their exploits in and out of the office are viewed with a hushed reverence. When one of the firm's partners casually confesses, "I need to spend my Sundays paragliding in order to relax," awed junior executives take careful note. When you work in an atmosphere where sayings like "Only under high pressure can diamonds develop" are unofficial policy, it's no surprise that everyone—whether consciously or not—seeks to emulate that ideal.

How do these sensation-seeking right-siders survive in a sometimes-stifling office environment? The truth is, many don't. The leaders who have managed to last in these settings have devised their own secret weapons over time. To remain fully engaged at work, they sometimes manufacture emergencies to provide the chemical cocktail they crave for optimal performance. They start work on a crucial presentation just a few hours before they have to step onstage to deliver it. They leave for an international flight at the last possible minute. A sensation-seeking news editor we knew would frequently redesign the front page just minutes before the paper had to go

to press. Many of his colleagues were convinced that he was some sort of sadist, when in truth he was probably just artificially raising the stakes in order to perform at his best. The amount of stress that would induce heart palpitations in others makes these right-siders feel more focused and creative. They find routine tasks and long, unproductive meetings far more stressful than skydiving and they frequently check their smartphones for incoming email and text messages to distract themselves from what they perceive to be almost unbearable boredom.

Not surprisingly, people who fall on the right side of the performance curve tend to take a dim view of those who lean more toward the left. When we asked a group of right-side executives what kind of people they thought would perform best on the far left side of the curve, they had some quick answers. "Primary school teachers," someone ventured. "Bureaucrats," someone else chimed in. Overall, there did not seem to be a whole lot of respect for individuals who needed predictability and certainty, loved rules and systems, and abhorred tight deadlines, emergencies, and all sorts of stress. They were quick to judge those who performed on the far left of the curve as underachievers.

PEOPLE ON THE LEFT

The knee-jerk tendency to ridicule or dismiss left-side peak performers began to diminish once our group of right-side executives had a little more time to think things through. "What about Nobel Prize winners?" someone asked. "Aren't they extremely meticulous and detail driven and sometimes working for decades on the same molecule?" "And authors who rewrite their novels seventeen times?" wondered another. Clearly, there are high-performing individuals who don't re-

quire a lot of external stimulation. Although no one mentioned Louis Pasteur, he would've provided an excellent example. It ultimately became clear that the people on the left are just as important for organizations and society at large as the dopamine-dominant thrill seekers on the right.

FINDING YOUR HOME ON THE RANGE

At first blush it might seem that right-siders and left-siders come from totally different planets, much like the popular notion that men are from Mars and women are from Venus. Once a Martian, always a Martian? Are you destined to dwell on one side of the scale or another? Definitely not. Gender, genetics, age, environment, and experience all play a role in determining the position of your personal peak performance curve.

Gender. The Mars/Venus dichotomy may be an oversimplification, but it turns out that there's some scientific basis behind this divide. Countless tests have arrived at the same conclusion: Men are statistically more likely to be sensation seekers than are women. As we'll see in chapter 7, one of the key elements that determines where you are situated on the performance scale is testosterone. Although testosterone is best known as a male hormone, both men and women have it in differing degrees. But because men, on average, have more of it, that usually pushes them further to the right.

Genetics. In addition to gender, some other genetic factors can influence your position on the performance scale. For example, the dopamine receptor gene DRD4 is associated with novelty seeking, a key factor that can also push your curve significantly to the right. Again, as we'll see in chapter 7, high-ranking executives often have an unusually active dopamine system.[12]

Another set of genes appears to influence your overall response to stress. A recent study conducted by researchers at the Medical University of Vienna found that a trio of genetic variants can interfere with your ability to bounce back from stressful situations. If you have one or more of these variants, you may find it more difficult to recover from a challenging life event and may be more sensitive to other stressful situations. On the other hand, if you lack these at-risk genetic variants, each stressful situation can actually make you stronger.[13]

Does this mean the die is cast? No. At least, not always. The mere presence of certain genes doesn't automatically determine your destiny. Personality traits remain a combination of both nature and nurture. Estimates suggest that genes can influence your personality anywhere from 20 to 60 percent.[14] For a gene to have an effect, it must be switched on, or, as geneticists put it, "expressed." As a result, certain genetic dispositions can remain dormant throughout your life. As University of Wisconsin psychologist Richard Davidson suggests, the genes in your DNA are like the albums in your music collection: "Just because you have a CD doesn't mean that you will play it . . ."[15]

Age. The tendency to be irresponsible in adolescence and gradually grow more cautious and conservative with age is common but by no means universal. A key factor in what some consider budding wisdom and others view as steady steps toward stodginess is a decrease in levels of testosterone. Researchers in Australia have theorized that rather than being caused by aging, testosterone drops are associated with obesity and depression, two characteristics more common in older men.[16] Regardless of the cause, the outcome is the same. Men (and women) experience a decrease in testosterone levels as they grow older. And a drop in testosterone will almost

always move you further left on the performance scale. (Interestingly, new fathers—and new mothers—often experience a drop in testosterone too.[17])

Environment. Of all the factors that influence your position on the performance scale, environment is the one over which you have the most control. Many consultants who initially seem to thrive in the high-pressure world of international business, with its constant travel and unforgiving deadlines, find that after a few years they prefer to move to an atmosphere that is not quite as relentless. Companies are now taking these preferences into account by creating separate tracks for "generalists" and "experts." Although the expert track may not be as fast-paced, it still attracts and requires top-notch talent. Experts are neither better nor worse than generalists. They just prefer a different way of working. The two options make it possible for both to find an environment where they can thrive.

Experience. Of course, not everyone automatically feels the need to shift from the generalist to expert track after a few years in the field. Some consultants can crisscross the globe their entire careers without getting burned out. In fact, many find the demands to be less and less of a burden as time goes on and actually crave steadily increasing challenges in order to avoid feeling bored. This hints at another factor that can influence your performance: experience. Often, the more practiced and experienced you are, the more tasks you can handle automatically by relying on your unconscious brain (see chapter 5). This not only makes your job easier, but it also makes it easier to handle stressful situations as they arise.

and activities throughout your typical workweek. Then rate each according to how it makes you feel: overaroused, underaroused, or at the top of your game.

If drawing up a detailed list doesn't seem like your style, you can try the approach that psychologists often use. Start by setting an alert on your smartphone at ninety-minute intervals throughout the day. Each time the alarm goes off, do a quick inventory of your current performance level. Are you feeling bored, uninspired, or apathetic? If so, add an *L* for "low" (the low end of the performance curve) to your calendar for that time period. If, on the other hand, you're feeling overstressed or under the gun, add an *H* to your calendar for "high." And, of course, if you were performing at your peak when the alert went off (we apologize in advance for taking you out of the zone!), put a *P* for "peak performance" in your calendar.

Regardless of the approach you take, you should find that a pattern emerges, giving you a clearer sense of the factors that influence your performance. The more you learn about the rises and falls in your typical week, the greater control you will gain in hitting your performance sweet spot precisely when you need it most—and the better sense you'll have of whether you're a good fit in your current job.

LOCATION, LOCATION, LOCATION

As the old adage suggests, the three most important considerations in purchasing real estate are 1) location, 2) location, and 3) location. The same wisdom applies to finding your performance sweet spot. Nothing is more important. And when we say "location," we don't necessarily mean whether you work in a high-rise, at your kitchen table, or on the deck of a yacht. We're talking about the overall atmosphere of your

workplace environment. It doesn't take a trained neuroscientist to realize that Louis Pasteur would've been a disaster as an astronaut and that Gordo Cooper would've been a liability in a laboratory. Above all, your success depends on finding an environment that matches your performance profile. If you find yourself constantly over- or underaroused, then you need to either alter the environment or make a serious change to the kind of tasks you handle or the way you are working. If you are the Pasteur type, don't go to work for an investment bank, and if you are a sensation seeker like Gordo Cooper, working in a highly controlled environment like Pasteur's laboratory will probably leave you feeling bored or frustrated or both.

Your success depends on finding an environment that matches your performance profile.

In many cases the solution doesn't have to be as drastic as switching jobs. Try to find out exactly what is putting you into over- or underarousal and work to change these situations. Altering your hours, changing your work environment, or reallocating responsibilities with coworkers can all help. Talk about your needs with your supervisor and colleagues. The simplicity of the performance curve makes it relatively easy to discuss with friends and colleagues. As we'll see in chapter 4, sometimes seemingly small changes can make a very big difference.

TOO MUCH OF A GOOD THING

Although achieving peak performance should be your goal, staying at the top of the curve for an extended period is nei-

ther desirable nor beneficial. You should rise to the occasion when it's needed most. Attempting to maintain the optimum mix of dopamine, noradrenaline, and acetylcholine for a prolonged period would likely overtax the system and deplete the neurotransmitters, resulting in burnout and exhaustion. Think of cello virtuoso Yo-Yo Ma or top-ranked snowboarder Shaun White. It would seem absurd to ask either of them to perform at world-class level 24-7. Instead, they practice, rest, perform, and recover according to specific plans in order to be in an optimal state exactly when it counts.

Finding a daily, weekly, and monthly rhythm that leads to optimal energy management is equally important in the corporate world, where the demands on executives often rival the challenges faced by professional athletes in terms of difficulty and intensity. "Being in a high-performance state all the time is detrimental; being in a high-performance state when it counts is a winning strategy," says Axel Kowalski, a psychologist and neurofeedback expert who uses computer technology to help business leaders achieve peak performance. "The key is flexibility," he says.[19] Only leaders who can switch to the optimal states of arousal for the task at hand are really managing their neurological resources well.

PERFECT YOUR PERFORMANCE

Once you have made sure that you are in the right environment, you can use powerful techniques to fine-tune your position on the performance curve depending on the demands of a particular task or situation. But before you engage in that, make sure you are in the right spot! Keep in mind that these are minor tweaks intended for performance adjustments, not total game changers designed to transform a bad job into a good one. The more you are in balance and are selecting envi-

ronments that are in line with your strengths, the less you will need these arousal-adjusting tricks.

Raising Arousal

Over time, most people gain an intuitive sense of when their arousal level is too low, too high, or just right. Those who find it difficult to assess their own stress level can measure it more scientifically by using the Perceived Stress Scale (PSS), a fourteen-item instrument devised by psychologists from Carnegie Mellon and the University of Oregon.[20] If you use the PSS or simply do a mental diagnosis and find that your arousal level is lower than you need it in order to be effective, there are a number of ways to artificially raise it.

Imagining a mild fear, even if it isn't related to the work at hand, can sometimes increase your level of noradrenaline and move you further to the right. When he needs an extra boost of noradrenaline, one colleague we know likes to envision the specter of a rapidly approaching deadline and the faces of unhappy stakeholders if he somehow fails to meet it.

If you're feeling bored, unengaged, or unmotivated, or if work simply doesn't seem fun, what you may lack is dopamine. To increase your level of dopamine, humor, positive thinking, and changing your location or approach can all help. In addition, aerobic exercise not only sweeps away the midafternoon blahs but can also add a welcome burst of dopamine to a humdrum day.

Lowering Arousal

If you're getting ready to push the panic button, you can employ a few effective strategies to dampen the threat response and move further to the left on the performance curve. It's important to remember that stressful experiences often result

from the killer combination of high demands and low control. To temporarily take your foot off the gas, try engaging in some of the daily activities that you can do on "automatic pilot," like straightening your desk or deleting some e-mails. If you're feeling a loss of control, focus on those aspects of the process you can control, such as the general strategic direction of the solutions for the client rather than the developments in the stock market. And finally there's exercise, a versatile solution that can both increase your energy and reduce your stress. A lunchtime run or even a quick trip up and down the stairs can lower the level of damaging cortisol in your bloodstream. If these options aren't available, then follow the example of Louis Pasteur and take a walk through your office hallway.

ALL the nervous pacing that Louis Pasteur did outside his laboratory in Lille eventually paid off. Driven by a deep desire for the betterment of health and humanity, he set a secret goal to find a cure for contagious diseases.[21]

A series of escalating scientific breakthroughs paved the way to his dream. Solving the mystery of fermentation unlocked a door to the discovery of the role of microbes, which in turn led to his efforts to contain and eradicate infectious diseases. This ultimately led to the development of a number of lifesaving vaccines against deadly illnesses. Perhaps most important, his careful study of microorganisms revolutionized the procedures that surgeons use when operating on patients. The sterile conditions that characterize a modern hospital operating room can be traced back directly to the tenacious and dedicated work of Louis Pasteur.

TROUBLE started for astronaut Gordo Cooper during the nineteenth of twenty-two unprecedented Earth orbits when his

Both gender and age can affect your performance profile. Women in general tend to be more to the left on the peak performance curve, whereas men on average are more to the right. With age we all tend to move further to the left.

Match your environment to your personal performance profile. If you are constantly over- or underaroused at work, the single most important thing you should do is to check whether your natural predisposition is in line with your environment.

Cultivate an optimal environment for your employees too. If you're a leader, try to adapt the workplace environment to allow people to operate more in line with their individual performance profiles. Aim for enough flexibility in working conditions so that everyone can more readily reach his or her peak.

Use mental training techniques for fine-tuning, not life-changing. Only after you've found the right environment can you use mental training techniques to adjust your level of arousal so that you're at your very best just when you need it.

CHAPTER 2

REGULATE YOUR EMOTIONS

Learn How to Gain Greater Control of Your Emotional Temperature

ZINEDINE Yazid Zidane, known to millions of fans as "Zizou," is perhaps the greatest soccer player that France has ever known. Yet, for much of his international audience, the first thing that comes to mind when they think of Zizou is a single ugly incident in 2006 that took just a few seconds to transpire.

In the 2006 World Cup Final between France and Italy, it was Zizou who put France on the scoreboard with a penalty kick that ricocheted off the crossbar and landed behind the goal line. Twelve minutes later, Italy's feisty center fullback, Marco Materazzi, evened the score at 1-1 by deftly heading in a deflection off a corner kick.

After ninety minutes of fierce play from both sides, Zidane and Materazzi still accounted for the only goals. What happened next was both controversial and devastating. Two-thirds of the way through extra time, as the two men jogged by each other, they both stopped briefly and Materazzi tugged

at Zizou's jersey. Although Zidane seemed at first to be walking away from the confrontation, he suddenly turned to face Materazzi and threw himself at him with full force, knocking him to the ground with a violent head butt to his chest.

Fans all over the world watched in utter disbelief. It's not clear whether any of the referees personally witnessed the incident, but the act was so brazen and breathtakingly unsportsmanlike that officials felt they had no choice. Zinedine Zidane was issued a red card and ousted from the match.

Deprived of its leader as well as one of its most skillful penalty kickers, France lost in the shootout round, and Italy emerged as the 2006 World Cup champion. Although soccer is a game of great complexity and a certain amount of luck, it could be reasonably argued that a few-second lapse in one man's emotional regulation cost his country a world championship.

OUR PRIMITIVE NETWORKS

It may not have had the violence or the international profile of Zidane's infamous head butt, but perhaps you've witnessed an emotional outburst at work that was nearly as devastating. Who knows? You may even have been the instigator. If you were, you almost certainly felt regret once you calmed down. Many people who experience lapses in emotional regulation ask themselves the same question: "What was I thinking?!"

Granted, that question is meant to be rhetorical, but it still has a neuroscientific answer: You weren't actually *thinking*. You were *reacting*. Emotional outbursts occur when the more civilized, conscious region of your brain is hijacked by a more powerful, primitive, and largely unconscious part. It's just one skirmish in a constant battle between your prefrontal

cortex and your limbic system, which is the source of your two most fundamental responses. As humans, we are capable of displaying a remarkable array of emotions. Yet most of them grow out of just two very basic and very primitive networks in our brains: the threat circuit and the reward circuit.

THE THREAT CIRCUIT: STAYIN' ALIVE

Although the brain exhibits an impressive number of skills and abilities (everything from sinking a putt to deciphering an income tax form), make no mistake: Its primary business is to keep you alive. So you'll have to forgive it for being a little oversensitive whenever it gets even an inkling of something that might put you in jeopardy. Like a bodyguard with an itchy trigger finger, it shoots first and asks questions later.

Many of the threats that primitive humans faced are no longer a factor, but the software that was designed to respond to them is still up and running. Instead of replacing our outmoded survival instincts with newer ones, our modern brain was actually built on top of our caveman-era thinking system. And because our older brain systems are more entrenched and more powerful, they are usually the first to react to any stimulus we encounter. What this means is that the suave, well-dressed, college-educated employee in your company meeting room is apt to react like an angry, bearskin-wearing, club-wielding savage if you happen to push the wrong buttons.

Now that saber-toothed tigers are extinct, we may mistakenly feel as though we live in a safer world, when in fact the situations that can trigger a stress response have increased dramatically: the unexpected message from your superior, who needs the concept within the next hour; the client who calls and is "totally dissatisfied with the proposal"; the colleague

who "helpfully" informs you that he's getting promoted next month and that you aren't; the calendar alarm that tells you there are now only two days left until the client visit takes place. And then, just when you think nothing else could possibly go wrong, you get a call from the school, notifying you that your ten-year-old is sick and needs to be sent home.

When we see something that we perceive as putting our survival in danger, we react, quickly and often unconsciously. The car that suddenly darts out into our lane and the coworker who questions our competence are both treated in remarkably similar fashion by our brains. They have both been perceived as challenges to our current existence. In the case of the car, we should be grateful that we're equipped with such a hair-trigger alarm system. We hit the brakes or swerve suddenly to avoid an accident, and we usually do it so quickly that our conscious mind doesn't catch on to what we're up to until our unconscious reaction has already occurred. Our heart beats faster, our senses become more alert, our long-term cognition is momentarily shut down, and our focus is suddenly laserlike. We avert disaster and only realize it after the fact by the pounding in our chest or the sweatiness of our palms.

The ability to instantly avoid an oncoming car can literally save our lives. In contrast, our response to a social snub is rarely lifesaving these days. That's not because it isn't as quick as our reaction to a car. It's just that our lives were probably never in jeopardy when a colleague asked pointed questions about a discrepancy in our monthly report. Our executive brain almost certainly realizes this, but by the time it does, our threat circuit has already kicked in, responding to the coworker almost exactly the same way it would if she were an oncoming car.

This tendency to place greater emphasis on threats than rewards is more than just stressful or annoying. It can be devastating to long-term relationships. In fact, University of Washington psychologist John Gottman claims to be able to predict the success or failure of a marriage with an astounding 83 percent accuracy, simply by analyzing a fifteen-minute conversation between the couple. Gottman's research points to a "magic ratio" of 5 to 1, which suggests that for every negative feeling or interaction between partners, there must be five positive feelings or interactions to offset them in order to ensure a successful marriage.

Of course, married couples aren't the only people with threat and reward circuits. We all have them. The extra weight we give to threats also explains why your boss's many heartfelt compliments about your performance can be overwhelmed by a single offhand remark about an area that "needs improvement." Rewards are intense but short-lived. A threat never forgets.

Stress Ate My Brain

If it isn't obvious already, our brains are largely a product of the distant past. Although we may have evolved somewhat since then, our tools for responding to stress have not. We've spent a lot more of our time on earth running from danger than running for the bus. These days most stress no longer protects you as it was originally designed to do. Ironically, it is more likely to put you at risk. According to data provided by the American Institute of Stress, a nonprofit organization, 75 to 95 percent of all visits to the

Our brains are largely a product of the distant past.