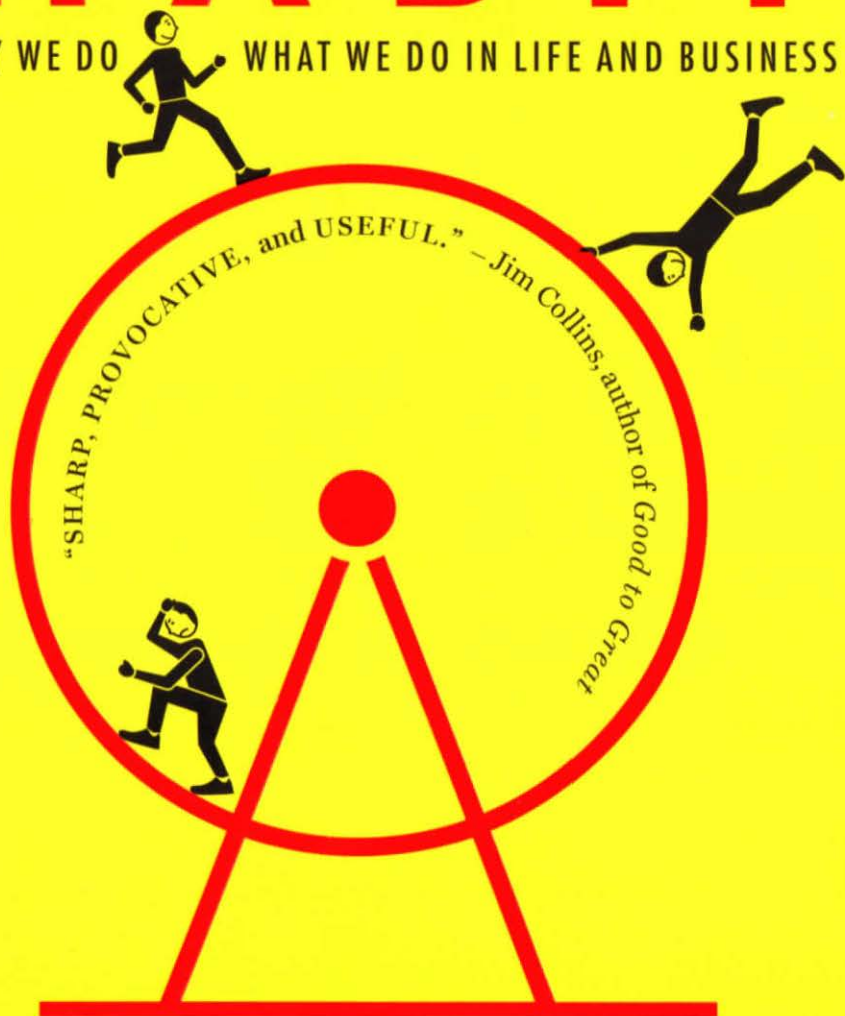


NEW YORK TIMES BESTSELLER

THE POWER OF  
**HABIT**

WHY WE DO WHAT WE DO IN LIFE AND BUSINESS



**Charles Duhigg**

WITH A NEW AFTERWORD BY THE AUTHOR

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THE POWER OF HABIT

## PROLOGUE

### The Habit Cure

She was the scientists' favorite participant.

Lisa Allen, according to her file, was thirty-four years old, had started smoking and drinking when she was sixteen, and had struggled with obesity for most of her life. At one point, in her mid-twenties, collection agencies were hounding her to recover \$10,000 in debts. An old résumé listed her longest job as lasting less than a year.

The woman in front of the researchers today, however, was lean and vibrant, with the toned legs of a runner. She looked a decade younger than the photos in her chart and like she could out-exercise anyone in the room. According to the most recent report in her file, Lisa had no outstanding debts, didn't drink, and was in her thirty-ninth month at a graphic design firm.

"How long since your last cigarette?" one of the physicians asked, starting down the list of questions Lisa answered every time she came to this laboratory outside Bethesda, Maryland.

"Almost four years," she said, "and I've lost sixty pounds and run a marathon since then." She'd also started a master's degree and bought a home. It had been an eventful stretch.

The scientists in the room included neurologists, psychologists, geneticists, and a sociologist. For the past three years, with funding from the National Institutes of Health, they had poked and prodded Lisa and more than two dozen other former smokers, chronic overeaters, problem drinkers, obsessive shoppers, and people with other destructive habits. All of the participants had one thing in common: They had remade their lives in relatively short periods of time. The researchers wanted to understand how. So they measured subjects' vital signs, installed video cameras inside their homes to watch their daily routines, sequenced portions of their DNA, and, with technologies that allowed them to peer inside people's skulls in real time, watched as blood and electrical impulses flowed through their brains while they were exposed to temptations such as cigarette smoke and lavish meals. The researchers' goal was to figure out how habits work on a neurological level—and what it took to make them change.

"I know you've told this story a dozen times," the doctor said to Lisa, "but some of my colleagues have only heard it secondhand. Would you mind describing again how you gave up cigarettes?"

"Sure," Lisa said. "It started in Cairo." The vacation had been something of a rash decision, she explained. A few months earlier, her husband had come home from work and announced that he was leaving her because he was in love with another woman. It took Lisa a while to process the betrayal and absorb the fact that she was actually getting a divorce. There was a period of mourning, then a period of obsessively spying on him, following his new girlfriend around town, calling her after midnight and hanging up. Then there was the evening Lisa showed up at the girlfriend's house, drunk, pounding on her door and screaming that she was going to burn the condo down.

"It wasn't a great time for me," Lisa said. "I had always wanted to see the pyramids, and my credit cards weren't maxed out yet, so . . ."

On her first morning in Cairo, Lisa woke at dawn to the sound of the call to prayer from a nearby mosque. It was pitch black inside her hotel room. Half blind and jet-lagged, she reached for a cigarette.

She was so disoriented that she didn't realize—until she smelled burning plastic—that she was trying to light a pen, not a Marlboro. She had spent the past four months crying, binge eating, unable to sleep, and feeling ashamed, helpless, depressed, and angry, all at once. Lying in bed, she broke down. "It was like this wave of sadness," she said. "I felt like everything I had ever wanted had crumbled. I couldn't even smoke right."

"And then I started thinking about my ex-husband, and how hard it would be to find another job when I got back, and how much I was going to hate it and how unhealthy I felt all the time. I got up and knocked over a water jug and it shattered on the floor, and I started crying even harder. I felt desperate, like I had to change something, at least one thing I could control."

She showered and left the hotel. As she rode through Cairo's rutted streets in a taxi and then onto the dirt roads leading to the Sphinx, the pyramids of Giza, and the vast, endless desert around them, her self-pity, for a brief moment, gave way. She needed a goal in her life, she thought. Something to work toward.

So she decided, sitting in the taxi, that she would come back to Egypt and trek through the desert.

It was a crazy idea, Lisa knew. She was out of shape, overweight, with no money in the bank. She didn't know the name of the desert she was looking at or if such a trip was possible. None of that mattered, though. She needed something to focus on. Lisa decided that she would give herself one year to prepare. And to survive such an expedition, she was certain she would have to make sacrifices.

In particular, she would need to quit smoking.

When Lisa finally made her way across the desert eleven months later—in an air-conditioned and motorized tour with a half-dozen other people, mind you—the caravan carried so much water, food, tents, maps, global positioning systems, and two-way radios that throwing in a carton of cigarettes wouldn't have made much of a difference.

But in the taxi, Lisa didn't know that. And to the scientists at the laboratory, the details of her trek weren't relevant. Because for reasons they were just beginning to understand, that one small shift in Lisa's perception that day in Cairo—the conviction that she *had* to give up smoking to accomplish her goal—had touched off a series of changes that would ultimately radiate out to every part of her life. Over the next six months, she would replace smoking with jogging, and that, in turn, changed how she ate, worked, slept, saved money, scheduled her workdays, planned for the future, and so on. She would start running half-marathons, and then a marathon, go back to school, buy a house, and get engaged. Eventually she was recruited into the scientists' study, and when researchers began examining images of Lisa's brain, they saw something remarkable: One set of neurological patterns—her old habits—had been overridden by new patterns. They could still see the neural activity of her old behaviors, but those impulses were crowded out by new urges. As Lisa's habits changed, so had her brain.

It wasn't the trip to Cairo that had caused the shift, scientists were convinced, or the divorce or desert trek. It was that Lisa had focused on changing just one habit—smoking—at first. Everyone in the study had gone through a similar process. By focusing on one pattern—what is known as a “keystone habit”—Lisa had taught herself how to reprogram the other routines in her life, as well.

It's not just individuals who are capable of such shifts. When companies focus on changing habits, whole organizations can transform. Firms such as Procter & Gamble, Starbucks, Alcoa, and Target have seized on this insight to influence how work gets done,

how employees communicate, and—without customers realizing it—the way people shop.

“I want to show you one of your most recent scans,” a researcher told Lisa near the end of her exam. He pulled up a picture on a computer screen that showed images from inside her head. “When you see food, these areas”—he pointed to a place near the center of her brain—“which are associated with craving and hunger, are still active. Your brain still produces the urges that made you overeat.

“However, there's new activity in this area”—he pointed to the region closest to her forehead—“where we believe behavioral inhibition and self-discipline starts. That activity has become more pronounced each time you've come in.”

Lisa was the scientists' favorite participant because her brain scans were so compelling, so useful in creating a map of where behavioral patterns—habits—reside within our minds. “You're helping us understand how a decision becomes an automatic behavior,” the doctor told her.

Everyone in the room felt like they were on the brink of something important. And they were.



When you woke up this morning, what did you do first? Did you hop in the shower, check your email, or grab a doughnut from the kitchen counter? Did you brush your teeth before or after you towed off? Tie the left or right shoe first? What did you say to your kids on your way out the door? Which route did you drive to work? When you got to your desk, did you deal with email, chat with a colleague, or jump into writing a memo? Salad or hamburger for lunch? When you got home, did you put on your sneakers and go for a run, or pour yourself a drink and eat dinner in front of the TV?

“All our life, so far as it has definite form, is but a mass of habits,” William James wrote in 1892. Most of the choices we make each day

may feel like the products of well-considered decision making, but they're not. They're habits. And though each habit means relatively little on its own, over time, the meals we order, what we say to our kids each night, whether we save or spend, how often we exercise, and the way we organize our thoughts and work routines have enormous impacts on our health, productivity, financial security, and happiness. One paper published by a Duke University researcher in 2006 found that more than 40 percent of the actions people performed each day weren't actual decisions, but habits.

William James—like countless others, from Aristotle to Oprah—spent much of his life trying to understand why habits exist. But only in the past two decades have scientists and marketers really begun understanding how habits *work*—and more important, how they change.

This book is divided into three parts. The first section focuses on how habits emerge within individual lives. It explores the neurology of habit formation, how to build new habits and change old ones, and the methods, for instance, that one ad man used to push toothbrushing from an obscure practice into a national obsession. It shows how Procter & Gamble turned a spray named Febreze into a billion-dollar business by taking advantage of consumers' habitual urges, how Alcoholics Anonymous reforms lives by attacking habits at the core of addiction, and how coach Tony Dungy reversed the fortunes of the worst team in the National Football League by focusing on his players' automatic reactions to subtle on-field cues.

The second part examines the habits of successful companies and organizations. It details how an executive named Paul O'Neill—before he became treasury secretary—remade a struggling aluminum manufacturer into the top performer in the Dow Jones Industrial Average by focusing on one keystone habit, and how Starbucks turned a high school dropout into a top manager by instilling habits designed to strengthen his willpower. It describes why even

the most talented surgeons can make catastrophic mistakes when a hospital's organizational habits go awry.

The third part looks at the habits of societies. It recounts how Martin Luther King, Jr., and the civil rights movement succeeded, in part, by changing the ingrained social habits of Montgomery, Alabama—and why a similar focus helped a young pastor named Rick Warren build the nation's largest church in Saddleback Valley, California. Finally, it explores thorny ethical questions, such as whether a murderer in Britain should go free if he can convincingly argue that his habits led him to kill.

Each chapter revolves around a central argument: Habits can be changed, if we understand how they work.

This book draws on hundreds of academic studies, interviews with more than three hundred scientists and executives, and research conducted at dozens of companies. (For an index of resources, please see the book's notes and <http://www.thepowerofhabit.com>.) It focuses on habits as they are technically defined: the choices that all of us deliberately make at some point, and then stop thinking about but continue doing, often every day. At one point, we all consciously decided how much to eat and what to focus on when we got to the office, how often to have a drink or when to go for a jog. Then we stopped making a choice, and the behavior became automatic. It's a natural consequence of our neurology. And by understanding how it happens, you can rebuild those patterns in whichever way you choose.



I first became interested in the science of habits eight years ago, as a newspaper reporter in Baghdad. The U.S. military, it occurred to me as I watched it in action, is one of the biggest habit-formation experiments in history. Basic training teaches soldiers carefully de-

signed habits for how to shoot, think, and communicate under fire. On the battlefield, every command that's issued draws on behaviors practiced to the point of automation. The entire organization relies on endlessly rehearsed routines for building bases, setting strategic priorities, and deciding how to respond to attacks. In those early days of the war, when the insurgency was spreading and death tolls were mounting, commanders were looking for habits they could instill among soldiers and Iraqis that might create a durable peace.

I had been in Iraq for about two months when I heard about an officer conducting an impromptu habit modification program in Kufa, a small city ninety miles south of the capital. He was an army major who had analyzed videotapes of recent riots and had identified a pattern: Violence was usually preceded by a crowd of Iraqis gathering in a plaza or other open space and, over the course of several hours, growing in size. Food vendors would show up, as well as spectators. Then, someone would throw a rock or a bottle and all hell would break loose.

When the major met with Kufa's mayor, he made an odd request: Could they keep food vendors out of the plazas? Sure, the mayor said. A few weeks later, a small crowd gathered near the Masjid al-Kufa, or Great Mosque of Kufa. Throughout the afternoon, it grew in size. Some people started chanting angry slogans. Iraqi police, sensing trouble, radioed the base and asked U.S. troops to stand by. At dusk, the crowd started getting restless and hungry. People looked for the kebab sellers normally filling the plaza, but there were none to be found. The spectators left. The chanters became dispirited. By 8 P.M., everyone was gone.

When I visited the base near Kufa, I talked to the major. You wouldn't necessarily think about a crowd's dynamics in terms of habits, he told me. But he had spent his entire career getting drilled in the psychology of habit formation.

At boot camp, he had absorbed habits for loading his weapon,

falling asleep in a war zone, maintaining focus amid the chaos of battle, and making decisions while exhausted and overwhelmed. He had attended classes that taught him habits for saving money, exercising each day, and communicating with bunkmates. As he moved up the ranks, he learned the importance of organizational habits in ensuring that subordinates could make decisions without constantly asking permission, and how the right routines made it easier to work alongside people he normally couldn't stand. And now, as an impromptu nation builder, he was seeing how crowds and cultures abided by many of the same rules. In some sense, he said, a community was a giant collection of habits occurring among thousands of people that, depending on how they're influenced, could result in violence or peace. In addition to removing the food vendors, he had launched dozens of different experiments in Kufa to influence residents' habits. There hadn't been a riot since he arrived.

"Understanding habits is the most important thing I've learned in the army," the major told me. "It's changed everything about how I see the world. You want to fall asleep fast and wake up feeling good? Pay attention to your nighttime patterns and what you automatically do when you get up. You want to make running easy? Create triggers to make it a routine. I drill my kids on this stuff. My wife and I write out habit plans for our marriage. This is all we talk about in command meetings. Not one person in Kufa would have told me that we could influence crowds by taking away the kebab stands, but once you see everything as a bunch of habits, it's like someone gave you a flashlight and a crowbar and you can get to work."

The major was a small man from Georgia. He was perpetually spitting either sunflower seeds or chewing tobacco into a cup. He told me that prior to entering the military, his best career option had been repairing telephone lines, or, possibly, becoming a methamphetamine entrepreneur, a path some of his high school peers had



chosen to less success. Now, he oversaw eight hundred troops in one of the most sophisticated fighting organizations on earth.

“I’m telling you, if a hick like me can learn this stuff, anyone can. I tell my soldiers all the time, there’s nothing you can’t do if you get the habits right.”

In the past decade, our understanding of the neurology and psychology of habits and the way patterns work within our lives, societies, and organizations has expanded in ways we couldn’t have imagined fifty years ago. We now know why habits emerge, how they change, and the science behind their mechanics. We know how to break them into parts and rebuild them to our specifications. We understand how to make people eat less, exercise more, work more efficiently, and live healthier lives. Transforming a habit isn’t necessarily easy or quick. It isn’t always simple.

But it is possible. And now we understand how.



## The Habits of Individuals

# 1

## THE HABIT LOOP

How Habits Work

### I.

In the fall of 1993, a man who would spend much of what we know about habits walked into a laboratory in San Diego for a scheduled appointment. He was elderly, a shade over six feet tall, and neatly dressed in a blue button-down shirt. His thick white hair would have inspired envy at any fiftieth high school reunion. Arthritis caused him to limp slightly as he paced the laboratory's hallways, and he held his wife's hand, walking slowly, as if unsure about what each new step would bring.

About a year earlier, Eugene Pauly, or "E.P." as he would come to be known in medical literature, had been at home in Playa del Rey, preparing for dinner, when his wife mentioned that their son, Michael, was coming over.

"Who's Michael?" Eugene asked.

"Your child," said his wife, Beverly. "You know, the one we raised?"

Eugene looked at her blankly. "Who is that?" he asked.

The next day, Eugene started vomiting and writhing with stomach cramps. Within twenty-four hours, his dehydration was so pronounced that a panicked Beverly took him to the emergency room. His temperature started rising, hitting 105 degrees as he sweated a yellow halo of perspiration onto the hospital's sheets. He became delirious, then violent, yelling and pushing when nurses tried to insert an IV into his arm. Only after sedation was a physician able to slide a long needle between two vertebra in the small of his back and extract a few drops of cerebrospinal fluid.

The doctor performing the procedure sensed trouble immediately. The fluid surrounding the brain and spinal nerves is a barrier against infection and injury. In healthy individuals, it is clear and quick flowing, moving with an almost silky rush through a needle. The sample from Eugene's spine was cloudy and dripped out sluggishly, as if filled with microscopic grit. When the results came back from the laboratory, Eugene's physicians learned why he was ill: He was suffering from viral encephalitis, a disease caused by a relatively harmless virus that produces cold sores, fever blisters, and mild infections on the skin. In rare cases, however, the virus can make its way into the brain, inflicting catastrophic damage as it chews through the delicate folds of tissue where our thoughts, dreams—and according to some, souls—reside.

Eugene's doctors told Beverly there was nothing they could do to counter the damage already done, but a large dose of antiviral drugs might prevent it from spreading. Eugene slipped into a coma and for ten days was close to death. Gradually, as the drugs fought the disease, his fever receded and the virus disappeared. When he finally awoke, he was weak and disoriented and couldn't swallow properly. He couldn't form sentences and would sometimes gasp, as if he had momentarily forgotten how to breathe. But he was alive.

Eventually, Eugene was well enough for a battery of tests. The doctors were amazed to find that his body—including his nervous

system—appeared largely unscathed. He could move his limbs and was responsive to noise and light. Scans of his head, though, revealed ominous shadows near the center of his brain. The virus had destroyed an oval of tissue close to where his cranium and spinal column met. "He might not be the person you remember," one doctor warned Beverly. "You need to be ready if your husband is gone."

Eugene was moved to a different wing of the hospital. Within a week, he was swallowing easily. Another week, and he started talking normally, asking for Jell-O and salt, flipping through television channels and complaining about boring soap operas. By the time he was discharged to a rehabilitation center five weeks later, Eugene was walking down hallways and offering nurses unsolicited advice about their weekend plans.

"I don't think I've ever seen anyone come back like this," a doctor told Beverly. "I don't want to raise your hopes, but this is amazing."

Beverly, however, remained concerned. In the rehab hospital it became clear that the disease had changed her husband in unsettling ways. Eugene couldn't remember which day of the week it was, for instance, or the names of his doctors and nurses, no matter how many times they introduced themselves. "Why do they keep asking me all these questions?" he asked Beverly one day after a physician left his room. When he finally returned home, things got even stranger. Eugene didn't seem to remember their friends. He had trouble following conversations. Some mornings, he would get out of bed, walk into the kitchen, cook himself bacon and eggs, then climb back under the covers and turn on the radio. Forty minutes later, he would do the same thing: get up, cook bacon and eggs, climb back into bed, and fiddle with the radio. Then he would do it again.

Alarmed, Beverly reached out to specialists, including a researcher at the University of California, San Diego, who specialized in memory loss. Which is how, on a sunny fall day, Beverly and Eu-

gene found themselves in a nondescript building on the university's campus, holding hands as they walked slowly down a hallway. They were shown into a small exam room. Eugene began chatting with a young woman who was using a computer.

"Having been in electronics over the years, I'm amazed at all this," he said, gesturing at the machine she was typing on. "When I was younger, that thing would have been in a couple of six-foot racks and taken up this whole room."

The woman continued pecking at the keyboard. Eugene chuckled.

"That is incredible," he said. "All those printed circuits and diodes and triodes. When I was in electronics, there would have been a couple of six-foot racks holding that thing."

A scientist entered the room and introduced himself. He asked Eugene how old he was.

"Oh, let's see, fifty-nine or sixty?" Eugene replied. He was seventy-one years old.

The scientist started typing on the computer. Eugene smiled and pointed at it. "That is really something," he said. "You know, when I was in electronics there would have been a couple of six-foot racks holding that thing!"

The scientist was fifty-two-year-old Larry Squire, a professor who had spent the past three decades studying the neuroanatomy of memory. His specialty was exploring how the brain stores events. His work with Eugene, however, would soon open a new world to him and hundreds of other researchers who have reshaped our understanding of how habits function. Squire's studies would show that even someone who can't remember his own age or almost anything else can develop habits that seem inconceivably complex—until you realize that everyone relies on similar neurological processes every day. His and others' research would help reveal the subconscious mechanisms that impact the countless choices that seem as

if they're the products of well-reasoned thought, but actually are influenced by urges most of us barely recognize or understand.

By the time Squire met Eugene, he had already been studying images of his brain for weeks. The scans indicated that almost all the damage within Eugene's skull was limited to a five-centimeter area near the center of his head. The virus had almost entirely destroyed his medial temporal lobe, a sliver of cells which scientists suspected was responsible for all sorts of cognitive tasks such as recall of the past and the regulation of some emotions. The completeness of the destruction didn't surprise Squire—viral encephalitis consumes tissue with a ruthless, almost surgical, precision. What shocked him was how familiar the images seemed.

Thirty years earlier, as a PhD student at MIT, Squire had worked alongside a group studying a man known as "H.M.," one of the most famous patients in medical history. When H.M.—his real name was Henry Molaison, but scientists shrouded his identity throughout his life—was seven years old, he was hit by a bicycle and landed hard on his head. Soon afterward, he developed seizures and started blacking out. At sixteen, he had his first grand mal seizure, the kind that affects the entire brain; soon, he was losing consciousness up to ten times a day.

By the time he turned twenty-seven, H.M. was desperate. Anti-convulsive drugs hadn't helped. He was smart, but couldn't hold a job. He still lived with his parents. H.M. wanted a normal existence. So he sought help from a physician whose tolerance for experimentation outweighed his fear of malpractice. Studies had suggested that an area of the brain called the hippocampus might play a role in seizures. When the doctor proposed cutting into H.M.'s head, lifting up the front portion of his brain, and, with a small straw, sucking out the hippocampus and some surrounding tissue from the interior of his skull, H.M. gave his consent.

The surgery occurred in 1953, and as H.M. healed, his seizures

slowed. Almost immediately, however, it became clear that his brain had been radically altered. H.M. knew his name and that his mother was from Ireland. He could remember the 1929 stock market crash and news reports about the invasion of Normandy. But almost everything that came afterward—all the memories, experiences, and struggles from most of the decade before his surgery—had been erased. When a doctor began testing H.M.'s memory by showing him playing cards and lists of numbers, he discovered that H.M. couldn't retain any new information for more than twenty seconds or so.

From the day of his surgery until his death in 2008, every person H.M. met, every song he heard, every room he entered, was a completely fresh experience. His brain was frozen in time. Each day, he was befuddled by the fact that someone could change the television channel by pointing a black rectangle of plastic at the screen. He introduced himself to his doctors and nurses over and over, dozens of times each day.

"I loved learning about H.M., because memory seemed like such a tangible, exciting way to study the brain," Squire told me. "I grew up in Ohio, and I can remember, in first grade, my teacher handing everyone crayons, and I started mixing all the colors together to see if it would make black. Why have I kept that memory, but I can't remember what my teacher looked like? Why does my brain decide that one memory is more important than another?"

When Squire received the images of Eugene's brain, he marveled at how similar it seemed to H.M.'s. There were empty, walnut-sized chunks in the middle of both their heads. Eugene's memory—just like H.M.'s—had been removed.

As Squire began examining Eugene, though, he saw that this patient was different from H.M. in some profound ways. Whereas almost everyone knew within minutes of meeting H.M. that something was amiss, Eugene could carry on conversations and perform tasks that wouldn't alert a casual observer that anything was wrong.

The effects of H.M.'s surgery had been so debilitating that he was institutionalized for the remainder of his life. Eugene, on the other hand, lived at home with his wife. H.M. couldn't really carry on conversations. Eugene, in contrast, had an amazing knack for guiding almost any discussion to a topic he was comfortable talking about at length, such as satellites—he had worked as a technician for an aerospace company—or the weather.

Squire started his exam of Eugene by asking him about his youth. Eugene talked about the town where he had grown up in central California, his time in the merchant marines, a trip he had taken to Australia as a young man. He could remember most of the events in his life that had occurred prior to about 1960. When Squire asked about later decades, Eugene politely changed the topic and said he had trouble recollecting some recent events.

Squire conducted a few intelligence tests and found that Eugene's intellect was still sharp for a man who couldn't remember the last three decades. What's more, Eugene still had all the habits he had formed in his youth, so whenever Squire gave him a cup of water or complimented him on a particularly detailed answer, Eugene would thank him and offer a compliment in return. Whenever someone entered the room, Eugene would introduce himself and ask about their day.

But when Squire asked Eugene to memorize a string of numbers or describe the hallway outside the laboratory's door, the doctor found his patient couldn't retain any new information for more than a minute or so. When someone showed Eugene photos of his grandchildren, he had no idea who they were. When Squire asked if he remembered getting sick, Eugene said he had no recollection of his illness or the hospital stay. In fact, Eugene almost never recalled that he was suffering from amnesia. His mental image of himself didn't include memory loss, and since he couldn't remember the injury, he couldn't conceive of anything being wrong.

In the months after meeting Eugene, Squire conducted experi-

ments that tested the limits of his memory. By then, Eugene and Beverly had moved from Playa del Rey to San Diego to be closer to their daughter, and Squire often visited their home for his exams. One day, Squire asked Eugene to sketch a layout of his house. Eugene couldn't draw a rudimentary map showing where the kitchen or bedroom was located. "When you get out of bed in the morning, how do you leave your room?" Squire asked.

"You know," Eugene said, "I'm not really sure."

Squire took notes on his laptop, and as the scientist typed, Eugene became distracted. He glanced across the room and then stood up, walked into a hallway, and opened the door to the bathroom. A few minutes later, the toilet flushed, the faucet ran, and Eugene, wiping his hands on his pants, walked back into the living room and sat down again in his chair next to Squire. He waited patiently for the next question.

At the time, no one wondered how a man who couldn't draw a map of his home was able to find the bathroom without hesitation. But that question, and others like it, would eventually lead to a trail of discoveries that has transformed our understanding of habits' power. It would help spark a scientific revolution that today involves hundreds of researchers who are learning, for the first time, to understand all the habits that influence our lives.

As Eugene sat at the table, he looked at Squire's laptop.

"That's amazing," he said, gesturing at the computer. "You know, when I was in electronics, there would have been a couple of six-foot racks holding that thing."



In the first few weeks after they moved into their new house, Beverly tried to take Eugene outside each day. The doctors had told her that it was important for him to get exercise, and if Eugene was inside too long he drove Beverly crazy, asking her the same questions

over and over in an endless loop. So each morning and afternoon, she took him on a walk around the block, always together and always along the same route.

The doctors had warned Beverly that she would need to monitor Eugene constantly. If he ever got lost, they said, he would never be able to find his way home. But one morning, while she was getting dressed, Eugene slipped out the front door. He had a tendency to wander from room to room, so it took her a while to notice he was gone. When she did, she became frantic. She ran outside and scanned the street. She couldn't see him. She went to the neighbors' house and pounded on the windows. Their homes looked similar—maybe Eugene had become confused and had gone inside? She ran to the door and rang the bell until someone answered. Eugene wasn't there. She sprinted back to the street, running up the block, screaming Eugene's name. She was crying. What if he had wandered into traffic? How would he tell anyone where he lived? She had been outside for fifteen minutes already, looking everywhere. She ran home to call the police.

When she burst through the door, she found Eugene in the living room, sitting in front of the television watching the History Channel. Her tears confused him. He didn't remember leaving, he said, didn't know where he'd been, and couldn't understand why she was so upset. Then Beverly saw a pile of pinecones on the table, like the ones she'd seen in a neighbor's yard down the street. She came closer and looked at Eugene's hands. His fingers were sticky with sap. That's when she realized that Eugene had gone for a walk by himself. He had wandered down the street and collected some souvenirs.

And he had found his way home.

Soon, Eugene was going for walks every morning. Beverly tried to stop him, but it was pointless.

"Even if I told him to stay inside, he wouldn't remember a few minutes later," she told me. "I followed him a few times to make sure he wouldn't get lost, but he always came back." Sometimes he

would return with pinecones or rocks. Once he came back with a wallet; another time with a puppy. He never remembered where they came from.

When Squire and his assistants heard about these walks, they started to suspect that something was happening inside Eugene's head that didn't have anything to do with his conscious memory. They designed an experiment. One of Squire's assistants visited the house one day and asked Eugene to draw a map of the block where he lived. He couldn't do it. How about where his house was located on the street, she asked. He doodled a bit, then forgot the assignment. She asked him to point out which doorway led to the kitchen. Eugene looked around the room. He didn't know, he said. She asked Eugene what he would do if he were hungry. He stood up, walked into the kitchen, opened a cabinet, and took down a jar of nuts.

Later that week, a visitor joined Eugene on his daily stroll. They walked for about fifteen minutes through the perpetual spring of Southern California, the scent of oleanders heavy in the air. Eugene didn't say much, but he always led the way and seemed to know where he was going. He never asked for directions. As they rounded the corner near his house, the visitor asked Eugene where he lived. "I don't know, exactly," he said. Then he walked up his sidewalk, opened his front door, went into the living room, and turned on the television.

It was clear to Squire that Eugene was absorbing new information. But where inside his brain was that information residing? How could someone find a jar of nuts when he couldn't say where the kitchen was located? Or find his way home when he had no idea which house was his? How, Squire wondered, were new patterns forming inside Eugene's damaged brain?

## II.

Within the building that houses the Brain and Cognitive Sciences department of the Massachusetts Institute of Technology are labora-

tories that contain what, to the casual observer, look like dollhouse versions of surgical theaters. There are tiny scalpels, small drills, and miniature saws less than a quarter inch wide attached to robotic arms. Even the operating tables are tiny, as if prepared for child-sized surgeons. The rooms are always kept at a chilly sixty degrees because a slight nip in the air steadies researchers' fingers during delicate procedures. Inside these laboratories, neurologists cut into the skulls of anesthetized rats, implanting tiny sensors that can record the smallest changes inside their brains. When the rats wake, they hardly seem to notice that there are now dozens of microscopic wires arrayed, like neurological spider webs, inside their heads.

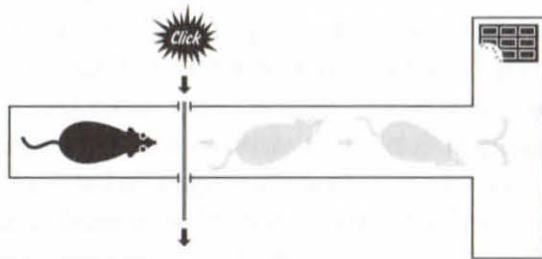
These laboratories have become the epicenter for a quiet revolution in the science of habit formation, and the experiments unfolding here explain how Eugene—as well as you, me, and everyone else—developed the behaviors necessary to make it through each day. The rats in these labs have illuminated the complexity that occurs inside our heads whenever we do something as mundane as brush our teeth or back the car out of the driveway. And for Squire, these laboratories helped explain how Eugene managed to learn new habits.

When the MIT researchers started working on habits in the 1990s—at about the same time that Eugene came down with his fever—they were curious about a nub of neurological tissue known as the basal ganglia. If you picture the human brain as an onion, composed of layer upon layer of cells, then the outside layers—those closest to the scalp—are generally the most recent additions from an evolutionary perspective. When you dream up a new invention or laugh at a friend's joke, it's the outside parts of your brain at work. That's where the most complex thinking occurs.

Deeper inside the brain and closer to the brain stem—where the brain meets the spinal column—are older, more primitive structures. They control our automatic behaviors, such as breathing and swallowing, or the startle response we feel when someone leaps out from behind a bush. Toward the center of the skull is a golf ball-

sized lump of tissue that is similar to what you might find inside the head of a fish, reptile, or mammal. This is the basal ganglia, an oval of cells that, for years, scientists didn't understand very well, except for suspicions that it played a role in diseases such as Parkinson's.

In the early 1990s, the MIT researchers began wondering if the basal ganglia might be integral to habits as well. They noticed that animals with injured basal ganglia suddenly developed problems with tasks such as learning how to run through mazes or remembering how to open food containers. They decided to experiment by employing new micro-technologies that allowed them to observe, in minute detail, what was occurring within the heads of rats as they performed dozens of routines. In surgery, each rat had what looked like a small joystick and dozens of tiny wires inserted into its skull. Afterward, the animal was placed into a T-shaped maze with chocolate at one end.



The maze was structured so that each rat was positioned behind a partition that opened when a loud click sounded. Initially, when a rat heard the click and saw the partition disappear, it would usually wander up and down the center aisle, sniffing in corners and scratching at walls. It appeared to smell the chocolate, but couldn't figure out how to find it. When it reached the top of the T, it often turned to the right, away from the chocolate, and then wandered left, sometimes pausing for no obvious reason. Eventually, most animals discovered the reward. But there was no discernible pattern

in their meanderings. It seemed as if each rat was taking a leisurely, unthinking stroll.

The probes in the rats' heads, however, told a different story. While each animal wandered through the maze, its brain—and in particular, its basal ganglia—worked furiously. Each time a rat sniffed the air or scratched a wall, its brain exploded with activity, as if analyzing each new scent, sight, and sound. The rat was processing information the entire time it meandered.

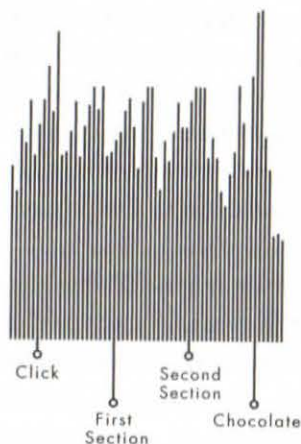
The scientists repeated their experiment, again and again, watching how each rat's brain activity changed as it moved through the same route hundreds of times. A series of shifts slowly emerged. The rats stopped sniffing corners and making wrong turns. Instead, they zipped through the maze faster and faster. And within their brains, something unexpected occurred: As each rat learned how to navigate the maze, its mental activity *decreased*. As the route became more and more automatic, each rat started thinking less and less.

It was as if the first few times a rat explored the maze, its brain had to work at full power to make sense of all the new information. But after a few days of running the same route, the rat didn't need to scratch the walls or smell the air anymore, and so the brain activity associated with scratching and smelling ceased. It didn't need to choose which direction to turn, and so decision-making centers of the brain went quiet. All it had to do was recall the quickest path to the chocolate. Within a week, even the brain structures related to memory had quieted. The rat had internalized how to sprint through the maze to such a degree that it hardly needed to think at all.

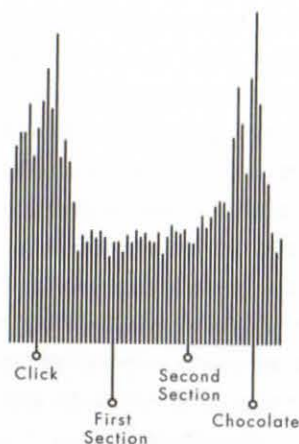
But that internalization—run straight, hang a left, eat the chocolate—relied upon the basal ganglia, the brain probes indicated. This tiny, ancient neurological structure seemed to take over as the rat ran faster and faster and its brain worked less and less. The basal ganglia was central to recalling patterns and acting on them. The basal ganglia, in other words, stored habits even while the rest of the brain went to sleep.



To see this capacity in action, consider this graph, which shows activity within a rat's skull as it encounters the maze for the first time. Initially, the brain is working hard the entire time:



After a week, once the route is familiar and the scurrying has become a habit, the rat's brain settles down as it runs through the maze:



This process—in which the brain converts a sequence of actions into an automatic routine—is known as “chunking,” and it’s at the root of how habits form. There are dozens—if not hundreds—of behavioral chunks that we rely on every day. Some are simple: You automatically put toothpaste on your toothbrush before sticking it in your mouth. Some, such as getting dressed or making the kids’ lunch, are a little more complex.

Others are so complicated that it’s remarkable a small bit of tissue that evolved millions of years ago can turn them into habits at all. Take the act of backing your car out of the driveway. When you first learned to drive, the driveway required a major dose of concentration, and for good reason: It involves opening the garage, unlocking the car door, adjusting the seat, inserting the key in the ignition, turning it clockwise, moving the rearview and side mirrors and checking for obstacles, putting your foot on the brake, moving the gearshift into reverse, removing your foot from the brake, mentally estimating the distance between the garage and the street while keeping the wheels aligned and monitoring for oncoming traffic, calculating how reflected images in the mirrors translate into actual distances between the bumper, the garbage cans, and the hedges, all while applying slight pressure to the gas pedal and brake, and, most likely, telling your passenger to please stop fiddling with the radio.

Nowadays, however, you do all of that every time you pull onto the street with hardly any thought. The routine occurs by habit.

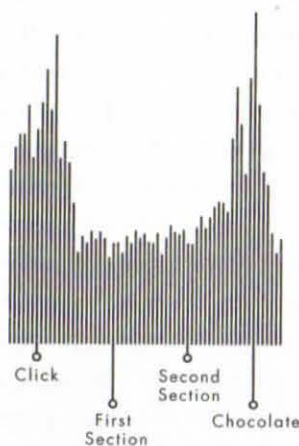
Millions of people perform this intricate ballet every morning, unthinkingly, because as soon as we pull out the car keys, our basal ganglia kicks in, identifying the habit we’ve stored in our brains related to backing an automobile into the street. Once that habit starts unfolding, our gray matter is free to quiet itself or chase other thoughts, which is why we have enough mental capacity to realize that Jimmy forgot his lunchbox inside.

Habits, scientists say, emerge because the brain is constantly looking for ways to save effort. Left to its own devices, the brain will try to

make almost any routine into a habit, because habits allow our minds to ramp down more often. This effort-saving instinct is a huge advantage. An efficient brain requires less room, which makes for a smaller head, which makes childbirth easier and therefore causes fewer infant and mother deaths. An efficient brain also allows us to stop thinking constantly about basic behaviors, such as walking and choosing what to eat, so we can devote mental energy to inventing spears, irrigation systems, and, eventually, airplanes and video games.

But conserving mental effort is tricky, because if our brains power down at the wrong moment, we might fail to notice something important, such as a predator hiding in the bushes or a speeding car as we pull onto the street. So our basal ganglia have devised a clever system to determine when to let habits take over. It's something that happens whenever a chunk of behavior starts or ends.

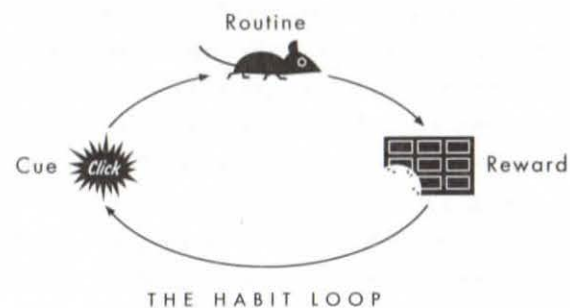
To see how it works, look closely at the graph of the rat's neurological habit again. Notice that brain activity spikes at the beginning of the maze, when the rat hears the click before the partition starts moving, and again at the end, when it finds the chocolate.



Those spikes are the brain's way of determining when to cede control to a habit, and which habit to use. From behind a partition,

for instance, it's difficult for a rat to know if it's inside a familiar maze or an unfamiliar cupboard with a cat lurking outside. To deal with this uncertainty, the brain spends a lot of effort at the beginning of a habit looking for something—a cue—that offers a hint as to which pattern to use. From behind a partition, if a rat hears a click, it knows to use the maze habit. If it hears a meow, it chooses a different pattern. And at the end of the activity, when the reward appears, the brain shakes itself awake and makes sure everything unfolded as expected.

This process within our brains is a three-step loop. First, there is a *cue*, a trigger that tells your brain to go into automatic mode and which habit to use. Then there is the *routine*, which can be physical or mental or emotional. Finally, there is a *reward*, which helps your brain figure out if this particular loop is worth remembering for the future:



Over time, this loop—cue, routine, reward; cue, routine, reward—becomes more and more automatic. The cue and reward become intertwined until a powerful sense of anticipation and craving emerges. Eventually, whether in a chilly MIT laboratory or your driveway, a habit is born.



Habits aren't destiny. As the next two chapters explain, habits can be ignored, changed, or replaced. But the reason the discovery of the habit loop is so important is that it reveals a basic truth: When a habit emerges, the brain stops fully participating in decision making. It stops working so hard, or diverts focus to other tasks. So unless you deliberately *fight* a habit—unless you find new routines—the pattern will unfold automatically.

However, simply understanding how habits work—learning the structure of the habit loop—makes them easier to control. Once you break a habit into its components, you can fiddle with the gears.

"We've done experiments where we trained rats to run down a maze until it was a habit, and then we extinguished the habit by changing the placement of the reward," Ann Graybiel, a scientist at MIT who oversaw many of the basal ganglia experiments, told me. "Then one day, we'll put the reward in the old place, and put in the rat, and, by golly, the old habit will reemerge right away. Habits never really disappear. They're encoded into the structures of our brain, and that's a huge advantage for us, because it would be awful if we had to relearn how to drive after every vacation. The problem is that your brain can't tell the difference between bad and good habits, and so if you have a bad one, it's always lurking there, waiting for the right cues and rewards."

This explains why it's so hard to create exercise habits, for instance, or change what we eat. Once we develop a routine of sitting on the couch, rather than running, or snacking whenever we pass a doughnut box, those patterns always remain inside our heads. By the same rule, though, if we learn to create new neurological routines that overpower those behaviors—if we take control of the habit loop—we can force those bad tendencies into the background, just as Lisa Allen did after her Cairo trip. And once someone creates a new pattern, studies have demonstrated, going for a jog or ignoring the doughnuts becomes as automatic as any other habit.

Without habit loops, our brains would shut down, overwhelmed

by the minutiae of daily life. People whose basal ganglia are damaged by injury or disease often become mentally paralyzed. They have trouble performing basic activities, such as opening a door or deciding what to eat. They lose the ability to ignore insignificant details—one study, for example, found that patients with basal ganglia injuries couldn't recognize facial expressions, including fear and disgust, because they were perpetually uncertain about which part of the face to focus on. Without our basal ganglia, we lose access to the hundreds of habits we rely on every day. Did you pause this morning to decide whether to tie your left or right shoe first? Did you have trouble figuring out if you should brush your teeth before or after you showered?

Of course not. Those decisions are habitual, effortless. As long as your basal ganglia is intact and the cues remain constant, the behaviors will occur unthinkingly. (Though when you go on vacation, you may get dressed in different ways or brush your teeth at a different point in your morning routine without noticing it.)

At the same time, however, the brain's dependence on automatic routines can be dangerous. Habits are often as much a curse as a benefit.

Take Eugene, for instance. Habits gave him his life back after he lost his memory. Then they took everything away again.

### III.

As Larry Squire, the memory specialist, spent more and more time with Eugene, he became convinced his patient was somehow learning new behaviors. Images of Eugene's brain showed that his basal ganglia had escaped injury from the viral encephalitis. Was it possible, the scientist wondered, that Eugene, even with severe brain damage, could still use the cue-routine-reward loop? Could this ancient neurological process explain how Eugene was able to walk around the block and find the jar of nuts in the kitchen?

To test if Eugene was forming new habits, Squire devised an experiment. He took sixteen different objects—bits of plastic and brightly colored pieces of toys—and glued them to cardboard rectangles. He then divided them into eight pairs: choice A and choice B. In each pairing, one piece of cardboard, chosen at random, had a sticker placed on the bottom that read “correct.”

Eugene was seated at a table, given a pair of objects, and asked to choose one. Next, he was told to turn over his choice to see if there was a “correct” sticker underneath. This is a common way to measure memory. Since there are only sixteen objects, and they are always presented in the same eight pairings, most people can memorize which item is “correct” after a few rounds. Monkeys can memorize all the “correct” items after eight to ten days.

Eugene couldn’t remember any of the “correct” items, no matter how many times he did the test. He repeated the experiment twice a week for months, looking at forty pairings each day.

“Do you know why you are here today?” a researcher asked at the beginning of one session a few weeks into the experiment.

“I don’t think so,” Eugene said.

“I’m going to show you some objects. Do you know why?”

“Am I supposed to describe them to you, or tell you what they are used for?” Eugene couldn’t recollect the previous sessions at all.

But as the weeks passed, Eugene’s performance improved. After twenty-eight days of training, Eugene was choosing the “correct” object 85 percent of the time. At thirty-six days, he was right 95 percent of the time. After one test, Eugene looked at the researcher, bewildered by his success.

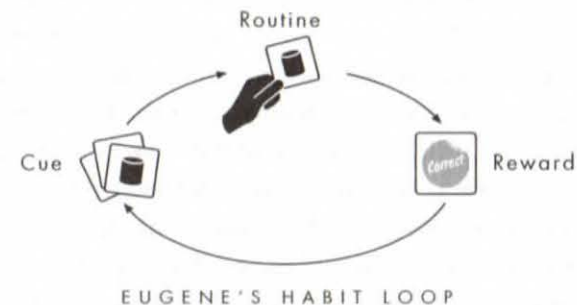
“How am I doing this?” he asked her.

“Tell me what is going on in your head,” the researcher said. “Do you say to yourself, ‘I remember seeing that one?’”

“No,” Eugene said. “It’s here somehow or another”—he pointed to his head—“and the hand goes for it.”

To Squire, however, it made perfect sense. Eugene was exposed

to a cue: a pair of objects always presented in the same combination. There was a routine: He would choose one object and look to see if there was a sticker underneath, even if he had no idea why he felt compelled to turn the cardboard over. Then there was a reward: the satisfaction he received after finding a sticker proclaiming “correct.” Eventually, a habit loop emerged.



To make sure this pattern was, in fact, a habit, Squire conducted one more experiment. He took all sixteen items and put them in front of Eugene at the same time. He asked him to put all the “correct” objects into one pile.

Eugene had no idea where to begin. “Gosh sakes, how to remember this?” he asked. He reached for one object and started to turn it over. The experimenter stopped him. No, she explained. The task was to put the items in *piles*. Why was he trying to turn them over?

“That’s just a habit, I think,” he said.

He couldn’t do it. The objects, when presented outside of the context of the habit loop, made no sense to him.

Here was the proof Squire was looking for. The experiments demonstrated that Eugene had the ability to form new habits, even when they involved tasks or objects he couldn’t remember for more than a few seconds. This explained how Eugene managed to go for a walk every morning. The cues—certain trees on corners or the placement of particular mailboxes—were consistent every time he

went outside, so though he couldn't recognize his house, his habits always guided him back to his front door. It also explained why Eugene would eat breakfast three or four times a day, even if he wasn't hungry. As long as the right cues were present—such as his radio or the morning light through his windows—he automatically followed the script dictated by his basal ganglia.

What's more, there were dozens of other habits in Eugene's life that no one noticed until they started looking for them. Eugene's daughter, for instance, would often stop by his house to say hello. She would talk to her father in the living room for a bit, then go into the kitchen to visit with her mother, and then leave, waving good-bye on her way out the door. Eugene, who had forgotten their earlier conversation by the time she left, would get angry—why was she leaving without chatting?—and then forget why he was upset. But the emotional habit had already started, and so his anger would persist, red hot and beyond his understanding, until it burned itself out.

"Sometimes he would bang the table or curse, and if you asked him why, he'd say 'I don't know, but I'm mad!'" Beverly told me. He would kick his chair, or snap at whoever came into the room. Then, a few minutes later, he would smile and talk about the weather. "It was like, once it started, he had to finish the frustration," she said.

Squire's new experiment also showed something else: that habits are surprisingly delicate. If Eugene's cues changed the slightest bit, his habits fell apart. The few times he walked around the block, for instance, and something was different—the city was doing street repairs or a windstorm had blown branches all over the sidewalk—Eugene would get lost, no matter how close he was to home, until a kind neighbor showed him the way to his door. If his daughter stopped to chat with him for ten seconds before she walked out, his anger habit never emerged.

Squire's experiments with Eugene revolutionized the scientific community's understanding of how the brain works by proving, once and for all, that it's possible to learn and make unconscious

choices without remembering anything about the lesson or decision making. Eugene showed that habits, as much as memory and reason, are at the root of how we behave. We might not remember the experiences that create our habits, but once they are lodged within our brains they influence how we act—often without our realization.



Since Squire's first paper on Eugene's habits was published, the science of habit formation has exploded into a major field of study. Researchers at Duke, Harvard, UCLA, Yale, USC, Princeton, the University of Pennsylvania, and at schools in the United Kingdom, Germany, and the Netherlands, as well as corporate scientists working for Procter & Gamble, Microsoft, Google, and hundreds of other companies are focused on understanding the neurology and psychology of habits, their strengths and weaknesses, and why they emerge and how they can be changed.

Researchers have learned that cues can be almost anything, from a visual trigger such as a candy bar or a television commercial to a certain place, a time of day, an emotion, a sequence of thoughts, or the company of particular people. Routines can be incredibly complex or fantastically simple (some habits, such as those related to emotions, are measured in milliseconds). Rewards can range from food or drugs that cause physical sensations, to emotional payoffs, such as the feelings of pride that accompany praise or self-congratulation.

And in almost every experiment, researchers have seen echoes of Squire's discoveries with Eugene: Habits are powerful, but delicate. They can emerge outside our consciousness, or can be deliberately designed. They often occur without our permission, but can be reshaped by fiddling with their parts. They shape our lives far more than we realize—they are so strong, in fact, that they cause our brains to cling to them at the exclusion of all else, including common sense.

In one set of experiments, for example, researchers affiliated with the National Institute on Alcohol Abuse and Alcoholism trained mice to press levers in response to certain cues until the behavior became a habit. The mice were always rewarded with food. Then, the scientists poisoned the food so that it made the animals violently ill, or electrified the floor, so that when the mice walked toward their reward they received a shock. The mice knew the food and cage were dangerous—when they were offered the poisoned pellets in a bowl or saw the electrified floor panels, they stayed away. When they saw their old cues, however, they unthinkingly pressed the lever and ate the food, or they walked across the floor, even as they vomited or jumped from the electricity. The habit was so ingrained the mice couldn't stop themselves.

It's not hard to find an analog in the human world. Consider fast food, for instance. It makes sense—when the kids are starving and you're driving home after a long day—to stop, just this once, at McDonald's or Burger King. The meals are inexpensive. It tastes so good. After all, one dose of processed meat, salty fries, and sugary soda poses a relatively small health risk, right? It's not like you do it all the time.

But habits emerge without our permission. Studies indicate that families usually don't *intend* to eat fast food on a regular basis. What happens is that a once a month pattern slowly becomes once a week, and then twice a week—as the cues and rewards create a habit—until the kids are consuming an unhealthy amount of hamburgers and fries. When researchers at the University of North Texas and Yale tried to understand why families gradually increased their fast food consumption, they found a series of cues and rewards that most customers never knew were influencing their behaviors. They discovered the habit loop.

Every McDonald's, for instance, looks the same—the company deliberately tries to standardize stores' architecture and what employees say to customers, so everything is a consistent cue to trigger

eating routines. The foods at some chains are specifically engineered to deliver immediate rewards—the fries, for instance, are designed to begin disintegrating the moment they hit your tongue, in order to deliver a hit of salt and grease as fast as possible, causing your pleasure centers to light up and your brain to lock in the pattern. All the better for tightening the habit loop.

However, even these habits are delicate. When a fast food restaurant closes down, the families that previously ate there will often start having dinner at home, rather than seek out an alternative location. Even small shifts can end the pattern. But since we often don't recognize these habit loops as they grow, we are blind to our ability to control them. By learning to observe the cues and rewards, though, we can change the routines.

#### IV.

By 2000, seven years after Eugene's illness, his life had achieved a kind of equilibrium. He went for a walk every morning. He ate what he wanted, sometimes five or six times a day. His wife knew that as long as the television was tuned to the History Channel, Eugene would settle into his plush chair and watch it regardless of whether it was airing reruns or new programs. He couldn't tell the difference.

As he got older, however, Eugene's habits started impacting his life in negative ways. He was sedentary, sometimes watching television for hours at a time because he never grew bored with the shows. His physicians became worried about his heart. The doctors told Beverly to keep him on a strict diet of healthy foods. She tried, but it was difficult to influence how frequently he ate or what he consumed. He never recalled her admonitions. Even if the refrigerator was stocked with fruits and vegetables, Eugene would root around until he found the bacon and eggs. That was his routine. And as Eugene aged and his bones became more brittle, the doctors said he

needed to be more careful walking around. In his mind, however, Eugene was twenty years younger. He never remembered to step carefully.

"All my life I was fascinated by memory," Squire told me. "Then I met E.P., and saw how rich life can be even if you can't remember it. The brain has this amazing ability to find happiness even when the memories of it are gone.

"It's hard to turn that off, though, which ultimately worked against him."

Beverly tried to use her understanding of habits to help Eugene avoid problems as he aged. She discovered that she could short-circuit some of his worst patterns by inserting new cues. If she didn't keep bacon in the fridge, Eugene wouldn't eat multiple, unhealthy breakfasts. When she put a salad next to his chair, he would sometimes pick at it, and as the meal became a habit, he stopped searching the kitchen for treats. His diet gradually improved.

Despite these efforts, however, Eugene's health still declined. One spring day, Eugene was watching television when he suddenly shouted. Beverly ran in and saw him clutching his chest. She called an ambulance. At the hospital, they diagnosed a minor heart attack. By then the pain had passed and Eugene was fighting to get off his gurney. That night, he kept pulling off the monitors attached to his chest so he could roll over and sleep. Alarms would blare and nurses would rush in. They tried to get him to quit fiddling with the sensors by taping the leads in place and telling him they would use restraints if he continued fussing. Nothing worked. He forgot the threats as soon as they were issued.

Then his daughter told a nurse to try complimenting him on his willingness to sit still, and to repeat the compliment, over and over, each time she saw him. "We wanted to, you know, get his pride involved," his daughter, Carol Rayes, told me. "We'd say, 'Oh, Dad, you're really doing something important for science by keeping these doodads in place.'" The nurses started to dote on him. He

loved it. After a couple of days, he did whatever they asked. Eugene returned home a week later.

Then, in the fall of 2008, while walking through his living room, Eugene tripped on a ledge near the fireplace, fell, and broke his hip. At the hospital, Squire and his team worried that he would have panic attacks because he wouldn't know where he was. So they left notes by his bedside explaining what had happened and posted photos of his children on the walls. His wife and kids came every day.

Eugene, however, never grew worried. He never asked why he was in the hospital. "He seemed at peace with all the uncertainty by that point," said Squire. "It had been fifteen years since he had lost his memory. It was as if part of his brain knew there were some things he would never understand and was okay with that."

Beverly came to the hospital every day. "I spent a long time talking to him," she said. "I told him that I loved him, and about our kids and what a good life we had. I pointed to the pictures and talked about how much he was adored. We were married for fifty-seven years, and forty-two of those were a real, normal marriage. Sometimes it was hard, because I wanted my old husband back so much. But at least I knew he was happy."

A few weeks later, his daughter came to visit. "What's the plan?" Eugene asked when she arrived. She took him outside in a wheelchair, onto the hospital's lawn. "It's a beautiful day," Eugene said. "Pretty nice weather, huh?" She told him about her kids and they played with a dog. She thought he might be able to come home soon. The sun was going down. She started to get ready to take him inside.

Eugene looked at her.

"I'm lucky to have a daughter like you," he said. She was caught off-guard. She couldn't remember the last time he had said something so sweet.

"I'm lucky that you're my dad," she told him.

"Gosh, it's a beautiful day," he said. "What do you think about the weather?"

That night, at one o'clock in the morning, Beverly's phone rang. The doctor said Eugene had suffered a massive heart attack and the staff had done everything possible, but hadn't been able to revive him. He was gone. After his death, he would be celebrated by researchers, the images of his brain studied in hundreds of labs and medical schools.

"I know he would have been really proud to know how much he contributed to science," Beverly told me. "He told me once, pretty soon after we got married, that he wanted to do something important with his life, something that mattered. And he did. He just never remembered any of it."

## 2

## THE CRAVING BRAIN

## How to Create New Habits

## I.

One day in the early 1900s, a prominent American executive named Claude C. Hopkins was approached by an old friend with a new business idea. The friend had discovered an amazing product, he explained, that he was convinced would be a hit. It was a toothpaste, a minty, frothy concoction he called "Pepsodent." There were some dicey investors involved—one of them had a string of busted land deals; another, it was rumored, was connected to the mob—but this venture, the friend promised, was going to be huge. If, that is, Hopkins would consent to help design a national promotional campaign.

Hopkins, at the time, was at the top of a booming industry that had hardly existed a few decades earlier: advertising. Hopkins was the man who had convinced Americans to buy Schlitz beer by boasting that the company cleaned their bottles "with live steam," while neglecting to mention that every other company used the exact same method. He had seduced millions of women into purchasing Pal-



molive soap by proclaiming that Cleopatra had washed with it, despite the sputtering protests of outraged historians. He had made Puffed Wheat famous by saying that it was “shot from guns” until the grains puffed “to eight times normal size.” He had turned dozens of previously unknown products—Quaker Oats, Goodyear tires, the Bissell carpet sweeper, Van Camp’s pork and beans—into household names. And in the process, he had made himself so rich that his best-selling autobiography, *My Life in Advertising*, devoted long passages to the difficulties of spending so much money.

Claude Hopkins was best known for a series of rules he coined explaining how to create new habits among consumers. These rules would transform industries and eventually became conventional wisdom among marketers, educational reformers, public health professionals, politicians, and CEOs. Even today, Hopkins’s rules influence everything from how we buy cleaning supplies to the tools governments use for eradicating disease. They are fundamental to creating any new routine.

However, when his old friend approached Hopkins about Pepsodent, the ad man expressed only mild interest. It was no secret that the health of Americans’ teeth was in steep decline. As the nation had become wealthier, people had started buying larger amounts of sugary, processed foods. When the government started drafting men for World War I, so many recruits had rotting teeth that officials said poor dental hygiene was a national security risk.

Yet as Hopkins knew, selling toothpaste was financial suicide. There was already an army of door-to-door salesmen hawking dubious tooth powders and elixirs, most of them going broke.

The problem was that hardly anyone bought toothpaste because, despite the nation’s dental problems, hardly anyone brushed their teeth.

So Hopkins gave his friend’s proposal a bit of thought, and then declined. He’d stick with soaps and cereals, he said. “I did not see a way to educate the laity in technical tooth-paste theories,” Hopkins

explained in his autobiography. The friend, however, was persistent. He came back again and again, appealing to Hopkins’s considerable ego until, eventually, the ad man gave in.

“I finally agreed to undertake the campaign if he gave me a six months’ option on a block of stock,” Hopkins wrote. The friend agreed.

It would be the wisest financial decision of Hopkins’s life.

Within five years of that partnership, Hopkins turned Pepsodent into one of the best-known products on earth and, in the process, helped create a toothbrushing habit that moved across America with startling speed. Soon, everyone from Shirley Temple to Clark Gable was bragging about their “Pepsodent smile.” By 1930, Pepsodent was sold in China, South Africa, Brazil, Germany, and almost anywhere else Hopkins could buy ads. A decade after the first Pepsodent campaign, pollsters found that toothbrushing had become a ritual for more than half the American population. Hopkins had helped establish toothbrushing as a daily activity.

The secret to his success, Hopkins would later boast, was that he had found a certain kind of cue and reward that fueled a particular habit. It’s an alchemy so powerful that even today the basic principles are still used by video game designers, food companies, hospitals, and millions of salesmen around the world. Eugene Pauly taught us about the habit loop, but it was Claude Hopkins that showed how new habits can be cultivated and grown.

So what, exactly, did Hopkins do?

He created a craving. And that craving, it turns out, is what makes cues and rewards work. That craving is what powers the habit loop.



Throughout his career, one of Claude Hopkins’s signature tactics was to find simple triggers to convince consumers to use his prod-

ucts every day. He sold Quaker Oats, for instance, as a breakfast cereal that could provide energy for twenty-four hours—but only if you ate a bowl every morning. He hawked tonics that cured stomachaches, joint pain, bad skin, and “womanly problems”—but only if you drank the medicine at symptoms’ first appearance. Soon, people were devouring oatmeal at daybreak and chugging from little brown bottles whenever they felt a hint of fatigue, which, as luck would have it, often happened at least once a day.

To sell Pepsodent, then, Hopkins needed a trigger that would justify the toothpaste’s daily use. He sat down with a pile of dental textbooks. “It was dry reading,” he later wrote. “But in the middle of one book I found a reference to the mucin plaques on teeth, which I afterward called ‘the film.’ That gave me an appealing idea. I resolved to advertise this toothpaste as a creator of beauty. To deal with that cloudy film.”

In focusing on tooth film, Hopkins was ignoring the fact that this same film has always covered people’s teeth and hadn’t seemed to bother anyone. The film is a naturally occurring membrane that builds up on teeth regardless of what you eat or how often you brush. People had never paid much attention to it, and there was little reason why they should: You can get rid of the film by eating an apple, running your finger over your teeth, brushing, or vigorously swirling liquid around your mouth. Toothpaste didn’t do anything to help remove the film. In fact, one of the leading dental researchers of the time said that all toothpastes—particularly Pepsodent—were worthless.

That didn’t stop Hopkins from exploiting his discovery. Here, he decided, was a cue that could trigger a habit. Soon, cities were plastered with Pepsodent ads.

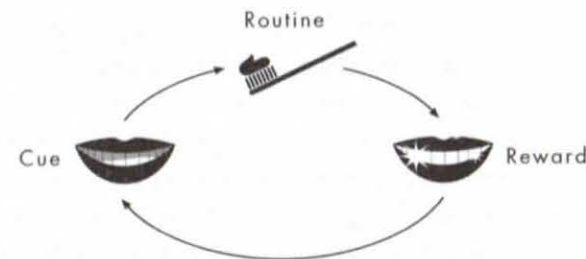
“Just run your tongue across your teeth,” read one. “You’ll feel a film—that’s what makes your teeth look ‘off color’ and invites decay.”

“Note how many pretty teeth are seen everywhere,” read another ad, featuring smiling beauties. “Millions are using a new method of

teeth cleansing. Why would any woman have dingy film on her teeth? Pepsodent removes the film!”

The brilliance of these appeals was that they relied upon a cue—tooth film—that was universal and impossible to ignore. Telling someone to run their tongue across their teeth, it turned out, was likely to cause them to run their tongue across their teeth. And when they did, they were likely to feel a film. Hopkins had found a cue that was simple, had existed for ages, and was so easy to trigger that an advertisement could cause people to comply automatically.

Moreover, the reward, as Hopkins envisioned it, was even more enticing. Who, after all, doesn’t want to be more beautiful? Who doesn’t want a prettier smile? Particularly when all it takes is a quick brush with Pepsodent?



HOPKINS'S CONCEPTION  
OF THE PEPSODENT HABIT LOOP

After the campaign launched, a quiet week passed. Then two. In the third week, demand exploded. There were so many orders for Pepsodent that the company couldn't keep up. In three years, the product went international, and Hopkins was crafting ads in Spanish, German, and Chinese. Within a decade, Pepsodent was one of the top-selling goods in the world, and remained America's best-selling toothpaste for more than thirty years.

Before Pepsodent appeared, only 7 percent of Americans had a tube of toothpaste in their medicine chests. A decade after Hop-

kins's ad campaign went nationwide, that number had jumped to 65 percent. By the end of World War II, the military downgraded concerns about recruits' teeth because so many soldiers were brushing every day.

"I made for myself a million dollars on Pepsodent," Hopkins wrote a few years after the product appeared on shelves. The key, he said, was that he had "learned the right human psychology." That psychology was grounded in two basic rules:

First, find a simple and obvious cue.

Second, clearly define the rewards.

If you get those elements right, Hopkins promised, it was like magic. Look at Pepsodent: He had identified a cue—tooth film—and a reward—beautiful teeth—that had persuaded millions to start a daily ritual. Even today, Hopkins's rules are a staple of marketing textbooks and the foundation of millions of ad campaigns.

And those same principles have been used to create thousands of other habits—often without people realizing how closely they are hewing to Hopkins's formula. Studies of people who have successfully started new exercise routines, for instance, show they are more likely to stick with a workout plan if they choose a specific cue, such as running as soon as they get home from work, and a clear reward, such as a beer or an evening of guilt-free television. Research on dieting says creating new food habits requires a predetermined cue—such as planning menus in advance—and simple rewards for dieters when they stick to their intentions.

"The time has come when advertising has in some hands reached the status of a science," Hopkins wrote. "Advertising, once a gamble, has thus become, under able direction, one of the safest of business ventures."

It's quite a boast. However, it turns out that Hopkins's two rules aren't enough. There's also a third rule that must be satisfied to create a habit—a rule so subtle that Hopkins himself relied on it without knowing it existed. It explains everything from why it's so hard

to ignore a box of doughnuts to how a morning jog can become a nearly effortless routine.

## 11.

The scientists and marketing executives at Procter & Gamble were gathered around a beat-up table in a small, windowless room, reading the transcript of an interview with a woman who owned nine cats, when one of them finally said what everyone was thinking.

"If we get fired, what exactly happens?" she asked. "Do security guards show up and walk us out, or do we get some kind of warning beforehand?"

The team's leader, a onetime rising star within the company named Drake Stimson, stared at her.

"I don't know," he said. His hair was a mess. His eyes were tired. "I never thought things would get this bad. They told me running this project was a promotion."

It was 1996, and the group at the table was finding out, despite Claude Hopkins's assertions, how utterly unscientific the process of selling something could become. They all worked for one of the largest consumer goods firms on earth, the company behind Pringles potato chips, Oil of Olay, Bounty paper towels, CoverGirl cosmetics, Dawn, Downy, and Duracell, as well as dozens of other brands. P&G collected more data than almost any other merchant on earth and relied on complex statistical methods to craft their marketing campaigns. The firm was incredibly good at figuring out how to sell things. In the clothes-washing market alone, P&G's products cleaned one out of every two laundry loads in America. Its revenues topped \$35 billion per year.

However, Stimson's team, which had been entrusted with designing the ad campaign for one of P&G's most promising new products, was on the brink of failure. The company had spent millions of dollars developing a spray that could remove bad smells

from almost any fabric. And the researchers in that tiny, windowless room had no idea how to get people to buy it.

The spray had been created about three years earlier, when one of P&G's chemists was working with a substance called hydroxypropyl beta cyclodextrin, or HPBCD, in a laboratory. The chemist was a smoker. His clothes usually smelled like an ashtray. One day, after working with HPBCD, his wife greeted him at the door when he got home.

"Did you quit smoking?" she asked him.

"No," he said. He was suspicious. She had been harassing him to give up cigarettes for years. This seemed like some kind of reverse psychology trickery.

"You don't smell like smoke, is all," she said.

The next day, he went back to the lab and started experimenting with HPBCD and various scents. Soon, he had hundreds of vials containing fabrics that smelled like wet dogs, cigars, sweaty socks, Chinese food, musty shirts, and dirty towels. When he put HPBCD in water and sprayed it on the samples, the scents were drawn into the chemical's molecules. After the mist dried, the smell was gone.

When the chemist explained his findings to P&G's executives, they were ecstatic. For years, market research had said that consumers were clamoring for something that could get rid of bad smells—not mask them, but eradicate them altogether. When one team of researchers had interviewed customers, they found that many of them left their blouses or slacks outside after a night at a bar or party. "My clothes smell like cigarettes when I get home, but I don't want to pay for dry cleaning every time I go out," one woman said.

P&G, sensing an opportunity, launched a top-secret project to turn HPBCD into a viable product. They spent millions perfecting the formula, finally producing a colorless, odorless liquid that could wipe out almost any foul odor. The science behind the spray was so advanced that NASA would eventually use it to clean the interiors of shuttles after they returned from space. The best part was that it was

cheap to manufacture, didn't leave stains, and could make any stinky couch, old jacket, or stained car interior smell, well, scentless. The project had been a major gamble, but P&G was now poised to earn billions—if they could come up with the right marketing campaign.

They decided to call it Febreze, and asked Stimson, a thirty-one-year-old wunderkind with a background in math and psychology, to lead the marketing team. Stimson was tall and handsome, with a strong chin, a gentle voice, and a taste for high-end meals. ("I'd rather my kids smoked weed than ate in McDonald's," he once told a colleague.) Before joining P&G, he had spent five years on Wall Street building mathematical models for choosing stocks. When he relocated to Cincinnati, where P&G was headquartered, he was tapped to help run important business lines, including Bounce fabric softener and Downy dryer sheets. But Febreze was different. It was a chance to launch an entirely new category of product—to add something to a consumer's shopping cart that had never been there before. All Stimson needed to do was figure out how to make Febreze into a habit, and the product would fly off the shelves. How tough could that be?

Stimson and his colleagues decided to introduce Febreze in a few test markets—Phoenix, Salt Lake City, and Boise. They flew in and handed out samples, and then asked people if they could come by their homes. Over the course of two months, they visited hundreds of households. Their first big breakthrough came when they visited a park ranger in Phoenix. She was in her late twenties and lived by herself. Her job was to trap animals that wandered out of the desert. She caught coyotes, raccoons, the occasional mountain lion. And skunks. Lots and lots of skunks. Which often sprayed her when they were caught.

"I'm single, and I'd like to find someone to have kids with," the ranger told Stimson and his colleagues while they sat in her living room. "I go on a lot of dates. I mean, I think I'm attractive, you know? I'm smart and I feel like I'm a good catch."

But her love life was crippled, she explained, because everything in her life smelled like skunk. Her house, her truck, her clothing, her boots, her hands, her curtains. Even her bed. She had tried all sorts of cures. She bought special soaps and shampoos. She burned candles and used expensive carpet shampooing machines. None of it worked.

"When I'm on a date, I'll get a whiff of something that smells like skunk and I'll start obsessing about it," she told them. "I'll start wondering, does he smell it? What if I bring him home and he wants to leave?"

"I went on four dates last year with a really nice guy, a guy I really liked, and I waited forever to invite him to my place. Eventually, he came over, and I thought everything was going really well. Then the next day, he said he wanted to 'take a break.' He was really polite about it, but I keep wondering, was it the smell?"

"Well, I'm glad you got a chance to try Febreze," Stimson said. "How'd you like it?"

She looked at him. She was crying.

"I want to thank you," she said. "This spray has changed my life."

After she had received samples of Febreze, she had gone home and sprayed her couch. She sprayed the curtains, the rug, the bedspread, her jeans, her uniform, the interior of her car. The bottle ran out, so she got another one, and sprayed everything else.

"I've asked all of my friends to come over," the woman said. "They can't smell it anymore. The skunk is gone."

By now, she was crying so hard that one of Stimson's colleagues was patting her on the shoulder. "Thank you so much," the woman said. "I feel so free. Thank you. This product is so important."

Stimson sniffed the air inside her living room. He couldn't smell anything. *We're going to make a fortune with this stuff*, he thought.



Stimson and his team went back to P&G headquarters and started reviewing the marketing campaign they were about to roll out. The key to selling Febreze, they decided, was conveying that sense of relief the park ranger felt. They had to position Febreze as something that would allow people to rid themselves of embarrassing smells. All of them were familiar with Claude Hopkins's rules, or the modern incarnations that filled business school textbooks. They wanted to keep the ads simple: Find an obvious cue and clearly define the reward.

They designed two television commercials. The first showed a woman talking about the smoking section of a restaurant. Whenever she eats there, her jacket smells like smoke. A friend tells her if she uses Febreze, it will eliminate the odor. The cue: the smell of cigarettes. The reward: odor eliminated from clothes. The second ad featured a woman worrying about her dog, Sophie, who always sits on the couch. "Sophie will always smell like Sophie," she says, but with Febreze, "now my furniture doesn't have to." The cue: pet smells, which are familiar to the seventy million households with animals. The reward: a house that doesn't smell like a kennel.

Stimson and his colleagues began airing the advertisements in 1996 in the same test cities. They gave away samples, put advertisements in mailboxes, and paid grocers to build mountains of Febreze near cash registers. Then they sat back, anticipating how they would spend their bonuses.

A week passed. Then two. A month. Two months. Sales started small—and got smaller. Panicked, the company sent researchers into stores to see what was happening. Shelves were filled with Febreze bottles that had never been touched. They started visiting housewives who had received free samples.

"Oh, yes!" one of them told a P&G researcher. "The spray! I remember it. Let's see." The woman got down on her knees in the kitchen and started rooting through the cabinet underneath the

sink. "I used it for a while, but then I forgot about it. I think it's back here somewhere." She stood up. "Maybe it's in the closet?" She walked over and pushed aside some brooms. "Yes! Here it is! In the back! See? It's still almost full. Did you want it back?"

Febreze was a dud.

For Stimson, this was a disaster. Rival executives in other divisions sensed an opportunity in his failure. He heard whispers that some people were lobbying to kill Febreze and get him reassigned to Nicky Clarke hair products, the consumer goods equivalent of Siberia.

One of P&G's divisional presidents called an emergency meeting and announced they had to cut their losses on Febreze before board members started asking questions. Stimson's boss stood up and made an impassioned plea. "There's still a chance to turn everything around," he said. "At the very least, let's ask the PhDs to figure out what's going on." P&G had recently snapped up scientists from Stanford, Carnegie Mellon, and elsewhere who were supposed experts in consumer psychology. The division's president agreed to give the product a little more time.

So a new group of researchers joined Stimson's team and started conducting more interviews. Their first inkling of why Febreze was failing came when they visited a woman's home outside Phoenix. They could smell her nine cats before they went inside. The house's interior, however, was clean and organized. She was somewhat of a neat freak, the woman explained. She vacuumed every day and didn't like to open her windows, since the wind blew in dust. When Stimson and the scientists walked into her living room, where the cats lived, the scent was so overpowering that one of them gagged.

"What do you do about the cat smell?" a scientist asked the woman.

"It's usually not a problem," she said.

"How often do you notice a smell?"

"Oh, about once a month," the woman replied.

The researchers looked at one another.

"Do you smell it now?" a scientist asked.

"No," she said.

The same pattern played out in dozens of other smelly homes the researchers visited. People couldn't detect most of the bad smells in their lives. If you live with nine cats, you become desensitized to their scent. If you smoke cigarettes, it damages your olfactory capacities so much that you can't smell smoke anymore. Scents are strange; even the strongest fade with constant exposure. That's why no one was using Febreze, Stimson realized. The product's cue—the thing that was supposed to trigger daily use—was hidden from the people who needed it most. Bad scents simply weren't noticed frequently enough to trigger a regular habit. As a result, Febreze ended up in the back of a closet. The people with the greatest proclivity to use the spray never smelled the odors that should have reminded them the living room needed a spritz.

Stimson's team went back to headquarters and gathered in the windowless conference room, rereading the transcript of the woman with nine cats. The psychologist asked what happens if you get fired. Stimson put his head in his hands. If he couldn't sell Febreze to a woman with nine cats, he wondered, who *could* he sell it to? How do you build a new habit when there's no cue to trigger usage, and when the consumers who most need it don't appreciate the reward?

### III.

The laboratory belonging to Wolfram Schultz, a professor of neuroscience at the University of Cambridge, is not a pretty place. His desk has been alternately described by colleagues as a black hole where documents are lost forever and a petri dish where organisms can grow, undisturbed and in wild proliferation, for years. When Schultz needs to clean something, which is uncommon, he doesn't use sprays or cleansers. He wets a paper towel and wipes

hard. If his clothes smell like smoke or cat hair, he doesn't notice. Or care.

However, the experiments that Schultz has conducted over the past twenty years have revolutionized our understanding of how cues, rewards, and habits interact. He has explained why some cues and rewards have more power than others, and has provided a scientific road map that explains why Pepsodent was a hit, how some dieters and exercise buffs manage to change their habits so quickly, and—in the end—what it took to make Febreze sell.

In the 1980s, Schultz was part of a group of scientists studying the brains of monkeys as they learned to perform certain tasks, such as pulling on levers or opening clasps. Their goal was to figure out which parts of the brain were responsible for new actions.

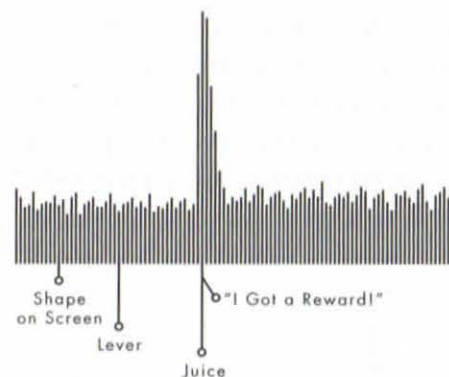
"One day, I noticed this thing that is interesting to me," Schultz told me. He was born in Germany and now, when he speaks English, sounds a bit like Arnold Schwarzenegger if the Terminator were a member of the Royal Society. "A few of the monkeys we watched loved apple juice, and the other monkeys loved grape juice, and so I began to wonder, what is going on inside those little monkey heads? Why do different rewards affect the brain in different ways?"

Schultz began a series of experiments to decipher how rewards work on a neurochemical level. As technology progressed, he gained access, in the 1990s, to devices similar to those used by the researchers at MIT. Rather than rats, however, Schultz was interested in monkeys like Julio, an eight-pound macaque with hazel eyes who had a very thin electrode inserted into his brain that allowed Schultz to observe neuronal activity as it occurred.

One day, Schultz positioned Julio on a chair in a dimly lit room and turned on a computer monitor. Julio's job was to touch a lever whenever colored shapes—small yellow spirals, red squiggles, blue lines—appeared on the screen. If Julio touched the lever when a shape appeared, a drop of blackberry juice would run down a tube hanging from the ceiling and onto the monkey's lips.

Julio liked blackberry juice.

At first, Julio was only mildly interested in what was happening on the screen. He spent most of his time trying to squirm out of the chair. But once the first dose of juice arrived, Julio became very focused on the monitor. As the monkey came to understand, through dozens of repetitions, that the shapes on the screen were a cue for a routine (touch the lever) that resulted in a reward (blackberry juice), he started staring at the screen with a laserlike intensity. He didn't squirm. When a yellow squiggle appeared, he went for the lever. When a blue line flashed, he pounced. And when the juice arrived, Julio would lick his lips contentedly.

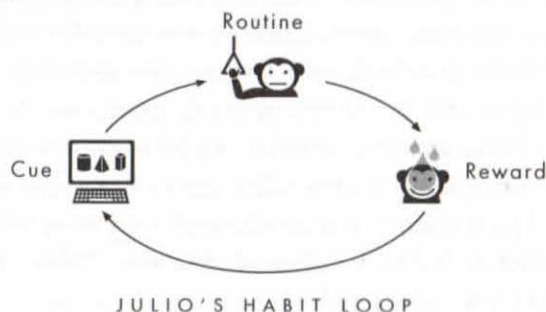


JULIO'S REWARD RESPONSE WHEN HE RECEIVES THE JUICE

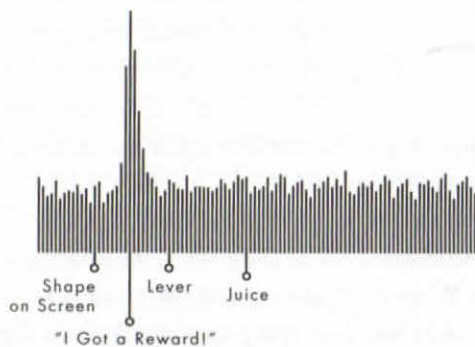
As Schultz monitored the activity within Julio's brain, he saw a pattern emerge. Whenever Julio received his reward, his brain activity would spike in a manner that suggested he was experiencing happiness. A transcript of that neurological activity shows what it looks like when a monkey's brain says, in essence, "I got a reward!"

Schultz took Julio through the same experiment again and again, recording the neurological response each time. Whenever Julio received his juice, the "I got a reward!" pattern appeared on the com-

puter attached to the probe in the monkey's head. Gradually, from a neurological perspective, Julio's behavior became a habit.



What was most interesting to Schultz, however, was how things changed as the experiment proceeded. As the monkey became more and more practiced at the behavior—as the habit became stronger and stronger—Julio's brain began *anticipating* the blackberry juice. Schultz's probes started recording the "I got a reward!" pattern the instant Julio saw the shapes on the screen, *before* the juice arrived:



NOW, JULIO'S REWARD RESPONSE  
OCCURS BEFORE THE JUICE ARRIVES

In other words, the shapes on the monitor had become a cue not just for pulling a lever, but also for a pleasure response inside the

monkey's brain. Julio started expecting his reward as soon as he saw the yellow spirals and red squiggles.

Then Schultz adjusted the experiment. Previously, Julio had received juice as soon as he touched the lever. Now, sometimes, the juice didn't arrive at all, even if Julio performed correctly. Or it would arrive after a slight delay. Or it would be watered down until it was only half as sweet.

When the juice didn't arrive or was late or diluted, Julio would get angry and make unhappy noises, or become mopey. And within Julio's brain, Schultz watched a new pattern emerge: craving. When Julio anticipated juice but didn't receive it, a neurological pattern associated with desire and frustration erupted inside his skull. When Julio saw the cue, he started anticipating a juice-fueled joy. But if the juice didn't arrive, that joy became a craving that, if unsatisfied, drove Julio to anger or depression.

Researchers in other labs have found similar patterns. Other monkeys were trained to anticipate juice whenever they saw a shape on a screen. Then, researchers tried to distract them. They opened the lab's door, so the monkeys could go outside and play with their friends. They put food in a corner, so the monkeys could eat if they abandoned the experiment.

For those monkeys who hadn't developed a strong habit, the distractions worked. They slid out of their chairs, left the room, and never looked back. They hadn't learned to crave the juice. However, once a monkey had developed a habit—once its brain *anticipated* the reward—the distractions held no allure. The animal would sit there, watching the monitor and pressing the lever, over and over again, regardless of the offer of food or the opportunity to go outside. The anticipation and sense of craving was so overwhelming that the monkeys stayed glued to their screens, the same way a gambler will play slots long after he's lost his winnings.

This explains why habits are so powerful: They create neurological cravings. Most of the time, these cravings emerge so gradually



that we're not really aware they exist, so we're often blind to their influence. But as we associate cues with certain rewards, a subconscious craving emerges in our brains that starts the habit loop spinning. One researcher at Cornell, for instance, found how powerfully food and scent cravings can affect behavior when he noticed how Cinnabon stores were positioned inside shopping malls. Most food sellers locate their kiosks in food courts, but Cinnabon tries to locate their stores *away* from other food stalls. Why? Because Cinnabon executives want the smell of cinnamon rolls to waft down hallways and around corners uninterrupted, so that shoppers will start subconsciously craving a roll. By the time a consumer turns a corner and sees the Cinnabon store, that craving is a roaring monster inside his head and he'll reach, unthinkingly, for his wallet. The habit loop is spinning because a sense of craving has emerged.

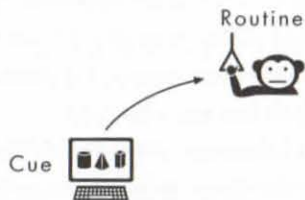
"There is nothing programmed into our brains that makes us see a box of doughnuts and automatically want a sugary treat," Schultz told me. "But once our brain learns that a doughnut box contains yummy sugar and other carbohydrates, it will start *anticipating* the sugar high. Our brains will push us toward the box. Then, if we don't eat the doughnut, we'll feel disappointed."

To understand this process, consider how Julio's habit emerged. First, he saw a shape on the screen:

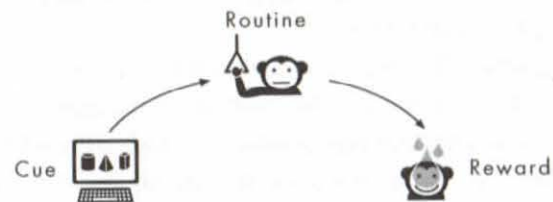


Cue

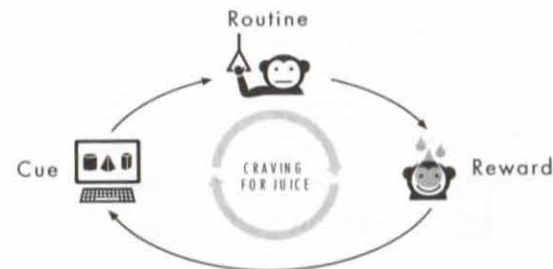
Over time, Julio learned that the appearance of the shape meant it was time to execute a routine. So he touched the lever:



As a result, Julio received a drop of blackberry juice.

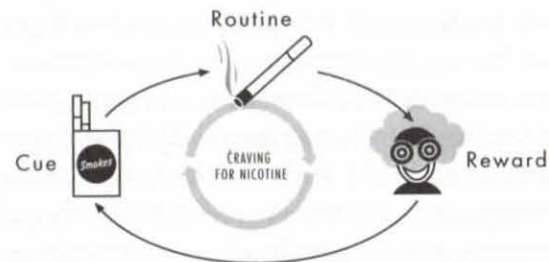


That's basic learning. The habit only emerges once Julio begins *craving* the juice when he sees the cue. Once that craving exists, Julio will act automatically. He'll follow the habit:



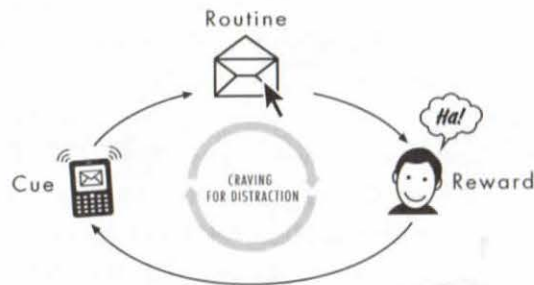
JULIO'S HABIT LOOP

This is how new habits are created: by putting together a cue, a routine, and a reward, and then cultivating a craving that drives the loop. Take, for instance, smoking. When a smoker sees a cue—say, a pack of Marlboros—her brain starts anticipating a hit of nicotine.



Just the sight of cigarettes is enough for the brain to crave a nicotine rush. If it doesn't arrive, the craving grows until the smoker reaches, unthinkingly, for a Marlboro.

Or take email. When a computer chimes or a smartphone vibrates with a new message, the brain starts anticipating the momentary distraction that opening an email provides. That expectation, if unsatisfied, can build until a meeting is filled with antsy executives checking their buzzing BlackBerrys under the table, even if they know it's probably only their latest fantasy football results. (On the other hand, if someone disables the buzzing—and, thus, removes the cue—people can work for hours without thinking to check their in-boxes.)



Scientists have studied the brains of alcoholics, smokers, and overeaters and have measured how their neurology—the structures of their brains and the flow of neurochemicals inside their skulls—changes as their cravings became ingrained. Particularly strong habits, wrote two researchers at the University of Michigan, produce addiction-like reactions so that “wanting evolves into obsessive craving” that can force our brains into autopilot, “even in the face of strong disincentives, including loss of reputation, job, home, and family.”

However, these cravings don't have complete authority over us. As the next chapter explains, there are mechanisms that can help us ignore the temptations. But to overpower the habit, we must recognize which craving is driving the behavior. If we're not conscious of

the anticipation, then we're like the shoppers who wander, as if drawn by an unseen force, into Cinnabon.

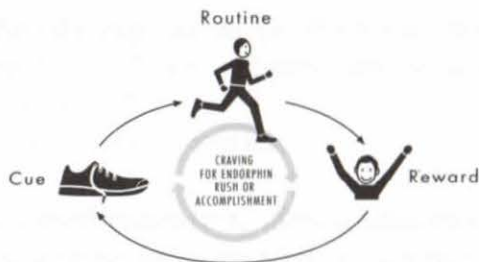
...

To understand the power of cravings in creating habits, consider how exercise habits emerge. In 2002 researchers at New Mexico State University wanted to understand why people habitually exercise. They studied 266 individuals, most of whom worked out at least three times a week. What they found was that many of them had started running or lifting weights almost on a whim, or because they suddenly had free time or wanted to deal with unexpected stresses in their lives. However, the reason they *continued*—why it became a habit—was because of a specific reward they started to crave.

In one group, 92 percent of people said they habitually exercised because it made them “feel good”—they grew to expect and crave the endorphins and other neurochemicals a workout provided. In another group, 67 percent of people said that working out gave them a sense of “accomplishment”—they had come to crave a regular sense of triumph from tracking their performances, and that self-reward was enough to make the physical activity into a habit.

If you want to start running each morning, it's essential that you choose a simple cue (like always lacing up your sneakers before breakfast or leaving your running clothes next to your bed) and a clear reward (such as a midday treat, a sense of accomplishment from recording your miles, or the endorphin rush you get from a jog). But countless studies have shown that a cue and a reward, on their own, aren't enough for a new habit to last. Only when your brain starts *expecting* the reward—craving the endorphins or sense of accomplishment—will it become automatic to lace up your jogging shoes each morning. The cue, in addition to triggering a routine, must also trigger a craving for the reward to come.

“Let me ask you about a problem I have,” I said to Wolfram Schultz,



the neuroscientist, after he explained to me how craving emerges. “I have a two-year-old, and when I’m home feeding him dinner—chicken nuggets and stuff like that—I’ll reach over and eat one myself without thinking about it. It’s a habit. And now I’m gaining weight.”

“Everybody does that,” Schultz said. He has three children of his own, all adults now. When they were young, he would pick at their dinners unthinkingly. “In some ways,” he told me, “we’re like the monkeys. When we see the chicken or fries on the table, our brains begin anticipating that food, even if we’re not hungry. Our brains are craving them. Frankly, I don’t even *like* this kind of food, but suddenly, it’s hard to fight this urge. And as soon as I eat it, I feel this rush of pleasure as the craving is satisfied. It’s humiliating, but that’s how habits work.”

“I guess I should be thankful,” he said, “because the same process has let me create good habits. I work hard because I expect pride from a discovery. I exercise because I expect feeling good afterward. I just wish I could pick and choose better.”

#### IV.

After their disastrous interview with the cat woman, Drake Stimson’s team at P&G started looking outside the usual channels for help. They began reading up on experiments such as those conducted by Wolfram Schultz. They asked a Harvard Business School professor to conduct psychological tests of Febreze’s ad campaigns. They interviewed customer after customer, looking for something that would give them a clue how to make Febreze a regular part of consumers’ lives.

One day, they went to speak with a woman in a suburb near Scottsdale. She was in her forties with four kids. Her house was clean, but not compulsively tidy. To the surprise of the researchers, she loved Febreze.

“I use it every day,” she told them.

“You do?” Stimson said. The house didn’t seem like the kind of place with smelly problems. There weren’t any pets. No one smoked. “How? What smells are you trying to get rid of?”

“I don’t really use it for specific smells,” the woman said. “I mean, you know, I’ve got boys. They’re going through puberty, and if I don’t clean their rooms, it smells like a locker. But I don’t really use it that way. I use it for normal cleaning—a couple of sprays when I’m done in a room. It’s a nice way to make everything smell good as a final touch.”

They asked if they could watch her clean the house. In the bedroom, she made her bed, plumped the pillows, tightened the sheet’s corners, and then took a Febreze bottle and sprayed the smoothed comforter. In the living room, she vacuumed, picked up the kids’ shoes, straightened the coffee table, and sprayed Febreze on the freshly cleaned carpet. “It’s nice, you know?” she said. “Spraying feels like a little mini-celebration when I’m done with a room.” At the rate she was using Febreze, Stimson estimated, she would empty a bottle every two weeks.

P&G had collected thousands of hours of videotapes of people cleaning their homes over the years. When the researchers got back to Cincinnati, some of them spent an evening looking through the tapes. The next morning, one of the scientists asked the Febreze team to join him in the conference room. He cued up the tape of one woman—a twenty-six-year-old with three children—making a bed. She smoothed the sheets and adjusted a pillow. Then, she smiled and left the room.

“Did you see that?” the researcher asked excitedly.

He put on another clip. A younger, brunette woman spread out a

colorful bedspread, straightened a pillow, and then smiled at her handiwork. "There it is again!" the researcher said. The next clip showed a woman in workout clothes tidying her kitchen and wiping the counter before easing into a relaxing stretch.

The researcher looked at his colleagues.

"Do you see it?" he asked.

"Each of them is doing something relaxing or happy when they finish cleaning," he said. "We can build off that! What if Febreze was something that happened at the *end* of the cleaning routine, rather than the beginning? What if it was the fun part of making something cleaner?"

Stimson's team ran one more test. Previously, the product's advertising had focused on eliminating bad smells. The company printed up new labels that showed open windows and gusts of fresh air. More perfume was added to the recipe, so that instead of merely neutralizing odors, Febreze had its own distinct scent. Television commercials were filmed of women spraying freshly made beds and spritzing just-laundered clothing. The tagline had been "Gets bad smells out of fabrics." It was rewritten as "Cleans life's smells."

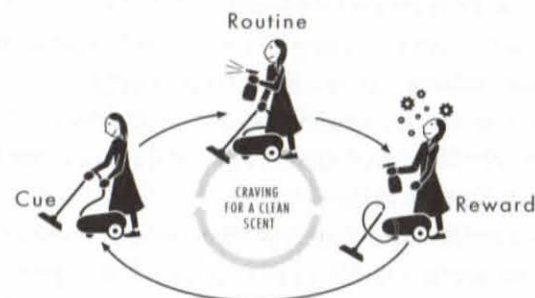
Each change was designed to appeal to a specific, daily cue: Cleaning a room. Making a bed. Vacuuming a rug. In each one, Febreze was positioned as the reward: the nice smell that occurs at the end of a cleaning routine. Most important, each ad was calibrated to elicit a craving: that things will smell as nice as they look when the cleaning ritual is done. The irony is that a product manufactured to destroy odors was transformed into the opposite. Instead of eliminating scents on dirty fabrics, it became an air freshener used as the finishing touch, once things are already clean.

When the researchers went back into consumers' homes after the new ads aired and the redesigned bottles were given away, they found that some housewives in the test market had started expecting—craving—the Febreze scent. One woman said that when her bottle ran dry, she squirted diluted perfume on her laundry. "If

I don't smell something nice at the end, it doesn't really seem clean now," she told them.

"The park ranger with the skunk problem sent us in the wrong direction," Stimson told me. "She made us think that Febreze would succeed by providing a solution to a problem. But who wants to admit their house stinks?"

"We were looking at it all wrong. No one craves scentlessness. On the other hand, lots of people crave a nice smell after they've spent thirty minutes cleaning."



THE FEBREZE HABIT LOOP

The Febreze relaunch took place in the summer of 1998. Within two months, sales doubled. Within a year, customers had spent more than \$230 million on the product. Since then, Febreze has spawned dozens of spin-offs—air fresheners, candles, laundry detergents, and kitchen sprays—that, all told, now account for sales of more than \$1 billion per year. Eventually, P&G began mentioning to customers that, in addition to smelling good, Febreze can also kill bad odors.

Stimson was promoted and his team received their bonuses. The formula had worked. They had found simple and obvious cues. They had clearly defined the reward.

But only once they created a sense of craving—the desire to make everything smell as nice as it looked—did Febreze become a hit. That craving is an essential part of the formula for creating new habits that Claude Hopkins, the Pepsodent ad man, never recognized.

## V.

In his final years of life, Hopkins took to the lecture circuit. His talks on the "Laws of Scientific Advertising" attracted thousands of people. From stages, he often compared himself to Thomas Edison and George Washington and spun out wild forecasts about the future (flying automobiles featured prominently). But he never mentioned cravings or the neurological roots of the habit loop. After all, it would be another seventy years before the MIT scientists and Wolfram Schultz conducted their experiments.

So how did Hopkins manage to build such a powerful tooth-brushing habit without the benefit of those insights?

Well, it turns out that he actually *did* take advantage of the principles eventually discovered at MIT and inside Schultz's laboratory, even if nobody knew it at the time.

Hopkins's experiences with Pepsodent weren't quite as straightforward as he portrays them in his memoirs. Though he boasted that he discovered an amazing cue in tooth film, and bragged that he was the first to offer consumers the clear reward of beautiful teeth, it turns out that Hopkins wasn't the originator of those tactics. Not by a long shot. Consider, for instance, some of the advertisements for other toothpastes that filled magazines and newspapers even before Hopkins knew that Pepsodent existed.

"The ingredients of this preparation are especially intended to prevent deposits of *tartar* from accumulating around the necks of the teeth," read an ad for Dr. Sheffield's Crème Dentifrice that predated Pepsodent. "Clean that dirty layer!"

"Your white enamel is only *hidden* by a coating of film," read an advertisement that appeared while Hopkins was looking through his dental textbooks. "Sanitol Tooth Paste quickly restores the original whiteness by removing film."

"The charm of a lovely smile depends upon the beauty of your teeth," proclaimed a third ad. "Beautiful, satin smooth teeth are

often the secret of a pretty girl's attractiveness. Use S.S. White Toothpaste!"

Dozens of other advertising men had used the same language as Pepsodent years before Hopkins jumped in the game. All of their ads had promised to remove tooth film and had offered the reward of beautiful, white teeth. None of them had worked.

But once Hopkins launched his campaign, sales of Pepsodent exploded. Why was Pepsodent different?

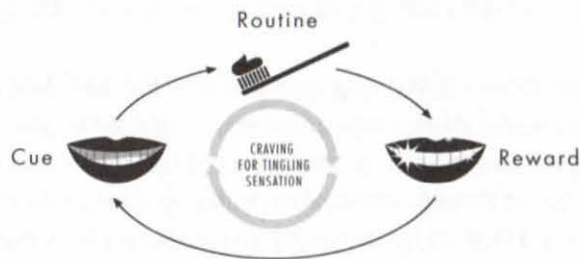
Because Hopkins's success was driven by the same factors that caused Julio the monkey to touch the lever and housewives to spray Febreze on freshly made beds. Pepsodent created a craving.

Hopkins doesn't spend any of his autobiography discussing the ingredients in Pepsodent, but the recipe listed on the toothpaste's patent application and company records reveals something interesting: Unlike other pastes of the period, Pepsodent contained citric acid, as well as doses of mint oil and other chemicals. Pepsodent's inventor used those ingredients to make the toothpaste taste fresh, but they had another, unanticipated effect as well. They're irritants that create a cool, tingling sensation on the tongue and gums.

After Pepsodent started dominating the marketplace, researchers at competing companies scrambled to figure out why. What they found was that customers said that if they forgot to use Pepsodent, they realized their mistake because they missed that cool, tingling sensation in their mouths. They expected—they *craved*—that slight irritation. If it wasn't there, their mouths didn't feel clean.

Claude Hopkins wasn't selling beautiful teeth. He was selling a sensation. Once people craved that cool tingling—once they equated it with cleanliness—brushing became a habit.

When other companies discovered what Hopkins was really selling, they started imitating him. Within a few decades, almost every toothpaste contained oils and chemicals that caused gums to tingle. Soon, Pepsodent started getting outsold. Even today, almost all



THE REAL PEPSODENT HABIT LOOP

toothpastes contain additives with the sole job of making your mouth tingle after you brush.

“Consumers need some kind of signal that a product is working,” Tracy Sinclair, who was a brand manager for Oral-B and Crest Kids Toothpaste, told me. “We can make toothpaste taste like anything—blueberries, green tea—and as long as it has a cool tingle, people feel like their mouth is clean. The tingling doesn’t make the toothpaste work any better. It just convinces people it’s doing the job.”

Anyone can use this basic formula to create habits of her or his own. Want to exercise more? Choose a cue, such as going to the gym as soon as you wake up, and a reward, such as a smoothie after each workout. Then think about that smoothie, or about the endorphin rush you’ll feel. Allow yourself to anticipate the reward. Eventually, that craving will make it easier to push through the gym doors every day.

Want to craft a new eating habit? When researchers affiliated with the National Weight Control Registry—a project involving more than six thousand people who have lost more than thirty pounds—looked at the habits of successful dieters, they found that 78 percent of them ate breakfast every morning, a meal cued by a time of day. But most of the successful dieters *also* envisioned a specific reward for sticking with their diet—a bikini they wanted to wear or the sense of pride they felt when they stepped on the scale each day—something they chose carefully and really wanted. They focused on the craving for that reward when temptations arose, cul-

tivated the craving into a mild obsession. And their cravings for that reward, researchers found, crowded out the temptation to drop the diet. The craving drove the habit loop.

For companies, understanding the science of cravings is revolutionary. There are dozens of daily rituals we *ought* to perform each day that never become habits. We should watch our salt and drink more water. We should eat more vegetables and fewer fats. We should take vitamins and apply sunscreen. The facts could not be more clear on this last front: Dabbing a bit of sunscreen on your face each morning significantly lowers the odds of skin cancer. Yet, while everyone brushes their teeth, fewer than 10 percent of Americans apply sunscreen each day. Why?

Because there’s no craving that has made sunscreen into a daily habit. Some companies are trying to fix that by giving sunscreens a tingling sensation or something that lets people know they’ve applied it to their skin. They’re hoping it will cue an expectation the same way the craving for a tingling mouth reminds us to brush our teeth. They’ve already used similar tactics in hundreds of other products.

“Foaming is a huge reward,” said Sinclair, the brand manager. “Shampoo doesn’t have to foam, but we add foaming chemicals because people expect it each time they wash their hair. Same thing with laundry detergent. And toothpaste—now every company adds sodium laureth sulfate to make toothpaste foam more. There’s no cleaning benefit, but people feel better when there’s a bunch of suds around their mouth. Once the customer starts expecting that foam, the habit starts growing.”

Cravings are what drive habits. And figuring out how to spark a craving makes creating a new habit easier. It’s as true now as it was almost a century ago. Every night, millions of people scrub their teeth in order to get a tingling feeling; every morning, millions put on their jogging shoes to capture an endorphin rush they’ve learned to crave.

And when they get home, after they clean the kitchen or tidy their bedrooms, some of them will spray a bit of Febreze.

## 3

## THE GOLDEN RULE OF HABIT CHANGE

## Why Transformation Occurs

## 1.

The game clock at the far end of the field says there are eight minutes and nineteen seconds left when Tony Dungy, the new head coach of the Tampa Bay Buccaneers—one of the worst teams in the National Football League, not to mention the history of professional football—starts to feel a tiny glimmer of hope.

It's late on a Sunday afternoon, November 17, 1996. The Buccaneers are playing in San Diego against the Chargers, a team that appeared in the Super Bowl the previous year. The Bucs are losing, 17 to 16. They've been losing all game. They've been losing all season. They've been losing all decade. The Buccaneers have not won a game on the West Coast in sixteen years, and many of the team's current players were in grade school the last time the Bucs had a victorious season. So far this year, their record is 2–8. In one of those games, the Detroit Lions—a team so bad it would later be described as putting the “less” in “hopeless”—beat the Bucs 21 to 6, and then, three weeks later, beat them again, 27 to 0. One newspaper colum-

nist has started referring to the Bucs as “America's Orange Door-mat.” ESPN is predicting that Dungy, who got his job only in January, could be fired before the year is done.

On the sidelines, however, as Dungy watches his team arrange itself for the next play, it feels like the sun has finally broken through the clouds. He doesn't smile. He never lets his emotions show during a game. But something is taking place on the field, something he's been working toward for years. As the jeers from the hostile crowd of fifty thousand rain down upon him, Tony Dungy sees something that no one else does. He sees proof that his plan is starting to work.



Tony Dungy had waited an eternity for this job. For seventeen years, he prowled the sidelines as an assistant coach, first at the University of Minnesota, then with the Pittsburgh Steelers, then the Kansas City Chiefs, and then back to Minnesota with the Vikings. Four times in the past decade, he had been invited to interview for head coaching positions with NFL teams.

All four times, the interviews hadn't gone well.

Part of the problem was Dungy's coaching philosophy. In his job interviews, he would patiently explain his belief that the key to winning was changing players' habits. He wanted to get players to stop making so many decisions during a game, he said. He wanted them to react automatically, habitually. If he could instill the right habits, his team would win. Period.

“Champions don't do extraordinary things,” Dungy would explain. “They do ordinary things, but they do them without thinking, too fast for the other team to react. They follow the habits they've learned.”

How, the owners would ask, are you going to create those new habits?

andra Alter, and Jake Goldstein have been wonderful friends. My sons, Oliver and John Harry, have been sources of inspiration and sleeplessness. My parents, John and Doris, encouraged me from a young age to write, even as I was setting things on fire and giving them reason to figure that future correspondence might be on prison stationary.

And, of course, my wife, Liz, whose constant love, support, guidance, intelligence and friendship made this book possible.

—September, 2011

## A NOTE ON SOURCES

The reporting in this book is based on hundreds of interviews, and thousands more papers and studies. Many of those sources are detailed in the text itself or the notes, along with guides to additional resources for interested readers.

In most situations, individuals who provided major sources of information or who published research that was integral to reporting were provided with an opportunity—after reporting was complete—to review facts and offer additional comments, address discrepancies, or register issues with how information is portrayed. Many of those comments are reproduced in the notes. (No source was given access to the book's complete text—all comments are based on summaries provided to sources.)

In a very small number of cases, confidentiality was extended to sources who, for a variety of reasons, could not speak on a for-attribution basis. In a very tiny number of instances, some identifying characteristics have been withheld or slightly modified to conform with patient privacy laws or for other reasons.



## NOTES

### PROLOGUE

xii **So they measured subjects' vital signs** Reporting for Lisa Allen's story is based on interviews with Allen. This research study is ongoing and unpublished, and thus researchers were not available for interviews. Basic outcomes, however, were confirmed by studies and interviews with scientists working on similar projects, including A. DelParigi et al., "Successful Dieters Have Increased Neural Activity in Cortical Areas Involved in the Control of Behavior," *International Journal of Obesity* 31 (2007): 440-48; Duc Son NT Le et al., "Less Activation in the Left Dorsolateral Prefrontal Cortex in the Reanalysis of the Response to a Meal in Obese than in Lean Women and Its Association with Successful Weight Loss," *American Journal of Clinical Nutrition* 86, no. 3 (2007): 573-79; A. DelParigi et al., "Persistence of Abnormal Neural Responses to a Meal in Postobese Individuals," *International Journal of Obesity* 28 (2004): 370-77; E. Stice et al., "Relation of Reward from Food Intake and Anticipated Food Intake to Obesity: A Functional Magnetic Resonance Imaging Study," *Journal of Abnormal Psychology* 117, no. 4 (November 2008): 924-35; A. C. Janes et al., "Brain fMRI Reactivity to Smoking-Related Images Before and During Extended Smoking Abstinence," *Experimental and Clinical Psychopharmacology* 17 (December 2009): 365-73; D. McBride et al., "Effects of Expectancy and Abstinence on the Neural Response to Smoking Cues in Cigarette Smokers: An fMRI Study," *Neuropsychopharmacology* 31 (Decem-

ber 2006): 2728–38; R. Sinha and C. S. Li, “Imaging Stress- and Cue-Induced Drug and Alcohol Craving: Association with Relapse and Clinical Implications,” *Drug and Alcohol Review* 26, no. 1 (January 2007): 25–31; E. Tricomi, B. W. Balleine, and J. P. O’Doherty, “A Specific Role for Posterior Dorsolateral Striatum in Human Habit Learning,” *European Journal of Neuroscience* 29, no. 11 (June 2009): 2225–32; D. Knoch, P. Bugger, and M. Regard, “Suppressing Versus Releasing a Habit: Frequency-Dependent Effects of Prefrontal Transcranial Magnetic Stimulation,” *Cerebral Cortex* 15, no. 7 (July 2005): 885–87.

**xv “All our life, so far as it has”** William James, *Talks to Teachers on Psychology and to Students on Some of Life’s Ideals*, originally published in 1899.

**xvi One paper published** Bas Verplanken and Wendy Wood, “Interventions to Break and Create Consumer Habits,” *Journal of Public Policy and Marketing* 25, no. 1 (2006): 90–103; David T. Neal, Wendy Wood, and Jeffrey M. Quinn, “Habits—A Repeat Performance,” *Current Directions in Psychological Science* 15, no. 4 (2006): 198–202.

**xvii The U.S. military, it occurred to me** For my understanding of the fascinating topic of the military’s use of habit training, I am indebted to Dr. Peter Schifferle at the School of Advanced Military Studies, Dr. James Lussier, and the many commanders and soldiers who were generous with their time both in Iraq and at SAMS. For more on this topic, see Scott B. Shadrack and James W. Lussier, “Assessment of the Think Like a Commander Training Program,” U.S. Army Research Institute for the Behavioral and Social Sciences Research Report 1824, July 2004; Scott B. Shadrack et al., “Positive Transfer of Adaptive Battlefield Thinking Skills,” U.S. Army Research Institute for the Behavioral and Social Sciences Research Report 1873, July 2007; Thomas J. Carnahan et al., “Novice Versus Expert Command Groups: Preliminary Findings and Training Implications for Future Combat Systems,” U.S. Army Research Institute for the Behavioral and Social Sciences Research Report 1821, March 2004; Carl W. Lickteig et al., “Human Performance Essential to Battle Command: Report on Four Future Combat Systems Command and Control Experiments,” U.S. Army Research Institute for the Behavioral and Social Sciences Research Report 1812, November 2003; and Army Field Manual 5–2 20, February 2009.

## CHAPTER ONE

**3 six feet tall** Lisa Stefanacci et al., “Profound Amnesia After Damage to the Medial Temporal Lobe: A Neuroanatomical and Neuropsychological Profile of Patient E.P.,” *Journal of Neuroscience* 20, no. 18 (2000): 7024–36.

**3 “Who’s Michael?”** I am indebted to the Pauly and Rayes families, as well as the Squire laboratory and coverage such as Joshua Foer, “Remember This,”

*National Geographic*, November 2007, 32–57; “Don’t Forget,” *Scientific American Frontiers*, television program, produced by Chedd-Angier Production Company, PBS, episode first aired May 11, 2004, hosted by Alan Alda; “Solved: Two Controversial Brain Teasers,” *Bioworld Today*, August 1999; David E. Graham, “UCSD Scientist Unlocks Working of Human Memory,” *The San Diego Union-Tribune*, August 12, 1999.

**4 The sample from Eugene’s spine** Richard J. Whitley and David W. Kimberlan, “Viral Encephalitis,” *Pediatrics in Review* 20, no. 6 (1999): 192–98.

**7 was seven years old** Some published papers say that H.M. was injured at age nine; others say seven.

**7 he was hit by a bicycle** Previous research indicates that H.M. was hit by a bicycle. New documents, as yet unpublished, indicate he may have fallen off a bike.

**7 landed hard on his head** Luke Dittrich, “The Brain That Changed Everything,” *Esquire*, October 2010.

**7 He was smart** Eric Hargreaves, “H.M.,” *Page O’Neuroplasticity*, <http://homepages.nyu.edu/>.

**7 When the doctor proposed cutting** Benedict Carey, “H. M., Whose Loss of Memory Made Him Unforgettable, Dies,” *The New York Times*, December 5, 2008.

**7 with a small straw** This was a common practice at the time.

**8 He introduced himself to his doctors** Dittrich, “The Brain That Changed Everything”; Larry R. Squire, “Memory and Brain Systems: 1969–2009,” *Journal of Neuroscience* 29, no. 41 (2009): 12711–26; Larry R. Squire, “The Legacy of Patient H.M. for Neuroscience,” *Neuron* 61, no. 1 (2009): 6–9.

**10 transformed our understanding of habits’ power** Jonathan M. Reed et al., “Learning About Categories That Are Defined by Object-Like Stimuli Despite Impaired Declarative Memory,” *Behavioral Neuroscience* 113 (1999): 411–19; B. J. Knowlton, J. A. Mangels, and L. R. Squire, “A Neostriatal Habit Learning System in Humans,” *Science* 273 (1996): 1399–1402; P. J. Bayley, J. C. Fraschino, and L. R. Squire, “Robust Habit Learning in the Absence of Awareness and Independent of the Medial Temporal Lobe,” *Nature* 436 (2005): 550–53.

**13 a golf ball-sized** B. Bendriem et al., “Quantitation of the Human Basal Ganglia with Positron Emission Tomography: A Phantom Study of the Effect of Contrast and Axial Positioning,” *IEEE Transactions on Medical Imaging* 10, no. 2 (1991): 216–22.

**14 an oval of cells** G. E. Alexander and M. D. Crutcher, “Functional Architecture of Basal Ganglia Circuits: Neural Substrates of Parallel Processing,” *Trends in Neurosciences* 13 (1990): 266–71; André Parent and Lili-Naz Hazrati, “Func-

tional Anatomy of the Basal Ganglia," *Brain Research Reviews* 20 (1995): 91–127; Roger L. Albin, Anne B. Young, and John B. Penney, "The Functional Anatomy of Basal Ganglia Disorders," *Trends in Neurosciences* 12 (1989): 366–75.

**14 diseases such as Parkinson's** Alain Dagher and T. W. Robbins, "Personality, Addiction, Dopamine: Insights from Parkinson's Disease," *Neuron* 61 (2009): 502–10.

**14 to open food containers** I am indebted to the following sources for expanding my understanding of the work at the MIT labs, the basal ganglia, and its role in habits and memory: F. Gregory Ashby and John M. Ennis, "The Role of the Basal Ganglia in Category Learning," *Psychology of Learning and Motivation* 46 (2006): 1–36; F. G. Ashby, B. O. Turner, and J. C. Horvitz, "Cortical and Basal Ganglia Contributions to Habit Learning and Automaticity," *Trends in Cognitive Sciences* 14 (2010): 208–15; C. Da Cunha and M. G. Packard, "Preface: Special Issue on the Role of the Basal Ganglia in Learning and Memory," *Behavioural Brain Research* 199 (2009): 1–2; C. Da Cunha et al., "Learning Processing in the Basal Ganglia: A Mosaic of Broken Mirrors," *Behavioural Brain Research* 199 (2009): 157–70; M. Desmurget and R. S. Turner, "Motor Sequences and the Basal Ganglia: Kinematics, Not Habits," *Journal of Neuroscience* 30 (2010): 7685–90; J. J. Ebberts and N. M. Wijnberg, "Organizational Memory: From Expectations Memory to Procedural Memory," *British Journal of Management* 20 (2009): 478–90; J. A. Grahn, J. A. Parkinson, and A. M. Owen, "The Role of the Basal Ganglia in Learning and Memory: Neuropsychological Studies," *Behavioural Brain Research* 199 (2009): 53–60; Ann M. Graybiel, "The Basal Ganglia: Learning New Tricks and Loving It," *Current Opinion in Neurobiology* 15 (2005): 638–44; Ann M. Graybiel, "The Basal Ganglia and Chunking of Action Repertoires," *Neurobiology of Learning and Memory* 70, nos. 1–2 (1998): 119–36; F. Gregory Ashby and V. Valentin, "Multiple Systems of Perceptual Category Learning: Theory and Cognitive Tests," in *Handbook of Categorization in Cognitive Science*, ed. Henri Cohen and Claire Lefebvre (Oxford: Elsevier Science, 2005); S. N. Haber and M. Johnson Gdowski, "The Basal Ganglia," in *The Human Nervous System*, 2nd ed., ed. George Paxinos and Jürgen K. Mai (San Diego: Academic Press, 2004), 676–738; T. D. Barnes et al., "Activity of Striatal Neurons Reflects Dynamic Encoding and Recoding of Procedural Memories," *Nature* 437 (2005): 1158–61; M. Laubach, "Who's on First? What's on Second? The Time Course of Learning in Corticostriatal Systems," *Trends in Neurosciences* 28 (2005): 509–11; E. K. Miller and T. J. Buschman, "Bootstrapping Your Brain: How Interactions Between the Frontal Cortex and Basal Ganglia May Produce Organized Actions and Lofty Thoughts," in *Neurobiology of Learning and Memory*, 2nd ed., ed. Raymond P. Kesner and Joe L. Martinez (Burlington, Vt.: Academic Press, 2007), 339–54; M. G. Packard, "Role of Basal Ganglia in Habit Learning and Memory: Rats, Monkeys, and

Humans," in *Handbook of Behavioral Neuroscience*, ed. Heinz Steiner and Kuei Y. Tseng, 561–69; D. P. Salmon and N. Butters, "Neurobiology of Skill and Habit Learning," *Current Opinion in Neurobiology* 5 (1995): 184–90; D. Shohamy et al., "Role of the Basal Ganglia in Category Learning: How Do Patients with Parkinson's Disease Learn?" *Behavioral Neuroscience* 118 (2004): 676–86; M. T. Ullman, "Is Broca's Area Part of a Basal Ganglia Thalamocortical Circuit?" *Cortex* 42 (2006): 480–85; N. M. White, "Mnemonic Functions of the Basal Ganglia," *Current Opinion in Neurobiology* 7 (1997): 164–69.

**14 The maze was structured** Ann M. Graybiel, "Overview at Habits, Rituals, and the Evaluative Brain," *Annual Review of Neuroscience* 31 (2008): 359–87; T. D. Barnes et al., "Activity of Striatal Neurons Reflects Dynamic Encoding and Recoding of Procedural Memories," *Nature* 437 (2005): 1158–61; Ann M. Graybiel, "Network-Level Neuroplasticity in Cortico-Basal Ganglia Pathways," *Parkinsonism and Related Disorders* 10 (2004): 293–96; N. Fujii and Ann M. Graybiel, "Time-Varying Covariance of Neural Activities Recorded in Striatum and Frontal Cortex as Monkeys Perform Sequential-Saccade Tasks," *Proceedings of the National Academy of Sciences* 102 (2005): 9032–37.

**16 To see this capacity in action** The graphs in this chapter have been simplified to exhibit salient aspects. However, a full description of these studies can be found among Dr. Graybiel's papers and lectures.

**17 root of how habits form** Ann M. Graybiel, "The Basal Ganglia and Chunking of Action Repertoires," *Neurobiology of Learning and Memory* 70 (1998): 119–36.

**19 a habit is born** For more, see A. David Smith and J. Paul Bolam, "The Neural Network of the Basal Ganglia as Revealed by the Study of Synaptic Connections of Identified Neurones," *Trends in Neurosciences* 13 (1990): 259–65; John G. McHaffie et al., "Subcortical Loops Through the Basal Ganglia," *Trends in Neurosciences* 28 (2005): 401–7; Ann M. Graybiel, "Neurotransmitters and Neuromodulators in the Basal Ganglia," *Trends in Neurosciences* 13 (1990): 244–54; J. Yelnik, "Functional Anatomy of the Basal Ganglia," *Movement Disorders* 17 (2002): 15–21.

**20 The problem is that your brain** For more, see Catherine A. Thorn et al., "Differential Dynamics of Activity Changes in Dorsolateral and Dorsomedial Striatal Loops During Learning," *Neuron* 66 (2010): 781–95; Ann M. Graybiel, "The Basal Ganglia: Learning New Tricks and Loving It," *Current Opinion in Neurobiology* 15 (2005): 638–44.

**22 In each pairing, one piece** For more, see Peter J. Bayley, Jennifer C. Frascino, and Larry R. Squire, "Robust Habit Learning in the Absence of Awareness and Independent of the Medial Temporal Lobe," *Nature* 436 (2005): 550–53; J. M. Reed et al., "Learning About Categories That Are Defined by Object-Like

Stimuli Despite Impaired Declarative Memory," *Behavioral Neuroscience* 133 (1999): 411–19; B. J. Knowlton, J. A. Mangels, and L. R. Squire, "A Neostriatal Habit Learning System in Humans," *Science* 273 (1996): 1399–1402.

**24 Squire's experiments with Eugene** It is worth noting that Squire's work with Pauly is not limited to habits and has also provided insights into subjects such as spatial memory and the effects of priming on the brain. For a more complete discussion of discoveries made possible by Pauly, see Squire's home page at <http://psychiatry.ucsd.edu/faculty/squire.html>.

**26 The habit was so ingrained** For discussion, see Monica R. F. Hilario et al., "Endocannabinoid Signaling Is Critical for Habit Formation," *Frontiers in Integrative Neuroscience* 1 (2007): 6; Monica R. F. Hilario and Rui M. Costa, "High on Habits," *Frontiers in Neuroscience* 2 (2008): 208–17; A. Dickinson, "Appetitive-Aversive Interactions: Superconditioning of Fear by an Appetitive CS," *Quarterly Journal of Experimental Psychology* 29 (1977): 71–83; J. Lamarre and P. C. Holland, "Transfer of Inhibition After Serial Feature Negative Discrimination Training," *Learning and Motivation* 18 (1987): 319–42; P. C. Holland, "Differential Effects of Reinforcement of an Inhibitory Feature After Serial and Simultaneous Feature Negative Discrimination Training," *Journal of Experimental Psychology: Animal Behavior Processes* 10 (1984): 461–75.

**26 When researchers at the University of North Texas** Jennifer L. Harris, Marlene B. Schwartz, and Kelly D. Brownell, "Evaluating Fast Food Nutrition and Marketing to Youth," Yale Rudd Center for Food Policy and Obesity, 2010; H. Qin and V. R. Prybutok, "Determinants of Customer-Perceived Service Quality in Fast-Food Restaurants and Their Relationship to Customer Satisfaction and Behavioral Intentions," *The Quality Management Journal* 15 (2008): 35; H. Qin and V. R. Prybutok, "Service Quality, Customer Satisfaction, and Behavioral Intentions in Fast-Food Restaurants," *International Journal of Quality and Service Sciences* 1 (2009): 78. For more on this topic, see K. C. Berridge, "Brain Reward Systems for Food Incentives and Hedonics in Normal Appetite and Eating Disorders," in *Appetite and Body Weight*, ed. Tim C. Kirkham and Steven J. Cooper (Burlington, Vt.: Academic Press, 2007), 91–215; K. C. Berridge et al., "The Tempted Brain Eats: Pleasure and Desire Circuits in Obesity and Eating Disorders," *Brain Research* 1350 (2010): 43–64; J. M. Dave et al., "Relationship of Attitudes Toward Fast Food and Frequency of Fast-Food Intake in Adults," *Obesity* 17 (2009): 1164–70; S. A. French et al., "Fast Food Restaurant Use Among Adolescents: Associations with Nutrient Intake, Food Choices and Behavioral and Psychosocial Variables," *International Journal of Obesity and Related Metabolic Disorders* 25 (2001): 1823; N. Ressler, "Rewards and Punishments, Goal-Directed Behavior and Consciousness," *Neuroscience and Biobehavioral Reviews* 28 (2004): 27–39; T. J. Richards, "Fast Food, Addiction, and Market Power," *Journal of Agricultural and Resource*

*Economics* 32 (2007): 425–47; M. M. Torregrossa, J. J. Quinn, and J. R. Taylor, "Impulsivity, Compulsivity, and Habit: The Role of Orbitofrontal Cortex Revisited," *Biological Psychiatry* 63 (2008): 253–55; L. R. Vartanian, C. P. Herman, and B. Wansink, "Are We Aware of the External Factors That Influence Our Food Intake?" *Health Psychology* 27 (2008): 533–38; T. Yamamoto and T. Shimura, "Roles of Taste in Feeding and Reward," in *The Senses: A Comprehensive Reference*, ed. Allan I. Basbaum et al. (New York: Academic Press, 2008), 437–58; F. G. Ashby, B. O. Turner, and J. C. Horvitz, "Cortical and Basal Ganglia Contributions to Habit Learning and Automaticity," *Trends in Cognitive Sciences* 14 (2010): 208–15.

**27 All the better for tightening** K. C. Berridge and T. E. Robinson, "Parsing Reward," *Trends in Neurosciences* 26 (2003): 507–13; Kelly D. Brownell and Katherine Battle Horgen, *Food Fight: The Inside Story of the Food Industry, America's Obesity Crisis, and What We Can Do About It* (Chicago: Contemporary Books, 2004); Karl Weber, ed., *Food, Inc.: How Industrial Food Is Making Us Sicker, Fatter, and Poorer—and What You Can Do About It* (New York: Public Affairs, 2004); Ronald D. Michman and Edward M. Mazze, *The Food Industry Wars: Marketing Triumphs and Blunders* (Westport, Conn.: Quorum Books, 1998); M. Nestle, *Food Politics: How the Food Industry Influences Nutrition and Health* (Berkeley: University of California Press, 2002); D. R. Reed and A. Knaapila, "Genetics of Taste and Smell: Poisons and Pleasures," in *Progress in Molecular Biology and Translational Science*, ed. Claude Bouchard (New York: Academic Press); N. Ressler, "Rewards and Punishments, Goal-Directed Behavior and Consciousness," *Neuroscience and Biobehavioral Reviews* 28 (2004): 27–39; T. Yamamoto and T. Shimura, "Roles of Taste in Feeding and Reward," in *The Senses: A Comprehensive Reference*, ed. Allan I. Basbaum et al. (New York: Academic Press, 2008), 437–58.

## CHAPTER TWO

**31 Hopkins would consent to** For the history of Hopkins, Pepsodent, and dental care in the United States, I am indebted to Scott Swank, curator at the Dr. Samuel D. Harris National Museum of Dentistry; James L. Gutmann, DDS; and David A. Chemin, editor of the *Journal of the History of Dentistry*. In addition, I drew heavily on James Twitchell, *Twenty Ads That Shook the World* (New York: Three Rivers Press, 2000); the Dr. Samuel D. Harris National Museum of Dentistry; the *Journal of the History of Dentistry*; Mark E. Parry, "Crest Toothpaste: The Innovation Challenge," *Social Science Research Network*, October 2008; Robert Aunger, "Tooth Brushing as Routine Behavior," *International Dental Journal* 57 (2007): 364–76; Jean-Paul Claessen et al., "Designing Interventions to Improve Tooth Brushing," *International Dental Journal* 58 (2008):

307–20; Peter Miskell, "Cavity Protection or Cosmetic Perfection: Innovation and Marketing of Toothpaste Brands in the United States and Western Europe, 1955–1985," *Business History Review* 78 (2004): 29–60; James L. Gutmann, "The Evolution of America's Scientific Advancements in Dentistry in the Past 150 Years," *The Journal of the American Dental Association* 140 (2009): 8S–15S; Domenick T. Zero et al., "The Biology, Prevention, Diagnosis and Treatment of Dental Caries: Scientific Advances in the United States," *The Journal of the American Dental Association* 140 (2009): 25S–34S; Alyssa Picard, *Making of the American Mouth: Dentists and Public Health in the Twentieth Century* (New Brunswick, N.J.: Rutgers University Press, 2009); S. Fischman, "The History of Oral Hygiene Products: How Far Have We Come in 6,000 Years?" *Periodontology* 2000 15 (1997): 7–14; Vincent Vinikas, *Soft Soap, Hard Sell: American Hygiene in the Age of Advertisement* (Ames: University of Iowa Press, 1992).

**32 As the nation had become wealthier** H. A. Levenstein, *Revolution at the Table: The Transformation of the American Diet* (New York: Oxford University Press, 1988); Scott Swank, *Paradox of Plenty: The Social History of Eating in Modern America* (Berkeley: University of California Press, 2003).

**32 hardly anyone brushed their teeth** Alyssa Picard, *Making of the American Mouth: Dentists and Public Health in the Twentieth Century* (New Brunswick, N.J.: Rutgers University Press, 2009).

**33 everyone from Shirley Temple** For more on celebrity advertising of toothpaste, see Steve Craig, "The More They Listen, the More They Buy: Radio and the Modernizing of Rural America, 1930–1939," *Agricultural History* 80 (2006): 1–16.

**33 By 1930, Pepsodent was sold** Kerry Seagrave, *America Brushes Up: The Use and Marketing of Toothpaste and Toothbrushes in the Twentieth Century* (Jefferson, N.C.: McFarland, 2010); Alys Eve Weinbaum, et al., *The Modern Girl Around the World: Consumption, Modernity, and Globalization* (Durham, N.C.: Duke University Press, 2008), 28–30.

**33 A decade after the first** Scripps-Howard, *Market Records, from a Home Inventory Study of Buying Habits and Brand Preferences of Consumers in Sixteen Cities* (New York: Scripps-Howard Newspapers, 1938).

**34 The film is a naturally occurring membrane** C. McGaughey and E. C. Stowell, "The Adsorption of Human Salivary Proteins and Porcine Submaxillary Mucin by Hydroxyapatite," *Archives of Oral Biology* 12, no. 7 (1967): 815–28; Won-Kyu Park et al., "Influences of Animal Mucins on Lysozyme Activity in Solution and on Hydroxyapatite Surface," *Archives of Oral Biology* 51, no. 10 (2006): 861–69.

**34 particularly Pepsodent—were worthless** William J. Gies, "Experimental Studies of the Validity of Advertised Claims for Products of Public Importance

in Relation to Oral Hygiene or Dental Therapeutics," *Journal of Dental Research* 2 (September 1920): 511–29.

**35 Pepsodent removes the film!** I am indebted to the Duke University digital collection of advertisements.

**35 Pepsodent was one of the top-selling** Kerry Seagrave, *America Brushes Up: The Use and Marketing of Toothpaste and Toothbrushes in the Twentieth Century* (Jefferson, N.C.: McFarland, 2010); Jeffrey L. Cruikshank and Arthur W. Schultz, *The Man Who Sold America: The Amazing (but True!) Story of Albert D. Lasker and the Creation of the Advertising Century* (Cambridge, Mass.: Harvard Business Press, 2010), 268–81.

**35 best-selling toothpaste for more than** Pepsodent was eventually outsold by Crest, which featured fluoride—the first ingredient in toothpaste that actually made it effective at fighting cavities.

**35 A decade after Hopkins's ad campaign** Peter Miskell, "Cavity Protection or Cosmetic Perfection: Innovation and Marketing of Toothpaste Brands in the United States and Western Europe, 1955–1985," *Business History Review* 78 (2004): 29–60.

**36 Studies of people who have successfully** H. Aarts, T. Paulussen, and H. Schaalma, "Physical Exercise Habit: On the Conceptualization and Formation of Habitual Health Behaviours," *Health Education Research* 3 (1997): 363–74.

**36 Research on dieting says** Krystina A. Finlay, David Trafimow, and Aimee Villarreal, "Predicting Exercise and Health Behavioral Intentions: Attitudes, Subjective Norms, and Other Behavioral Determinants," *Journal of Applied Social Psychology* 32 (2002): 342–56.

**37 In the clothes-washing market alone** Tara Parker-Pope, "P&G Targets Textiles Tide Can't Clean," *The Wall Street Journal*, April 29, 1998.

**37 Its revenues topped \$35 billion** Peter Sander and John Slatter, *The 100 Best Stocks You Can Buy* (Avon, Mass.: Adams Business, 2009), 294.

**39 They decided to call it Febreze** The history of Febreze comes from interviews and articles, including "Procter & Gamble—Jager's Gamble," *The Economist*, October 28, 1999; Christine Bittar, "P&G's Monumental Repackaging Project," *Brandweek*, March 2000, 40–52; Jack Neff, "Does P&G Still Matter?" *Advertising Age* 71 (2000): 48–56; Roderick E. White and Ken Mark, "Procter & Gamble Canada: The Febreze Decision," Ivey School of Business, London, Ontario, 2001. Procter & Gamble was asked to comment on the reporting contained in this chapter, and in a statement said: "P&G is committed to ensuring the confidentiality of information shared with us by our consumers. Therefore, we are unable to confirm or correct information that you have received from sources outside of P&G."

- 41 **The second ad featured a woman** Christine Bittar, "Freshbreeze at P&G," *Brandweek*, October 1999.
- 41 **The cue: pet smells** American Veterinary Medical Association, market research statistics for 2001.
- 42 **So a new group of researchers joined** A. J. Lafley and Ram Charan, *The Game Changer: How You Can Drive Revenue and Profit Growth with Innovation* (New York: Crown Business, 2008).
- 44 **Rather than rats, however** An overview of Wolfram Schultz's research can be found in "Behavioral Theories and the Neurophysiology of Reward," *Annual Review of Psychology* 57 (2006): 87–115; Wolfram Schultz, Peter Dayan, and P. Read Montague, "A Neural Substrate of Prediction and Reward," *Science* 275 (1997): 1593–99; Wolfram Schultz, "Predictive Reward Signal of Dopamine Neurons," *Journal of Neurophysiology* 80 (1998): 1–27; L. Tremblay and Wolfram Schultz, "Relative Reward Preference in Primate Orbitofrontal Cortex," *Nature* 398 (1999): 704–8; Wolfram Schultz, "Getting Formal with Dopamine and Reward," *Neuron* 36 (2002): 241–63; W. Schultz, P. Apicella, and T. Ljungberg, "Responses of Monkey Dopamine Neurons to Reward and Conditioned Stimuli During Successive Steps of Learning a Delayed Response Task," *Journal of Neuroscience* 13 (1993): 900–913.
- 45 **he was experiencing happiness** It is important to note that Schultz does not claim that these spikes represent happiness. To a scientist, a spike in neural activity is just a spike, and assigning it subjective attributes is beyond the realm of provable results. In a fact-checking email, Schultz clarified: "We cannot talk about pleasure and happiness, as we don't know the feelings of an animal. . . . We try to avoid unsubstantiated claims and simply look at the facts." That said, as anyone who has ever seen a monkey, or a three-year-old human, receive some juice can attest, the result looks a lot like happiness.
- 47 **The anticipation and sense of craving** Schultz, in a fact-checking email, clarifies that his research focused not only on habits but on other behaviors as well: "Our data are not restricted to habits, which are one particular form of behavior. Rewards, and reward prediction errors, play a general role in all behaviors. Irrespective of habit or not, when we don't get what we expect, we feel disappointed. That we call a negative prediction error (the negative difference between what we get and what we expected)."
- 48 **Most food sellers locate their kiosks** Brian Wansink, *Mindless Eating: Why We Eat More Than We Think* (New York: Bantam, 2006); Sheila Sasser and David Moore, "Aroma-Driven Craving and Consumer Consumption Impulses," presentation, session 2.4, American Marketing Association Summer Educator Conference, San Diego, California, August 8–11, 2008; David Fields, "In Sales, Nothing You Say Matters," Ascendant Consulting, 2005.

- 48 **The habit loop is spinning because** Harold E. Doweiko, *Concepts of Chemical Dependency* (Belmont, Calif.: Brooks Cole, 2008), 362–82.
- 49 **how new habits are created** K. C. Berridge and M. L. Kringelbach, "Affective Neuroscience of Pleasure: Reward in Humans and Animals," *Psychopharmacology* 199 (2008): 457–80; Wolfram Schultz, "Behavioral Theories and the Neurophysiology of Reward," *Annual Review of Psychology* 57 (2006): 87–115.
- 50 **wanting evolves into obsessive craving** T. E. Robinson and K. C. Berridge, "The Neural Basis of Drug Craving: An Incentive-Sensitization Theory of Addiction," *Brain Research Reviews* 18 (1993): 247–91.
- 51 **In 2002 researchers at New Mexico** Krystina A. Finlay, David Trafimow, and Aimee Villarreal, "Predicting Exercise and Health Behavioral Intentions: Attitudes, Subjective Norms, and Other Behavioral Determinants," *Journal of Applied Social Psychology* 32 (2002): 342–56.
- 51 **The cue, in addition to triggering** Henk Aarts, Theo Paulussen, and Herman Schaalma, "Physical Exercise Habit: On the Conceptualization and Formation of Habitual Health Behaviours," *Health Education Research* 12 (1997): 363–74.
- 55 **Within a year, customers had spent** Christine Bittar, "Freshbreeze at P&G," *Brandweek*, October 1999.
- 57 **Unlike other pastes** Patent 1,619,067, assigned to Rudolph A. Kuever.
- 58 **Want to craft a new eating** J. Brug, E. de Vet, J. de Nooijer, and B. Verplanken, "Predicting Fruit Consumption: Cognitions, Intention, and Habits," *Journal of Nutrition Education and Behavior* 38 (2006): 73–81.
- 59 **The craving drove the habit** For a full inventory of studies from the National Weight Control Registry, see <http://www.nwcr.ws/Research/published%20research.htm>.
- 59 **Yet, while everyone brushes** D. I. McLean and R. Gallagher, "Sunscreens: Use and Misuse," *Dermatologic Clinics* 16 (1998): 219–26.

## CHAPTER THREE

- 60 **The game clock at the far end** I am indebted to the time and writings of Tony Dungy and Nathan Whitacker, including *Quiet Strength: The Principles, Practices, and Priorities of a Winning Life* (Carol Stream, Ill.: Tyndale House, 2008); *The Mentor Leader: Secrets to Building People and Teams That Win Consistently* (Carol Stream, Ill.: Tyndale House, 2010); *Uncommon: Finding Your Path to Significance* (Carol Stream, Ill.: Tyndale House, 2011). I also owe a debt to Jene Bramel of Footballguys.com; Matthew Bowen of National Football Post and the St. Louis Rams, Green Bay Packers, Washington Redskins, and Buf-

falo Bills; Tim Layden of *Sports Illustrated* and his book *Blood, Sweat, and Chalk: The Ultimate Football Playbook: How the Great Coaches Built Today's Teams* (New York: Sports Illustrated, 2010); Pat Kirwan, *Take Your Eye Off the Ball: How to Watch Football by Knowing Where to Look* (Chicago: Triumph Books, 2010); Nunyo Demasio, "The Quiet Leader," *Sports Illustrated*, February 2007; Bill Plaschke, "Color Him Orange," *Los Angeles Times*, September 1, 1996; Chris Harry, "'Pups' Get to Bark for the Bucs," *Orlando Sentinel*, September 5, 2001; Jeff Legwold, "Coaches Find Defense in Demand," *Rocky Mountain News*, November 11, 2005; and Martin Fennelly, "Quiet Man Takes Charge with Bucs," *The Tampa Tribune*, August 9, 1996.

**60 It's late on a Sunday** I am indebted to Fox Sports for providing game tapes, and to Kevin Kernan, "The Bucks Stomp Here," *The San Diego Union-Tribune*, November 18, 1996; Jim Trotter, "Harper Says He's Done for Season," *The San Diego Union-Tribune*, November 18, 1996; Les East, "Still Worth the Wait," *The Advocate* (Baton Rouge, La.), November 21, 1996.

**60 described as putting the "less" in "hopeless"** Mitch Albom, "The Courage of Detroit," *Sports Illustrated*, September 22, 2009.

**61 "America's Orange Doormat"** Pat Yasinskas, "Behind the Scenes," *The Tampa Tribune*, November 19, 1996.

**62 He knew from experience** In a fact-checking letter, Dungy emphasized that these were not new strategies, but instead were approaches "I had learned from working with the Steelers in the seventies and eighties. What was unique, and what I think spread, was the idea of how to get those ideas across. . . . [My plan was] not overwhelming opponents with strategy or abundance of plays and formations but winning with execution. Being very sure of what we were doing and doing it well. Minimize the mistakes we would make. Playing with speed because we were not focusing on too many things."

**64 When his strategy works** For more on the Tampa 2 defense, see Rick Gosselin, "The Evolution of the Cover Two," *The Dallas Morning News*, November 3, 2005; Mohammed Alo, "Tampa 2 Defense," *The Football Times*, July 4, 2006; Chris Harry, "Duck and Cover," *Orlando Sentinel*, August 26, 2005; Jason Wilde, "What to Do with Tampa-2?" *Wisconsin State Journal*, September 22, 2005; Jim Thomas, "Rams Take a Run at Tampa 2," *St. Louis Post-Dispatch*, October 16, 2005; Alan Schmadtke, "Dungy's 'D' No Secret," *Orlando Sentinel*, September 6, 2006; Jene Bramel, "Guide to NFL Defenses," *The Fifth Down* (blog), *The New York Times*, September 6, 2010.

**66 Sitting in the basement** William L. White, *Slaying the Dragon* (Bloomington, Ill.: Lighthouse Training Institute, 1998).

**66 named Bill Wilson** Alcoholics Anonymous World Service, *The A.A. Service Manual Combined with Twelve Concepts for World Service* (New York: Alco-

holics Anonymous, 2005); Alcoholics Anonymous World Service, *Alcoholics Anonymous: The Story of How Many Thousands of Men and Women Have Recovered from Alcoholism* (New York: Alcoholics Anonymous, 2001); Alcoholics Anonymous World Service, *Alcoholics Anonymous Comes of Age: A Brief History of A.A.* (New York: Alcoholics Anonymous, 1957); Alcoholics Anonymous World Service, *As Bill Sees It* (New York: Alcoholics Anonymous, 1967); Bill W., *Bill W.: My First 40 Years—An Autobiography by the Cofounder of Alcoholics Anonymous* (Hazelden Center City, Minn.: Hazelden Publishing, 2000); Francis Hartigan, *Bill W.: A Biography of Alcoholics Anonymous Cofounder Bill Wilson* (New York: Thomas Dunne Books, 2009).

**67 He took a sip and felt** Susan Cheever, *My Name Is Bill: Bill Wilson—His Life and the Creation of Alcoholics Anonymous* (New York: Simon and Schuster, 2004).

**67 Wilson invited him over** Ibid.

**68 At that moment, he later wrote** Ernest Kurtz, *Not-God: A History of Alcoholics Anonymous* (Hazelden Center City, Minn.: Hazelden Publishing, 1991).

**68 An estimated 2.1 million people** Data provided by AA General Service Office Staff, based on 2009 figures.

**68 as many as 10 million alcoholics** Getting firm figures on AA's membership or those who have achieved sobriety through the program is notoriously difficult, in part because membership is anonymous and in part because there is no requirement to register with a central authority. However, the 10 million person figure, based on conversations with AA researchers, seems reasonable (if unverifiable) given the program's long history.

**68 What's interesting about AA** In psychology, this kind of treatment—targeting habits—is often referred to under the umbrella term of "cognitive behavioral therapy," or in an earlier era, "relapse prevention." CBT, as it is generally used within the treatment community, often incorporates five basic techniques: (1) Learning, in which the therapist explains the illness to the patient and teaches the patient to identify the symptoms; (2) Monitoring, in which the patient uses a diary to monitor the behavior and the situations triggering it; (3) Competing response, in which the patient cultivates new routines, such as relaxation methods, to offset the problematic behavior; (4) Rethinking, in which a therapist guides the patient to reevaluate how the patient sees situations; and (5) Exposing, in which the therapist helps the patient expose him- or herself to situations that trigger the behavior.

**69 What AA provides instead** Writing about AA is always a difficult proposition, because the program has so many critics and supporters, and there are dozens of interpretations for how and why the program works. In an email, for instance, Lee Ann Kaskutas, a senior scientist at the Alcohol Re-

search Group, wrote that AA indirectly "provides a method for attacking the habits that surround alcohol use. But that is via the people in AA, not the program of AA. The program of AA attacks the base problem, the alcoholic ego, the self-centered, spiritually bereft alcoholic." It is accurate, Kaskutas wrote, that AA provides solutions for alcoholic habits, such as the slogans "go to a meeting if you want to drink," and "avoid slippery people, places, and things." But, Kaskutas wrote, "The slogans aren't the program. The program is the steps. AA aims to go much deeper than addressing the habit part of drinking, and AA founders would argue that attacking the habit is a half measure that won't hold you in good stead; you will eventually succumb to drink unless you change more basic things." For more on the explorations of AA's science, and debates over the program's effectiveness, see C. D. Emrick et al., "Alcoholics Anonymous: What Is Currently Known?" in B. S. McCrady and W. R. Miller, eds., *Research on Alcoholics Anonymous: Opportunities and Alternatives* (New Brunswick, N.J.: Rutgers, 1993), 41–76; John F. Kelly and Mark G. Myers, "Adolescents' Participation in Alcoholics Anonymous and Narcotics Anonymous: Review, Implications, and Future Directions," *Journal of Psychoactive Drugs* 39, no. 3 (September 2007): 259–69; D. R. Groh, L. A. Jason, and C. B. Keys, "Social Network Variables in Alcoholics Anonymous: A Literature Review," *Clinical Psychology Review* 28, no. 3 (March 2008): 430–50; John Francis Kelly, Molly Magill, and Robert Lauren Stout, "How Do People Recover from Alcohol Dependence? A Systematic Review of the Research on Mechanisms of Behavior Change in Alcoholics Anonymous," *Addiction Research and Theory* 17, no. 3 (2009): 236–59.

**69 sitting in bed** Kurtz, *Not-God*.

**69 He chose the number twelve** I am indebted to Brendan I. Koerner for his advice, and to his article, "Secret of AA: After 75 Years, We Don't Know How It Works," *Wired*, July 2010; D. R. Davis and G. G. Hansen, "Making Meaning of Alcoholics Anonymous for Social Workers: Myths, Metaphors, and Realities," *Social Work* 43, no. 2 (1998): 169–82.

**70 step three, which says** Alcoholics Anonymous World Services, *Twelve Steps and Twelve Traditions* (New York: Alcoholics Anonymous World Services, Inc., 2002), 34. Alcoholics Anonymous World Services, *Alcoholics Anonymous: The Big Book*, 4th ed. (New York: Alcoholics Anonymous World Services, Inc., 2002), 59.

**70 Because of the program's lack** Arthur Cain, "Alcoholics Anonymous: Cult or Cure?" *Harper's Magazine*, February 1963, 48–52; M. Ferri, L. Amato, and M. Davoli, "Alcoholics Anonymous and Other 12-Step Programmes for Alcohol Dependence," *Addiction* 88, no. 4 (1993): 555–62; Harrison M. Trice and Paul Michael Roman, "Delabeling, Relabeling, and Alcoholics Anonymous," *Social Problems* 17, no. 4 (1970): 538–46; Robert E. Tournie, "Alcoholics Anonymous

as Treatment and as Ideology," *Journal of Studies on Alcohol* 40, no. 3 (1979): 230–39; P. E. Bebbington, "The Efficacy of Alcoholics Anonymous: The Elusiveness of Hard Data," *British Journal of Psychiatry* 128 (1976): 572–80.

**71 "It's not obvious from the way they're written"** Emrick et al., "Alcoholics Anonymous: What Is Currently Known?"; J. S. Tonigan, R. Toscova, and W. R. Miller, "Meta-analysis of the Literature on Alcoholics Anonymous: Sample and Study Characteristics Moderate Findings," *Journal of Studies on Alcohol* 57 (1995): 65–72; J. S. Tonigan, W. R. Miller, and G. J. Connors, "Project MATCH Client Impressions About Alcoholics Anonymous: Measurement Issues and Relationship to Treatment Outcome," *Alcoholism Treatment Quarterly* 18 (2000): 25–41; J. S. Tonigan, "Spirituality and Alcoholics Anonymous," *Southern Medical Journal* 100, no. 4 (2007): 437–40.

**72 One particularly dramatic demonstration** Heinze et al., "Counteracting Incentive Sensitization in Severe Alcohol Dependence Using Deep Brain Stimulation of the Nucleus Accumbens: Clinical and Basic Science Aspects," *Frontiers in Human Neuroscience* 3, no. 22 (2009).

**74 graduate student named Mandy** "Mandy" is a pseudonym used by the author of the case study this passage draws from.

**74 Mississippi State University** B. A. Dufrene, Stuart Watson, and J. S. Kazmerski, "Functional Analysis and Treatment of Nail Biting," *Behavior Modification* 32 (2008): 913–27.

**74 The counseling center referred Mandy** In a fact-checking letter, the author of this study, Brad Dufrene, wrote that the patient "consented to services at a university-based clinic which was a training and research clinic. At the outset of participating in therapy, she consented to allowing us to use data from her case as in research presentations or publications."

**76 one of the developers of habit reversal training** N. H. Azrin and R. G. Nunn, "Habit-Reversal: A Method of Eliminating Nervous Habits and Tics," *Behaviour Research and Therapy* 11, no. 4 (1973): 619–28; Nathan H. Azrin and Alan L. Peterson, "Habit Reversal for the Treatment of Tourette Syndrome," *Behaviour Research and Therapy* 26, no. 4 (1988): 347–51; N. H. Azrin, R. G. Nunn, and S. E. Frantz, "Treatment of Hairpulling (Trichotillomania): A Comparative Study of Habit Reversal and Negative Practice Training," *Journal of Behavior Therapy and Experimental Psychiatry* 11 (1980): 13–20; R. G. Nunn and N. H. Azrin, "Eliminating Nail-Biting by the Habit Reversal Procedure," *Behaviour Research and Therapy* 14 (1976): 65–67; N. H. Azrin, R. G. Nunn, and S. E. Frantz-Renshaw, "Habit Reversal Versus Negative Practice Treatment of Nervous Tics," *Behavior Therapy* 11, no. 2 (1980): 169–78; N. H. Azrin, R. G. Nunn, and S. E. Frantz-Renshaw, "Habit Reversal Treatment of Thumbsucking," *Behaviour Research and Therapy* 18, no. 5 (1980): 395–99.



**77 Today, habit reversal therapy** In a fact-checking letter, Dufrene emphasized that methods such as those used with Mandy—known as “simplified habit reversal training”—sometimes differ from other methods of HRT. “My understanding is that Simplified Habit Reversal is effective for reducing habits (e.g., hair pulling, nail biting, thumb sucking), tics (motor and vocal), and stuttering,” he wrote. However, other conditions might require more intense forms of HRT. “Effective treatments for depression, smoking, gambling problems, etc. fall under the umbrella term ‘Cognitive Behavioral Therapy,’” Dufrene wrote, emphasizing that simplified habit replacement is often not effective for those problems, which require more intensive interventions.

**77 verbal and physical tics** R. G. Nunn, K. S. Newton, and P. Faucher, “2.5 Years Follow-up of Weight and Body Mass Index Values in the Weight Control for Life! Program: A Descriptive Analysis,” *Addictive Behaviors* 17, no. 6 (1992): 579–85; D. J. Horne, A. E. White, and G. A. Varigos, “A Preliminary Study of Psychological Therapy in the Management of Atopic Eczema,” *British Journal of Medical Psychology* 62, no. 3 (1989): 241–48; T. Deckersbach et al., “Habit Reversal Versus Supportive Psychotherapy in Tourette’s Disorder: A Randomized Controlled Trial and Predictors of Treatment Response,” *Behaviour Research and Therapy* 44, no. 8 (2006): 1079–90; Douglas W. Woods and Raymond G. Miltenberger, “Habit Reversal: A Review of Applications and Variations,” *Journal of Behavior Therapy and Experimental Psychiatry* 26, no. 2 (1995): 123–31; D. W. Woods, C. T. Wetterneck, and C. A. Flessner, “A Controlled Evaluation of Acceptance and Commitment Therapy Plus Habit Reversal for Trichotillomania,” *Behaviour Research and Therapy* 44, no. 5 (2006): 639–56.

**78 More than three dozen studies** J. O. Prochaska and C. C. DiClemente, “Stages and Processes of Self-Change in Smoking: Toward an Integrative Model of Change,” *Journal of Consulting and Clinical Psychology* 51, no. 3 (1983): 390–95; James Prochaska, “Strong and Weak Principles for Progressing from Precontemplation to Action on the Basis of Twelve Problem Behaviors,” *Health Psychology* 13 (1994): 47–51; James Prochaska et al., “Stages of Change and Decisional Balance for 12 Problem Behaviors,” *Health Psychology* 13 (1994): 39–46; James Prochaska and Michael Goldstein, “Process of Smoking Cessation: Implications for Clinicians,” *Clinics in Chest Medicine* 12, no. 4 (1991): 727–35; James O. Prochaska, John Norcross, and Carlo DiClemente, *Changing for Good: A Revolutionary Six-Stage Program for Overcoming Bad Habits and Moving Your Life Positively Forward* (New York: HarperCollins, 1995).

**79 “Most of the time, it’s not physical”** Devin Gordon, “Coach Till You Drop,” *Newsweek*, September 2, 2002, 48.

**81 during crucial, high-stress moments** In fact-checking correspondence, Dungy said he “would not characterize it as falling apart in big games. I would

call it not playing well enough in crucial situations, not being able to put those lessons into practice when it was all on the line. St. Louis had one of the highest scoring offenses in the history of the NFL. They managed one TD that game with about 3 minutes left. A team that was scoring almost 38 points a game got 1 TD and 1 FG against the defense, so I hardly think they ‘fell apart.’”

**81 “What they were really saying”** In fact-checking correspondence, Dungy said “we did lose again in the playoffs to Phil, in another poor showing. This was probably our worst playoff game and it was done under the cloud of rumors, so everyone knew that . . . ownership would be making a coaching change. I think we had instances in the past where we didn’t truly trust the system, but I’m not sure that was the case here. Philadelphia was just a tough match-up for us and we couldn’t get past them. And not playing well, the score turned out to be ugly. However, it was one of our worst games since the ‘96 season.”

**84 began asking alcoholics** John W. Traphagan, “Multidimensional Measurement of Religiousness/Spirituality for Use in Health Research in Cross-Cultural Perspective,” *Research on Aging* 27 (2005): 387–419. Many of those studies use the scale published in G. J. Connors et al., “Measure of Religious Background and Behavior for Use in Behavior Change Research,” *Psychology of Addictive Behaviors* 10, no. 2 (June 1996): 90–96.

**84 Then they looked at the data** Sarah Zemore, “A Role for Spiritual Change in the Benefits of 12-Step Involvement,” *Alcoholism: Clinical and Experimental Research* 31 (2007): 76s–79s; Lee Ann Kaskutas et al., “The Role of Religion, Spirituality, and Alcoholics Anonymous in Sustained Sobriety,” *Alcoholism Treatment Quarterly* 21 (2003): 1–16; Lee Ann Kaskutas et al., “Alcoholics Anonymous Careers: Patterns of AA Involvement Five Years After Treatment Entry,” *Alcoholism: Clinical and Experimental Research* 29, no. 11 (2005): 1983–1990; Lee Ann Kaskutas, “Alcoholics Anonymous Effectiveness: Faith Meets Science,” *Journal of Addictive Diseases* 28, no. 2 (2009): 145–57; J. Scott Tonigan, W. R. Miller, and Carol Schermer, “Atheists, Agnostics, and Alcoholics Anonymous,” *Journal of Studies on Alcohol* 63, no. 5 (2002): 534–54.

**87 Paramedics had rushed him** Jarrett Bell, “Tragedy Forces Dungy ‘to Live in the Present,’” *USA Today*, September 1, 2006; Ohm Youngmisuk, “The Fight to Live On,” *New York Daily News*, September 10, 2006; Phil Richards, “Dungy: Son’s Death Was a ‘Test,’” *The Indianapolis Star*, January 25, 2007; David Goldberg, “Tragedy Lessened by Game,” *Tulsa World*, January 30, 2007; “Dungy Makes History After Rough Journey,” *Akron Beacon Journal*, February 5, 2007; “From Pain, a Revelation,” *The New York Times*, July 2007; “Son of Colts’ Coach Tony Dungy Apparently Committed Suicide,” Associated Press, December 22, 2005; Larry Stone, “Colts Take Field with Heavy Hearts,” *The Se-*

attle Times, December 25, 2005; Clifton Brown, "Dungy's Son Is Found Dead; Suicide Suspected," *The New York Times*, December 23, 2005; Peter King, "A Father's Wish," *Sports Illustrated*, February 2007.

**88 In a 1994 Harvard study** Todd F. Heatherton and Patricia A. Nichols, "Personal Accounts of Successful Versus Failed Attempts at Life Change," *Personality and Social Psychology Bulletin* 20, no. 6 (1994): 664–75.

**90 Dungy's team, once again, was I** am indebted to Michael Smith, "'Simple' Scheme Nets Big Gains for Trio of Defenses," ESPN.com, December 26, 2005.

**90 It's our time** Michael Silver, "This Time, It's Manning's Moment," *Sports Illustrated*, February 2007.

#### CHAPTER FOUR

**97 They were there to meet** For details on O'Neill's life and Alcoa, I am indebted to Paul O'Neill for his generous time, as well as numerous Alcoa executives. I also drew on Pamela Varley, "Vision and Strategy: Paul H. O'Neill at OMB and Alcoa," Kennedy School of Government, 1992; Peter Zimmerman, "Vision and Strategy: Paul H. O'Neill at OMB and Alcoa Sequel," Kennedy School of Government, 1994; Kim B. Clark and Joshua Margolis, "Workplace Safety at Alcoa (A)," *Harvard Business Review*, October 31, 1999; Steven J. Spear, "Workplace Safety at Alcoa (B)," *Harvard Business Review*, December 22, 1999; Steven Spear, *Chasing the Rabbit: How Market Leaders Outdistance the Competition and How Great Companies Can Catch Up and Win* (New York: McGraw-Hill, 2009); Peter Kolesar, "Vision, Values, and Milestones: Paul O'Neill Starts Total Quality at Alcoa," *California Management Review* 35, no. 3 (1993): 133–65; Ron Suskind, *The Price of Loyalty: George W. Bush, the White House, and the Education of Paul O'Neill* (New York: Simon and Schuster, 2004); Michael Arndt, "How O'Neill Got Alcoa Shining," *BusinessWeek*, February 2001; Glenn Kessler, "O'Neill Offers Cure for Workplace Injuries," *The Washington Post*, March 31, 2001; "Pittsburgh Health Initiative May Serve as US Model," Reuters, May 31; S. Smith, "America's Safest Companies: Alcoa: Finding True North," *Occupational Hazards* 64, no. 10 (2002): 53; Thomas A. Stewart, "A New Way to Wake Up a Giant," *Fortune*, October 1990; "O'Neill's Tenure at Alcoa Mixed," Associated Press, December 21, 2000; Leslie Wayne, "Designee Takes a Deft Touch and a Firm Will to Treasury," *The New York Times*, January 16, 2001; Terence Roth, "Alcoa Had Loss of \$14.7 Million in 4th Quarter," *The Wall Street Journal*, January 21, 1985; Daniel F. Cuff, "Alcoa Hedges Its Bets, Slowly," *The New York Times*, October 24, 1985; "Alcoa Is Stuck as Two Unions Reject Final Bid," *The Wall Street Journal*, June 2, 1986; Mark Russell, "Alcoa Strike Ends as Two Unions Agree to Cuts in Benefits and to Wage Freezes," *The Wall Street Journal*, July 7, 1986; Thomas F. O'Boyle

and Peter Pae, "The Long View: O'Neill Recasts Alcoa with His Eyes Fixed on the Decade Ahead," *The Wall Street Journal*, April 9, 1990; Tracey E. Benson, "Paul O'Neill: True Innovation, True Values, True Leadership," *Industry Week* 242, no. 8 (1993): 24; Joseph Kahn, "Industrialist with a Twist," *The New York Times*, December 21, 2000.

**102 O'Neill was one** Michael Lewis, "O'Neill's List," *The New York Times*, January 123, 2002; Ron Suskind, *The Price of Loyalty: George W. Bush, the White House, and the Education of Paul O'Neill* (New York: Simon and Schuster, 2004).

**103 What mattered was erecting** In a fact-checking conversation, O'Neill made clear that the comparison between organizational routines and individual habits is one that he understands and agrees with, but did not explicitly occur to him at the time. "I can relate to that, but I don't own that idea," he told me. Then, as now, he recognizes routines such as the hospital-building program, which is known as the Hill-Burton Act, as an outgrowth of a pattern. "The reason they kept building was because the political instincts are still there that bringing money back home to the district is how people think they get reelected, no matter how much overcapacity we were creating," he told me.

**103 "Routines are the organizational analogue"** Geoffrey M. Hodgson, "The Nature and Replication of Routines," unpublished manuscript, University of Hertfordshire, 2004, <http://www.gredeg.cnrs.fr/routines/workshop/papers/Hodgson.pdf>.

**104 It became an organizational** In a fact-checking conversation, O'Neill wanted to stress that these examples of NASA and the EPA, though illustrative, do not draw on his insights or experiences. They are independently reported.

**104 When lawyers asked for permission** Karl E. Weick, "Small Wins: Redefining the Scale of Social Problems," *American Psychologist* 39 (1984): 40–49.

**104 By 1975, the EPA was issuing** <http://www.epa.gov/history/>.

**106 He instituted an automatic routine** In a fact-checking conversation, O'Neill stressed that he believes that promotions and bonuses should not be tied to worker safety, any more than they should be tied to honesty. Rather, safety is a value that every Alcoa worker should embrace, regardless of the rewards. "It's like saying, 'We're going to pay people more if they don't lie,' which suggests that it's okay to lie a little bit, because we'll pay you a little bit less," he told me. However, it is important to note that in interviews with other Alcoa executives from this period, they said it was widely known that promotions were available only to those employees who evidenced a commitment to safety, and that promise of promotion served as a reward, even if that was not O'Neill's intention.

**106 Any time someone was injured** In a fact-checking conversation, O'Neill made clear that, at the time, the concept of the "habit loop" was unknown to him. He didn't necessarily think of these programs as fulfilling a criterion for habits, though in retrospect, he acknowledges how his efforts are aligned with more recent research indicating how organizational habits emerge.

**108 Take, for instance, studies from** P. Callaghan, "Exercise: A Neglected Intervention in Mental Health Care?" *Journal of Psychiatric and Mental Health Nursing* 11 (2004): 476–83; S. N. Blair, "Relationships Between Exercise or Physical Activity and Other Health Behaviors," *Public Health Reports* 100 (2009): 172–80; K. J. Van Rensburg, A. Taylor, and T. Hodgson, "The Effects of Acute Exercise on Attentional Bias Toward Smoking-Related Stimuli During Temporary Abstinence from Smoking," *Addiction* 104, no. 11 (2009): 1910–17; E. R. Ropelle et al., "IL-6 and IL-10 Anti-inflammatory Activity Links Exercise to Hypothalamic Insulin and Leptin Sensitivity Through IKK $\beta$  and ER Stress Inhibition," *PLoS Biology* 8, no. 8 (2010); P. M. Dubbert, "Physical Activity and Exercise: Recent Advances and Current Challenges," *Journal of Consulting and Clinical Psychology* 70 (2002): 526–36; C. Quinn, "Training as Treatment," *Nursing Standard* 24 (2002): 18–19.

**109 Studies have documented that families** S. K. Hamilton and J. H. Wilson, "Family Mealtimes: Worth the Effort?" *Infant, Child, and Adolescent Nutrition* 1 (2009): 346–50; American Dietetic Association, "Eating Together as a Family Creates Better Eating Habits Later in Life," *ScienceDaily.com*, September 4, 2007, accessed April 1, 2011.

**109 Making your bed every morning** Richard Layard, *Happiness: Lessons from a New Science* (New York: Penguin Press, 2005); Daniel Nettle, *Happiness: The Science Behind Your Smile* (Oxford: Oxford University Press, 2005); Marc Ian Barasch, *Field Notes on the Compassionate Life: A Search for the Soul of Kindness* (Emmaus, Penn.: Rodale, 2005); Alfie Kohn, *Unconditional Parenting: Moving from Rewards and Punishments to Love and Reason* (New York: Atria Books, 2005); P. Alex Linley and Stephen Joseph, eds., *Positive Psychology in Practice* (Hoboken, N.J.: Wiley, 2004).

**110 By 7 A.M.**, I am indebted to the time and help of Bob Bowman in understanding Phelps's training, as well as to Michael Phelps and Alan Abrahamson, *No Limits: The Will to Succeed* (New York: Free Press, 2009); Michael Phelps and Brian Cazeneuve, *Beneath the Surface* (Champaign, Ill.: Sports Publishing LLC, 2008); Bob Schaller, *Michael Phelps: The Untold Story of a Champion* (New York: St. Martin's Griffin, 2008); Karen Crouse, "Avoiding the Deep End When It Comes to Jitters," *The New York Times*, July 26, 2009; Mark Levine, "Out There," *The New York Times*, August 3, 2008; Eric Adelson, "And After That, Mr. Phelps Will Leap a Tall Building in a Single Bound," *ESPN.com*, July 28, 2008; Sean Gregory, "Michael Phelps: A Real GOAT," *Time*, Au-

gust 13, 2008; Norman Frauenheim, "Phelps Takes 4th, 5th Gold Medals," *The Arizona Republic*, August 12, 2008.

**112 "Once a small win has been accomplished"** Karl E. Weick, "Small Wins: Redefining the Scale of Social Problems," *American Psychologist* 39 (1984): 40–49.

**112 Small wins fuel transformative changes** "Small Wins—The Steady Application of a Small Advantage," Center for Applied Research, 1998, accessed June 24, 2011, [http://www.cfar.com/Documents/Small\\_win.pdf](http://www.cfar.com/Documents/Small_win.pdf).

**112 It seemed like the gay community's** For more details on this incident, see Alix Spiegel's wonderful "81 Words," broadcast on *This American Life*, January 18, 2002, <http://www.thisamericanlife.org/>.

**113 HQ 71-471 ("Abnormal Sexual Relations, Including Sexual Crimes")** Malcolm Spector and John I. Kitsuse, *Constructing Social Problems* (New Brunswick, N.J.: Transaction Publishers, 2001).

**114 He couldn't tell if they were leaking** Phelps and Abrahamson, *No Limits*.

**115 It was one additional victory** For further discussion of habits and Olympic swimmers, see Daniel Chambliss, "The Mundanity of Excellence," *Sociological Theory* 7 (1989): 70–86.

**116 He was killed instantly** Paul O'Neill keynote speech, June 25, 2002, at the Juran Center, Carlson School of Management, University of Minnesota, Minneapolis.

**118 Rural areas, in particular** "Infant Mortality Rates, 1950–2005," <http://www.infoplease.com/ipa/A0779935.html>; William H. Berentsen, "German Infant Mortality 1960–1980," *Geographical Review* 77 (1987): 157–70; Paul Norman et al., "Geographical Trends in Infant Mortality: England and Wales, 1970–2006," *Health Statistics Quarterly* 40 (2008): 18–29.

**119 Today, the U.S. infant mortality** World Bank, World Development Indicators. In an email sent in response to fact-checking questions, O'Neill wrote: "This is correct, but I would not take credit for our society doing a better job in reducing infant mortality."

**120 They began diets and joined gyms** T. A. Wadden, M. L. Butryn, and C. Wilson, "Lifestyle Modification for the Management of Obesity," *Gastroenterology* 132 (2007): 2226–38.

**120 Then, in 2009 a group of researchers** J. F. Hollis et al., "Weight Loss During the Intensive Intervention Phase of the Weight-Loss Maintenance Trial," *American Journal of Preventative Medicine* 35 (2008): 118–26. See also L. P. Svetkey et al., "Comparison of Strategies for Sustaining Weight Loss, the Weight Loss Maintenance Randomized Controlled Trial," *JAMA* 299 (2008): 1139–48; A. Fitch and J. Bock, "Effective Dietary Therapies for Pediatric

Obesity Treatment," *Reviews in Endocrine and Metabolic Disorders* 10 (2009): 231–36; D. Engstrom, "Eating Mindfully and Cultivating Satisfaction: Modifying Eating Patterns in a Bariatric Surgery Patient," *Bariatric Nursing and Surgical Patient Care* 2 (2007): 245–50; J. R. Peters et al., "Eating Pattern Assessment Tool: A Simple Instrument for Assessing Dietary Fat and Cholesterol Intake," *Journal of the American Dietetic Association* 94 (1994): 1008–13; S. M. Rebrot et al., "The Effect of Keeping Food Records on Eating Patterns," *Journal of the American Dietetic Association* 98 (1998): 1163–65.

**121 "After a while, the journal"** For more on weight loss studies, see R. R. Wing and James O. Hill, "Successful Weight Loss Maintenance," *Annual Review of Nutrition* 21 (2001): 323–41; M. L. Klem et al., "A Descriptive Study of Individuals Successful at Long-Term Maintenance of Substantial Weight Loss," *American Journal of Clinical Nutrition* 66 (1997): 239–46; M. J. Mahoney, N. G. Moura, and T. C. Wade, "Relative Efficacy of Self-Reward, Self-Punishment, and Self-Monitoring Techniques for Weight Loss," *Journal of Consulting and Clinical Psychology* 40 (1973): 404–7; M. J. Franz et al., "Weight Loss Outcomes: A Systematic Review and Meta-Analysis of Weight-Loss Clinical Trials with a Minimum 1-Year Follow-up," *Journal of the American Dietetic Association* 107 (2007): 1755–67; A. DelParigi et al., "Successful Dieters Have Increased Neural Activity in Cortical Areas Involved in the Control of Behavior," *International Journal of Obesity* 31 (2007): 440–48.

**124 researchers referred to as "grit"** Jonah Lehrer, "The Truth About Grit," *The Boston Globe*, August 2, 2009.

**124 "despite failure, adversity, and plateaus in progress"** A. L. Duckworth et al., "Grit: Perseverance and Passion for Long-Term Goals," *Journal of Personality and Social Psychology* 92 (2007): 1087–1101.

## CHAPTER FIVE

**131 willpower is the single most important** J. P. Tangney, R. F. Baumeister, and A. L. Boone, "High Self-Control Predicts Good Adjustment, Less Pathology, Better Grades, and Interpersonal Success," *Journal of Personality* 72, no. 2 (2004): 271–324; Paul Karoly, "Mechanisms of Self-Regulation: A Systems View," *Annual Review of Psychology* 44 (1993): 23–52; James J. Gross, Jane M. Richards, and Oliver P. John, "Emotional Regulation in Everyday Life," in *Emotion Regulation in Families: Pathways to Dysfunction and Health*, ed. Douglas K. Snyder, Jeffrey A. Simpson, and Jan N. Hughes (Washington, D.C.: American Psychological Association, 2006); Katleen De Stobbeleir, Susan Ashford, and Dirk Buyens, "From Trait and Context to Creativity at Work: Feedback-Seeking Behavior as a Self-Regulation Strategy for Creative Performance," Vlerick Leuven Gent Working Paper Series, September 17, 2008; Ba-

bette Raabe, Michael Frese, and Terry A. Beehr, "Action Regulation Theory and Career Self-Management," *Journal of Vocational Behavior* 70 (2007): 297–311; Albert Bandura, "The Primacy of Self-Regulation in Health Promotion," *Applied Psychology* 54 (2005): 245–54; Robert G. Lord et al., "Self-Regulation at Work," *Annual Review of Psychology* 61 (2010): 543–68; Colette A. Frayne and Gary P. Latham, "Application of Social Learning Theory to Employee Self-Management of Attendance," *Journal of Applied Psychology* 72 (1987): 387–92; Colette Frayne and J. M. Geringer, "Self-Management Training for Improving Job Performance: A Field Experiment Involving Salespeople," *Journal of Applied Psychology* 85 (2000): 361–72.

**131 "Self-discipline has a bigger effect on"** Angela L. Duckworth and Martin E. P. Seligman, "Self-Discipline Outdoes IQ in Predicting Academic Performance of Adolescents," *Psychological Science* 16 (2005): 939–44.

**132 Executives wrote workbooks that** Information on Starbucks training methods is drawn from numerous interviews, as well as the company's training materials. Information on training materials comes from copies provided by Starbucks employees and court records, including the following internal Starbucks documents and training manuals: *Starbucks Coffee Company Partner Guide, U.S. Store Version; Learning Coach Guide; In-Store Learning Coaches Guide; Shift Supervisor Learning Journey; Retail Management Training; Supervisory Skills Facilitator Guide; Supervisory Skills Partner Workbook; Shift Supervisor Training; Store Manager's Planning and Coaches Guide; Managers' Guide: Learning to Lead, Level One and Two; Supervisory Skills: Learning to Lead Facilitators Guide; First Impressions Guide; Store Manager Training Plan/Guide; District Manager Training Plan/Guide; Partner Resources Manual; Values Walk*. In a statement sent in response to fact-checking inquiries, a Starbucks representative wrote: "In reviewing, we felt that your overall theme focuses on emotional intelligence (EQ) and that we attract partners who need development in this area—this is not true holistically. It's important to note that 70 percent of U.S. partners are students and learning in a lot of ways in their life. What Starbucks provides—and partners are inclined to join because of it—is an environment that matches their values, a place to be a part of something bigger (like community), an approach that focuses on problem solving by showing not telling and a successful way to deliver inspired service." The company added that "we'd like to note that as part of our Customer Service Vision, our partners are trusted completely and are empowered to use their best judgment. We believe that this level of trust and empowerment is unique, and that partners rise to the occasion when we treat them with respect."

**133 It was as if the marshmallow-ignoring kids** Harriet Mischel and Walter Mischel, "The Development of Children's Knowledge of Self-Control Strate-

gies," *Child Development* 54 (1983): 603–19; W. Mischel, Y. Shoda, and M. I. Rodriguez, "Delay of Gratification in Children," *Science* 244 (1989): 933–38; Walter Mischel et al., "The Nature of Adolescent Competencies Predicted by Preschool Delay of Gratification," *Journal of Personality and Social Psychology* 54 (1988): 687–96; J. Metcalfe and W. Mischel, "A Hot/Cool-System Analysis of Delay of Gratification: Dynamics of Will Power," *Psychological Review* 106 (1999): 3–19; Jonah Lehrer, "The Secret of Self Control," *The New Yorker*, May 18, 2009.

**137 Some have suggested it helps clarify** In a fact-checking email, Muraven wrote: "There is research to suggest that marital problems spring from low self-control and that depletion contributes to poor outcomes when couples are discussing tense relationship issues. Likewise, we have found that on days that require more self-control than average, people are more likely to lose control over their drinking. There is also some research that suggests depleted individuals make poorer decisions than nondepleted individuals. These findings may be extended to explain extramarital affairs or mistakes by physicians, but that has not been" directly shown to be a cause-and-effect relationship.

**137 "If you use it up too early"** Roy F. Baumeister et al., "Ego-Depletion: Is the Active Self a Limited Resource?" *Journal of Personality and Social Psychology* 18 (1998): 130–50; R. F. Baumeister, M. Muraven, and D. M. Tice, "Self-Control as a Limited Resource: Regulatory Depletion Patterns," *Psychological Bulletin* 126 (1998): 247–59; R. F. Baumeister, M. Muraven, and D. M. Tice, "Longitudinal Improvement of Self-Regulation Through Practice: Building Self-Control Strength Through Repeated Exercise," *Journal of Social Psychology* 139 (1999): 446–57; R. F. Baumeister, M. Muraven, and D. M. Tice, "Ego Depletion: A Resource Model of Volition, Self-Regulation, and Controlled Processing," *Social Cognition* 74 (2000): 1252–65; Roy F. Baumeister and Mark Muraven, "Self-Regulation and Depletion of Limited Resources: Does Self-Control Resemble a Muscle?" *Psychological Bulletin* 126 (2000): 247–59; See also M. S. Hagger et al., "Ego Depletion and the Strength Model of Self-Control: A Meta-Analysis," *Psychological Bulletin* 136 (2010): 495–25; R. G. Baumeister, K. D. Vohs, and D. M. Tice, "The Strength Model of Self-Control," *Current Directions in Psychological Science* 16 (2007): 351–55; M. I. Posne and M. K. Rothbart, "Developing Mechanisms of Self-Regulation," *Development and Psychopathology* 12 (2000): 427–41; Roy F. Baumeister and Todd F. Heatherton, "Self-Regulation Failure: An Overview," *Psychological Inquiry* 7 (1996): 1–15; Kathleen D. Vohs et al., "Making Choices Impairs Subsequent Self-Control: A Limited-Resource Account of Decision Making, Self-Regulation, and Active Initiative," *Journal of Personality and Social Psychology* 94 (2008): 883–98; Daniel Romer et al., "Can Adolescents Learn Self-Control? Delay of Gratification in the Development of Control over Risk Taking," *Prevention Science* 11 (2010):

319–30. In a fact-checking email, Muraven wrote: "Our research suggests that people often don't even realize that they are depleted and that the first act of self-control affected them. Instead, exerting self-control causes people to be less willing to work hard on subsequent self-control efforts (ultimately, this is a theory of motivation, not cognition). . . . [E]ven after the most depleting day, people still don't urinate on the floor. Again, this suggests the motivational aspect of the theory—they lack the motivation to force themselves to do things that are less important to them. I realize this may seem like splitting hairs, but it is critical to understand that self-control doesn't fail because the person cannot muster the needed resources. Instead it fails because the effort seems too great for the payoff. Basically, I don't want the next murderer to say that he was depleted so he couldn't control himself."

**138 They enrolled two dozen people** Megan Oaten and K. Cheng, "Longitudinal Gains in Self-Regulation from Regular Physical Exercise," *Journal of Health Psychology* 11 (2006): 717–33. See also Roy F. Baumeister et al., "Self-Regulation and Personality: How Interventions Increase Regulatory Success, and How Depletion Moderates the Effects of Traits on Behavior," *Journal of Personality* 74 (2006): 1773–1801.

**138 So they designed another experiment** Megan Oaten and K. Cheng, "Improvements in Self-Control from Financial Monitoring," *Journal of Economic Psychology* 28 (2007): 487–501.

**139 fifteen fewer cigarettes each day** Roy F. Baumeister et al., "Self-Regulation and Personality."

**139 They enrolled forty-five** Ibid.

**139 Heatherton, a researcher at Dartmouth** For a selection of Heather-ton's fascinating work, see Todd F. Heatherton, Ph.D., <http://www.dartmouth.edu/~heath/#Pubs>, last modified June 30, 2009.

**139 Many of these schools have dramatically** Lehrer, "The Secret of Self Control."

**140 A five-year-old who can follow** In a fact-checking email, Dr. Heatherton expanded upon this idea: "Exactly how the brain does this is somewhat unclear, although I propose that people develop better frontal control over subcortical reward centers. . . . The repeated practice helps strengthen the 'muscle' (although clearly it is not a muscle; more likely it is better prefrontal cortical control or the development of a strong network of brain regions involved in controlling behavior)." For more information, see Todd F. Heatherton and Dylan D. Wagner, "Cognitive Neuroscience of Self-Regulation Failure," *Trends in Cognitive Sciences* 15 (2011): 132–39.

**140 They sponsored weight-loss classes** In a fact-checking email, a Starbucks spokesman wrote: "Currently, Starbucks offers discounts at many of the

national fitness clubs. We believe that this discussion should be more around overall health and wellness options provided to our partners, rather than focusing specifically on gym memberships. We know that our partners want to find ways to be well and we continue to look for programs that will enable them to do that."

**141 opening seven new stores every day** Michael Herriman et al., "A Crack in the Mug: Can Starbucks Mend It?" *Harvard Business Review*, October 2008.

**141 In 1992, a British psychologist** Sheina Orbell and Paschal Sheeran, "Motivational and Volitional Processes in Action Initiation: A Field Study of the Role of Implementation Intentions," *Journal of Applied Social Psychology* 30, no. 4 (April 2000): 780–97.

**145 An impatient crowd might overwhelm** In a fact-checking statement, a Starbucks spokesman wrote: "Overall accurate assessment, however, we would argue that any job is stressful. As mentioned above, one of the key elements of our Customer Service Vision is that every partner owns the customer experience. This empowerment lets partners know that the company trusts them to resolve issues and helps create the confidence to successfully navigate these moments."

**145 The company identified specific rewards** These details were confirmed with Starbucks employees and executives. In a fact-checking statement, however, a Starbucks spokesman wrote: "This is not accurate." The spokesman declined to provide further details.

**145 We Listen to the customer** In a fact-checking statement, a Starbucks spokesman wrote: "While it is certainly not incorrect or wrong to refer to it, LATTE is no longer part of our formal training. In fact, we are moving away from more prescriptive steps like LATTE and are widening the guardrails to enable store partners to engage in problem solving to address the many unique issues that arise in our stores. This model is very dependent on continual effective coaching by shift supervisors, store, and district managers."

**146 Then they practice those plans** In a fact-checking statement, a Starbucks spokesman wrote: "Overall accurate assessment—we strive to provide tools and training on both skills and behaviors to deliver world-class customer service to every customer on every visit. We would like to note, however, that similar to LATTE (and for the same reasons), we do not formally use Connect, Discover, Respond."

**147 "This is better than a visit"** Constance L. Hays, "These Days the Customer Isn't Always Treated Right," *The New York Times*, December 23, 1998.

**147 Schultz, the man who built Starbucks** Information on Schultz from Adi Ignatius, "We Had to Own the Mistakes," *Harvard Business Review*, July-August 2010; William W. George and Andrew N. McLean, "Howard Schultz: Building

Starbucks Community (A)," *Harvard Business Review*, June 2006; Koehn, Besharov, and Miller, "Starbucks Coffee Company in the 21st Century," *Harvard Business Review*, June 2008; Howard Schultz and Dori Jones Yang, *Pour Your Heart Into It: How Starbucks Built a Company One Cup at a Time* (New York: Hyperion, 1997); Taylor Clark, *Starbucked: A Double Tall Tale of Caffeine, Commerce, and Culture* (New York: Little, Brown, 2007); Howard Behar, *It's Not About the Coffee: Lessons on Putting People First from a Life at Starbucks* (New York: Portfolio Trade, 2009); John Moore, *Tribal Knowledge* (New York: Kaplan, 2006); Bryant Simon, *Everything but the Coffee: Learning About America from Starbucks* (Berkeley: University of California Press, 2009). In a fact-checking statement, a Starbucks spokesman wrote: "Although at a very high level, the overall story is correct, a good portion of the details are incorrect or cannot be verified." That spokesperson declined to detail what was incorrect or provide any clarifications.

**149 Mark Muraven, who was by then** M. Muraven, M. Gagné, and H. Rosman, "Helpful Self-Control: Autonomy Support, Vitality, and Depletion," *Journal of Experimental and Social Psychology* 44, no. 3 (2008): 573–85. See also Mark Muraven, "Practicing Self-Control Lowers the Risk of Smoking Lapse," *Psychology of Addictive Behaviors* 24, no. 3 (2010): 446–52; Brandon J. Schmeichel and Kathleen Vohs, "Self-Affirmation and Self-Control: Affirming Core Values Counteracts Ego Depletion," *Journal of Personality and Social Psychology* 96, no. 4 (2009): 770–82; Mark Muraven, "Autonomous Self-Control Is Less Depleting," *Journal of Research in Personality* 42, no. 3 (2008): 763–70; Mark Muraven, Dikla Shmueli, and Edward Burkley, "Conserving Self-Control Strength," *Journal of Personality and Social Psychology* 91, no. 3 (2006): 524–37; Ayelet Fishbach, "The Dynamics of Self-Regulation," in *11th Sydney Symposium of Social Psychology* (New York: Psychology Press, 2001); Tyler F. Stillman et al., "Personal Philosophy and Personnel Achievement: Belief in Free Will Predicts Better Job Performance," *Social Psychological and Personality Science* 1 (2010): 43–50; Mark Muraven, "Lack of Autonomy and Self-Control: Performance Contingent Rewards Lead to Greater Depletion," *Motivation and Emotion* 31, no. 4 (2007): 322–30.

**151 One 2010 study** This study, as of the time of writing this book, was unpublished and shared with me on the condition its authors would not be revealed. However, further details on employee empowerment studies can be found in C. O. Longenecker, J. A. Scazzero, and T. T. Standfield, "Quality Improvement Through Team Goal Setting, Feedback, and Problem Solving: A Field Experiment," *International Journal of Quality and Reliability Management* 11, no. 4 (1994): 45–52; Susan G. Cohen and Gerald E. Ledford, "The Effectiveness of Self-Managing Teams: A Quasi-Experiment," *Human Relations* 47, no. 1 (1994): 13–43; Ferris, Rosen, and Barnum, *Handbook of Human Resource Management* (Cambridge, Mass.: Blackwell Publishers, 1995); Linda Honold,

"A Review of the Literature on Employee Empowerment," *Empowerment in Organizations* 5, no. 4 (1997): 202–12; Thomas C. Powell, "Total Quality Management and Competitive Advantage: A Review and Empirical Study," *Strategic Management Journal* 16 (1995): 15–37.

## CHAPTER SIX

**154 Afterward, he had trouble staying awake** Details on this case come from a variety of sources, including interviews with the professionals involved, witnesses in the operating room and emergency room, and news accounts and documents published by the Rhode Island Department of Health. Those include consent orders published by the Rhode Island Department of Health; the Statement of Deficiencies and Plan of Correction published by Rhode Island Hospital on August 8, 2007; Felicia Mello, "Wrong-Site Surgery Case Leads to Probe," *The Boston Globe*, August 4, 2007; Felice Freyer, "Doctor to Blame in Wrong-Side Surgery, Panel Says," *The Providence Journal*, October 14, 2007; Felice Freyer, "R.I. Hospital Cited for Wrong-Side Surgery," *The Providence Journal*, August 3, 2007; "Doctor Disciplined for Wrong-Site Brain Surgery," Associated Press, August 3, 2007; Felice Freyer, "Surgeon Relied on Memory, Not CT Scan," *The Providence Journal*, August 24, 2007; Felicia Mello, "Wrong-Site Surgery Case Leads to Probe 2nd Case of Error at R.I. Hospital This Year," *The Boston Globe*, August 4, 2007; "Patient Dies After Surgeon Operates on Wrong Side of Head," Associated Press, August 24, 2007; "Doctor Back to Work After Wrong-Site Brain Surgery," Associated Press, October 15, 2007; Felice Freyer, "R.I. Hospital Fined After Surgical Error," *The Providence Journal*, November 27, 2007.

**155 Unless the blood was drained** Accounts of this case were described by multiple individuals, and some versions of events differ with one another. Those differences, where appropriate, are described in the notes.

**155 In 2002, the National Coalition on Health Care** <http://www.rhodeislandhospital.org>.

**155 "They can't take away our pride."** Mark Pratt, "Nurses Rally on Eve of Contract Talks," Associated Press, June 22, 2000; "Union Wants More Community Support During Hospital Contract Dispute," Associated Press, June 25, 2000; "Nurses Say Staff Shortage Hurting Patients," Associated Press, August 31, 2000; "Health Department Surveyors Find Hospitals Stressed," Associated Press, November 18, 2001; "R.I. Hospital Union Delivers Strike Notice," Associated Press, June 20, 2000.

**155 Administrators eventually agreed to limit** In a statement, a spokeswoman for Rhode Island Hospital said: "The strike was not about relation-

ships between physicians and nurses, it was about wages and work rules. Mandatory overtime is a common practice and has been an issue in unionized hospitals across the country. I don't know whether there were signs with those messages during the 2000 union negotiations, but if so, they would have referred to mandatory overtime, not relationships between physicians and nurses."

**155 to make sure mistakes are avoided** American Academy of Orthopaedic Surgeons Joint Commission Guidelines, <http://www3.aaos.org/member/safety/guidelines.cfm>.

**157 A half hour later** RIDH Statement of Deficiencies and Plan of Correction, August 7, 2007.

**157 There was no clear indication of** In a statement, Rhode Island Hospital said some of these details are incorrect, and referred to the August 7, 2007, RIDH Statement of Deficiencies and Plan of Correction. That document says, "There is no evidence in the medical record that the Nurse Practitioner, employed by the covering Neurosurgeon, received, or attempted to obtain, the necessary information related to the patient's CT scan . . . to confirm the correct side of the bleed and [sic] prior to having the consent form signed for craniotomy surgery. . . . The medical record indicates that the surgical consent was obtained by a Nurse Practitioner working for the Neurosurgeon who was on call. Although the surgical consent indicates that the procedure to be performed was a 'Right craniotomy and evacuation of subdural hematoma,' the side (right) was not initially entered onto the consent form. Interview on 8/2/07 at 2:05 PM with the Director of Perioperative Surgery indicated that patient . . . was transported from the emergency department with an incomplete (as to side) signed surgical consent. The Circulating Nurse noted that the site of the craniotomy was not included on the signed surgical consent as required by hospital policy. She indicated that the site of the craniotomy surgery was then added by the Neurosurgeon, in the operating room, once he was questioned by the Circulating Nurse regarding the site of the surgery." In a follow-up statement, Rhode Island Hospital wrote that the surgeon "and his assistant finished the spinal surgery, the OR was readied, and when they were in the hall, about to return to the OR, the OR nurse saw the consent form did not include the side of the surgery and told [the surgeon]. The doctor took the consent from the nurse and wrote 'right' on it."

**158 "We have to operate immediately."** In a letter sent in response to fact-checking inquiries, the physician involved in this case contradicted or challenged some of the events described in this chapter. The physician wrote that the nurse in this case was not concerned that the physician was operating on the wrong side. The nurse's concern focused on paperwork issues. The physician contended that the nurse did not question the physician's expertise

or accuracy. The nurse did not ask the physician to pull up the films, according to the physician. The physician said that he asked the nurse to find the family to see if it was possible to "redo the consent form properly," rather than the other way around. When the family could not be found, according to the physician, the physician asked for clarification from the nurse regarding the procedure to improve the paperwork. The nurse, according to the physician, said he wasn't sure, and as a result, the physician decided to "put a correction to the consent form and write a note in the chart detailing that we needed to proceed." The physician said he never swore and was not excited.

Rhode Island Hospital, when asked about this account of events, said it was not accurate and referred to the August 7, 2007, RIDH Statement of Deficiencies and Plan of Correction. In a statement, the hospital wrote, "During our investigation, no one said they heard [the surgeon] say that the patient was going to die."

"Those quotes with all the excitement and irritation in my manner, even swearing was completely inaccurate," the physician wrote. "I was calm and professional. I showed some emotion only for a brief moment when I realized I had started on the wrong side. The critical problem was that we would not have films to look at during the procedure. . . . Not having films to view during the case is malpractice by the hospital; however we had no choice but to proceed without films."

Rhode Island Hospital responded that the institution "can't comment on [the surgeon's] statement but would note that the hospital assumed that surgeons would put films up as they performed surgery if there was any question about the case. After this event, the hospital mandated that films would be available for the team to view." In a second statement, the hospital wrote the surgeon "did not swear during this exchange. The nurse told [the surgeon] he had not received report from the ED and the nurse spent several minutes in the room trying to reach the correct person in the ED. The NP indicated he had received report from the ED physician. However, the CRNA (nurse anesthetist) needed to know the drugs that had been given in the ED, so the nurse was going thru the record to get her the info."

The Rhode Island Board of Medical Licensure and Discipline, in a consent order, wrote that the physician "failed to make an accurate assessment of the location of the hematoma prior to performing the surgical evacuation." The State Department of Health found that "an initial review of this incident reveals hospital surgical safeguards are deficient and that some systems were not followed."

Representatives of both the Board and Department of Health declined to comment further.

**159 the surgeon yelled** In a statement, a representative of Rhode Island Hospital wrote "I believe [the surgeon] was the one who noticed that there was no bleeding—there are various versions as to what he said at that time. He asked for the films to be pulled up, confirmed the error and they proceeded to close and perform the procedure on the correct side. Except for [the surgeon's] comments, the staff said the room was very quiet once they realized the error."

**159 ever working at Rhode Island Hospital again** In the physician's letter responding to fact-checking inquiries, he wrote that "no one has claimed that this mistake cost [the patient] his life. The family never claimed wrongful death, and they personally expressed their gratitude to me for saving his life on that day. The hospital and the nurse practitioner combined paid more towards a \$140,000 settlement than I did." Rhode Island Hospital, when asked about this account, declined to comment.

**160 The book's bland cover and daunting** R. R. Nelson and S. G. Winter, *An Evolutionary Theory of Economic Change* (Cambridge, Mass.: Belknap Press of Harvard University Press, 1982).

**160 candidates didn't pretend to understand** R. R. Nelson and S. G. Winter, "The Schumpeterian Tradeoff Revisited," *The American Economic Review* 72 (1982): 114–32. Winter, in a note in response to fact-checking questions, wrote: "The 'Schumpeterian tradeoff' (subject of a 1982 AER paper and a kindred chapter, 14, in our book) was only a facet of the project, and not a motivating one. Nelson and I were discussing a collection of issues around technological change, economic growth and firm behavior long before 1982, long before we were together at Yale, and particularly at RAND in 1966–68. Nelson went to Yale in 1968; I went to Michigan that year and joined the Yale faculty in 1976. We were 'on the trail' of the 1982 book from 1967, and started publishing related work in 1973. . . . In short, while the 'Schumpeter' influence is obviously strong in the heritage, the specific 'Schumpeterian tradeoff' aspect is not."

**160 Within the world of business strategy** For an overview of subsequent research, see M. C. Becker, "Organizational Routines: A Review of the Literature," *Industrial and Corporate Change* 13 (2004): 643–78; Marta S. Feldman, "Organizational Routines as a Source of Continuous Change," *Organization Science* 11 (2000): 611–29.

**160 before arriving at their central conclusion** Winter, in a note in response to fact-checking questions, wrote: "There was very little empirical work of my own, and even less that got published—most of that being Nelson on aspects of technological change. In the domain of firm behavior, we mostly stood on the shoulders of the giants of the Carnegie School (Simon, Cyert, and March), and relied on a wide range of other sources—technology studies, business his-



ories, development economics, some psychologists . . . and Michael Polanyi, however you classify him."

**161 thousands of employees' independent decisions** Winter, in a note in response to fact-checking questions, clarified that such patterns that emerge from thousands of employees' independent decisions are an aspect of routines, but routines also "get shaped from a lot of directions, one of which is deliberate managerial design. We emphasized, however, that when that happens, the actual routine that emerges, as opposed to the nominal one that was deliberately designed, is influenced, again, by a lot of choices at the individual level, as well as other considerations (see book [*Evolutionary Theory of Economic Change*] p. 108)."

**161 These organizational habits—or "routines"** For more on the fascinating topic of how organizational routines emerge and work, see Paul S. Adler, Barbara Goldoftas, and David I. Levine, "Flexibility Versus Efficiency? A Case Study of Model Changeovers in the Toyota Production System," *Organization Science* 10 (1999): 43–67; B. E. Ashforth and Y. Fried, "The Mindlessness of Organisational Behaviors," *Human Relations* 41 (1988): 305–29; Donde P. Ashmos, Dennis Duchon, and Reuben R. McDaniel, "Participation in Strategic Decision Making: The Role of Organisational Predisposition and Issue Interpretation," *Decision Sciences* 29 (1998): 25–51; M. C. Becker, "The Influence of Positive and Negative Normative Feedback on the Development and Persistence of Group Routines," doctoral thesis, Purdue University, 2001; M. C. Becker and N. Lazaric, "The Role of Routines in Organizations: An Empirical and Taxonomic Investigation," doctoral thesis, Judge Institute of Management, University of Cambridge, 2004; Bessant, Caffyn, and Gallagher, "The Influence of Knowledge in the Replication of Routines," *Economie Appliquée* LVI, 65–94; "An Evolutionary Model of Continuous Improvement Behaviour," *Technovation* 21 (2001): 67–77; Tilmann Betsch, Klaus Fiedler, and Julia Brinkmann, "Behavioral Routines in Decision Making: The Effects of Novelty in Task Presentation and Time Pressure on Routine Maintenance and Deviation," *European Journal of Psychology* 28 (1998): 861–78; Tilmann Betsch et al., "When Prior Knowledge Overrides New Evidence: Adaptive Use of Decision Strategies and Role Behavioral Routines," *Swiss Journal of Psychology* 58 (1999): 151–60; Tilmann Betsch et al., "The Effects of Routine Strength on Adaptation and Information Search in Recurrent Decision Making," *Organisational Behaviour and Human Decision Processes* 84 (2001): 23–53; J. Burns, "The Dynamics of Accounting Change: Interplay Between New Practices, Routines, Institutions, Power, and Politics," *Accounting, Auditing and Accountability Journal* 13 (2000): 566–86; M. D. Cohen, "Individual Learning and Organisational Routine: Emerging Connections," *Organisation Science* 2 (1991): 135–39; M. Cohen and P. Bacdayan, "Organisational Routines Are Stored as Procedural

Memory: Evidence from a Laboratory Study," *Organisation Science* 5 (1994): 554–68; M. D. Cohen et al., "Routines and Other Recurring Action Patterns of Organisations: Contemporary Research Issues," *Industrial and Corporate Change* 5 (1996): 653–98; B. Coriat, "Variety, Routines, and Networks: The Metamorphosis of Fordist Firms," *Industrial and Corporate Change* 4 (1995): 205–27; B. Coriat and G. Dosi, "Learning How to Govern and Learning How to Solve Problems: On the Co-evolution of Competences, Conflicts, and Organisational Routines," in *The Role of Technology, Strategy, Organisation, and Regions*, ed. A. D. J. Chandler, P. Hadstroem, and O. Soelvell (Oxford: Oxford University Press, 1998); L. D'Adderio, "Configuring Software, Reconfiguring Memories: The Influence of Integrated Systems on the Reproduction of Knowledge and Routines," *Industrial and Corporate Change* 12 (2003): 321–50; P. A. David, *Path Dependence and the Quest for Historical Economics: One More Chorus of the Ballad of QWERTY* (Oxford: Oxford University Press, 1997); G. Delmestri, "Do All Roads Lead to Rome . . . or Berlin? The Evolution of Intra- and Inter-organisational Routines in the Machine-Building Industry," *Organisation Studies* 19 (1998): 639–65; Giovanni Dosi, Richard R. Nelson, and Sidney Winter, "Introduction: The Nature and Dynamics of Organisational Capabilities," *The Nature and Dynamics of Organisational Capabilities*, ed. G. Dosi, R. R. Nelson, and S. G. Winter (Oxford: Oxford University Press, 2000), 1–22; G. Dowell and A. Swaminathan, "Racing and Back-peddalling into the Future: New Product Introduction and Organisational Mortality in the US Bicycle Industry, 1880–1918," *Organisation Studies* 21 (2000): 405–31; A. C. Edmondson, R. M. Bohmer, and G. P. Pisano, "Disrupted Routines: Team Learning and New Technology Implementation in Hospitals," *Administrative Science Quarterly* 46 (2001): 685–716; M. Egidi, "Routines, Hierarchies of Problems, Procedural Behaviour: Some Evidence from Experiments," in *The Rational Foundations of Economic Behaviour*, ed. K. Arrow et al. (London: Macmillan, 1996), 303–33; M. S. Feldman, "Organisational Routines as a Source of Continuous Change," *Organisation Science* 11 (2000): 611–29; Marta S. Feldman, "A Performative Perspective on Stability and Change in Organizational Routines," *Industrial and Corporate Change* 12 (2003): 727–52; Marta S. Feldman and B. T. Pentland, "Reconceptualizing Organizational Routines as a Source of Flexibility and Change," *Administrative Science Quarterly* 48 (2003): 94–118; Marta S. Feldman and A. Rafaeli, "Organisational Routines as Sources of Connections and Understandings," *Journal of Management Studies* 39 (2002): 309–31; A. Garapin and A. Hollard, "Routines and Incentives in Group Tasks," *Journal of Evolutionary Economics* 9 (1999): 465–86; C. J. Gersick and J. R. Hackman, "Habitual Routines in Task-Performing Groups," *Organisational Behaviour and Human Decision Processes* 47 (1990): 65–97; R. Grant, "Toward a Knowledge-Based Theory of the Firm," *Strategic Management Journal* 17

(1996): 109–22; R. Heiner, "The Origin of Predictable Behaviour," *American Economic Review* 73 (1983): 560–95; G. M. Hodgson, "The Ubiquity of Habits and Rules," *Cambridge Journal of Economics* 21 (1997): 663–84; G. M. Hodgson, "The Mystery of the Routine: The Darwinian Destiny of An Evolutionary Theory of Economic Change," *Revue Économique* 54 (2003): 355–84; G. M. Hodgson and T. Knudsen, "The Firm as an Interactor: Firms as Vehicles for Habits and Routines," *Journal of Evolutionary Economics* 14, no. 3 (2004): 281–307; A. Inam, "Institutions, Routines, and Crises: Post-earthquake Housing Recovery in Mexico City and Los Angeles," doctoral thesis, University of Southern California, 1997; A. Inam, "Institutions, Routines, and Crises—Post-earthquake Housing Recovery in Mexico City and Los Angeles," *Cities* 16 (1999): 391–407; O. Jones and M. Craven, "Beyond the Routine: Innovation Management and the Teaching Company Scheme," *Technovation* 21 (2001): 267–79; M. Kilduff, "Performance and Interaction Routines in Multinational Corporations," *Journal of International Business Studies* 23 (1992): 133–45; N. Lazaric, "The Role of Routines, Rules, and Habits in Collective Learning: Some Epistemological and Ontological Considerations," *European Journal of Economic and Social Systems* 14 (2000): 157–71; N. Lazaric and B. Denis, "How and Why Routines Change: Some Lessons from the Articulation of Knowledge with ISO 9002 Implementation in the Food Industry," *Economies et Sociétés* 6 (2001): 585–612; B. Levitt and J. March, "Organisational Learning," *Annual Review of Sociology* 14 (1988): 319–40; P. Lillrank, "The Quality of Standard, Routine, and Nonroutine Processes," *Organization Studies* 24 (2003): 215–33; S. Massini et al., "The Evolution of Organizational Routines Among Large Western and Japanese Firms," *Research Policy* 31 (2002): 1333–48; T. J. McKeown, "Plans and Routines, Bureaucratic Bargaining, and the Cuban Missile Crisis," *Journal of Politics* 63 (2001): 1163–90; A. P. Minkler, "The Problem with Dispersed Knowledge: Firms in Theory and Practice," *Kyklos* 46 (1993): 569–87; P. Morosini, S. Shane, and H. Singh, "National Cultural Distance and Cross-Border Acquisition Performance," *Journal of International Business Studies* 29 (1998): 137–58; A. Narduzzo, E. Rocco, and M. Warglien, "Talking About Routines in the Field," in *The Nature and Dynamics of Organizational Capabilities*, ed. G. Dosi, R. Nelson, and S. Winter (Oxford: Oxford University Press, 2000), 27–50; R. R. Nelson, "Routines," in *The Elgar Companion to Institutional and Evolutionary Economics*, vol. 2, ed. G. Hodgson, W. Samuels, and M. Tool (Aldershot, U.K.: Edward Elgar, 1992), 249–53; B. T. Pentland, "Conceptualizing and Measuring Variety in the Execution of Organizational Work Processes," *Management Science* 49 (2003): 857–70; B. T. Pentland and H. Rueter, "Organisational Routines as Grammars of Action," *Administrative Sciences Quarterly* 39 (1994): 484–510; L. Perren and P. Grant, "The Evolution of Management Accounting Routines in Small Businesses: A Social Construction

Perspective," *Management Accounting Research* 11 (2000): 391–411; D. J. Phillips, "A Genealogical Approach to Organizational Life Chances: The Parent-Progeny Transfer Among Silicon Valley Law Firms, 1946–1996," *Administrative Science Quarterly* 47 (2002): 474–506; S. Postrel and R. Rumelt, "Incentives, Routines, and Self-Command," *Industrial and Corporate Change* 1 (1992): 397–425; P. D. Sherer, N. Rogovsky, and N. Wright, "What Drives Employment Relations in Taxicab Organisations?" *Organization Science* 9 (1998): 34–48; H. A. Simon, "Programs as Factors of Production," *Proceedings of the Nineteenth Annual Winter Meeting, 1966*, Industrial Relations Research Association, 1967, 178–88; L. A. Suchman, "Office Procedure as Practical Action: Models of Work and System Design," *ACM Transactions on Office Information Systems* 1 (1983): 320–28; G. Szulanski, "Appropriability and the Challenge of Scope: Banc One Routinizes Replication," in *Nature and Dynamics of Organisational Capabilities*, ed. G. Dosi, R. R. Nelson, and S. G. Winter (Oxford: Oxford University Press, 1999), 69–97; D. Tranfield and S. Smith, "The Strategic Regeneration of Manufacturing by Changing Routines," *International Journal of Operations and Production Management* 18 (1998): 114–29; Karl E. Weick, "The Vulnerable System: An Analysis of the Tenerife Air Disaster," *Journal of Management* 16 (1990): 571–93; Karl E. Weick, "The Collapse of Sensemaking in Organizations: The Mann-Gulch Disaster," *Administrative Science Quarterly* 38 (1993): 628–52; H. M. Weiss and D. R. Ilgen, "Routinized Behaviour in Organisations," *Journal of Behavioral Economics* 14 (1985): 57–67; S. G. Winter, "Economic 'Natural Selection' and the Theory of the Firm," *Yale Economic Essays* 4 (1964): 225–72; S. G. Winter, "Optimization and Evolution in the Theory of the Firm," in *Adaptive Economic Models*, ed. R. Day and T. Groves (New York: Academic Press, 1975), 73–118; S. G. Winter and G. Szulanski, "Replication as Strategy," *Organization Science* 12 (2001): 730–43; S. G. Winter and G. Szulanski, "Replication of Organisational Routines: Conceptualizing the Exploitation of Knowledge Assets," in *The Strategic Management of Intellectual Capital and Organisational Knowledge: A Collection of Readings*, ed. N. Bontis and C. W. Choo (New York: Oxford University Press, 2001), 207–21; M. Zollo, J. Reuer, and H. Singh, "Interorganizational Routines and Performance in Strategic Alliances," *Organization Science* 13 (2002): 701–13.

**161 hundreds of unwritten rules** Esbjorn Segelod, "The Content and Role of the Investment Manual: A Research Note," *Management Accounting Research* 8, no. 2 (1997): 221–31; Anne Marie Knott and Bill McKelvey, "Nirvana Efficiency: A Comparative Test of Residual Claims and Routines," *Journal of Economic Behavior and Organization* 38 (1999): 365–83; J. H. Gittel, "Coordinating Mechanisms in Care Provider Groups: Relational Coordination as a Mediator and Input Uncertainty as a Moderator of Performance Effects," *Management Science* 48 (2002): 1408–26; A. M. Knott and Hart Posen, "Firm

R&D Behavior and Evolving Technology in Established Industries," *Organization Science* 20 (2009): 352–67.

**161 companies need to operate** G. M. Hodgson, *Economics and Evolution* (Cambridge: Polity Press, 1993); Richard N. Langlois, "Transaction-Cost Economics in Real Time," *Industrial and Corporate Change* (1992): 99–127; R. R. Nelson, "Routines"; R. Coombs and J. S. Metcalfe, "Organizing for Innovation: Co-ordinating Distributed Innovation Capabilities," in *Competence, Governance, and Entrepreneurship*, ed. J. N. Foss and V. Mahnke (Oxford: Oxford University Press, 2000); R. Amit and M. Belcourt, "HRM Processes: A Value-Creating Source of Competitive Advantage," *European Management Journal* 17 (1999): 174–81.

**161 They provide a kind of "organizational memory"** G. Dosi, D. Teece, and S. G. Winter, "Toward a Theory of Corporate Coherence: Preliminary Remarks," in *Technology and Enterprise in a Historical Perspective*, ed. G. Dosi, R. Giannetti, and P. A. Toninelli (Oxford: Clarendon Press, 1992), 185–211; S. G. Winter, Y. M. Kaniovski, and G. Dosi, "A Baseline Model of Industry Evolution," *Journal of Evolutionary Economics* 13, no. 4 (2003): 355–83; B. Levitt and J. G. March, "Organizational Learning," *Annual Review of Sociology* 14 (1988): 319–40; D. Teece and G. Pisano, "The Dynamic Capabilities of Firms: An Introduction," *Industrial and Corporate Change* 3 (1994): 537–56; G. M. Hodgson, "The Approach of Institutional Economics," *Journal of Economic Literature* 36 (1998): 166–92; Phillips, "Genealogical Approach to Organizational Life Chances"; M. Zollo, J. Reuer, and H. Singh, "Interorganizational Routines and Performance in Strategic Alliances," *Organization Science* 13 (2002): 701–13; P. Lillrank, "The Quality of Standard, Routine, and Nonroutine Processes," *Organization Studies* 24 (2003): 215–33.

**162 Routines reduce uncertainty** M. C. Becker, "Organizational Routines: A Review of the Literature," *Industrial and Corporate Change* 13, no. 4 (2004): 643–78.

**162 But among the most important benefits** B. Coriat and G. Dosi, "Learning How to Govern and Learning How to Solve Problems: On the Co-evolution of Competences, Conflicts, and Organisational Routines," in *The Role of Technology, Strategy, Organisation, and Regions*, ed. A. D. J. Chandler, P. Hadstroem, and O. Soelvell (Oxford: Oxford University Press, 1998); C. I. Barnard, *The Functions of the Executive* (Cambridge, Mass.: Harvard University Press, 1938); P. A. Mangolte, "La dynamique des connaissances tacites et articulées: une approche socio-cognitive," *Economie Appliquée* 50, no. 2 (1997): 105–34; P. A. Mangolte, "Le concept de 'routine organisationnelle' entre cognition et institution," doctoral thesis, Université Paris-Nord, U.F.R. de Sciences Economiques et de Gestion, Centre de Recherche en Economie Industrielle, 1997; P. A. Mangolte, "Organisational Learning and the Organisational Link: The Problem of

Conflict, Political Equilibrium and Truce," *European Journal of Economic and Social Systems* 14 (2000): 173–90; N. Lazaric and P. A. Mangolte, "Routines et mémoire organisationnelle: un questionnement critique de la perspective cognitiviste," *Revue Internationale de Systémique* 12 (1998): 27–49; N. Lazaric and B. Denis, "How and Why Routines Change: Some Lessons from the Articulation of Knowledge with ISO 9002 Implementation in the Food Industry," *Economies et Sociétés* 6 (2001): 585–612; N. Lazaric, P. A. Mangolte, and M. L. Massué, "Articulation and Codification of Know-How in the Steel Industry: Some Evidence from Blast Furnace Control in France," *Research Policy* 32 (2003): 1829–47; J. Burns, "The Dynamics of Accounting Change: Interplay Between New Practices, Routines, Institutions, Power, and Politics," *Accounting, Auditing and Accountability Journal* 13 (2000): 566–86.

**163 you'll probably get taken care of over time** Winter, in a note in response to fact-checking questions, wrote: "The 'routine as truce' formulation has turned out to have particularly long legs, and I think that is because anybody with some experience in working inside an organization quickly recognizes it as a convenient label for the sorts of goings-on that they are very familiar with. . . . But some of your example about the salesperson evokes issues of trust, cooperation, and organizational culture that go beyond the scope of 'routine as truce.' Those are subtle issues, which can be illuminated from a variety of directions. The 'routine as truce' idea is a lot more specific than related ideas about 'culture.' It says, 'If you, Mr. or Ms. Manager, VISIBLY DEFECT from a widely shared understanding of 'how we do things around here,' you are going to encounter strong resistance, fueled by levels of suspicion about your motives that are far beyond anything you might reasonably expect. And if these responses are not entirely independent of the quality of the arguments you advance, they will be so nearly independent that you will find it hard to see any difference.' So, for example, suppose we take your 'red this year' example down the road a bit, into the implementation phase, where enormous effort has gone into making sure that the red on the sweater is the same on the catalog cover and on catalog p. 17, and both of those match what is in the CEO's head, and that red is also the same one produced in response to contracts with suppliers in Malaysia, Thailand, and Guatemala. That stuff is at the other end of the routines spectrum from the decision on 'red'; people are engaged in complex coordinated behavior—it is more like the semiconductor case. People in the organization think they know what they are doing (because they did more or less the same with the green pullovers featured last year), and they are working like hell to do it, more or less on time. This is guts management stuff, and it is very hard work, thanks partly, in this case, to the (alleged) fact that the human eye can distinguish 7 million different colors. Into that, YOU, Mr. or Ms. Manager, come in and say 'Sorry, it's a mistake, it

should be purple. I know we are well down the road with our commitment to red, but hear me out, because . . . ' If you have lined up strong allies in the organization who also favor a belated switch to purple, you have just touched off another battle in the 'civil war,' with uncertain consequence. If you don't have such allies, your espoused cause and you are both dead in the organization, in short order. And it doesn't matter what logic and evidence you offer following your 'because.'"

**163 of throwing a rival overboard** Nelson and Winter, *Evolutionary Theory of Economic Change*, 110.

**165 But that's not enough** Rik Wenting, "Spinoff Dynamics and the Spatial Formation of the Fashion Design Industry, 1858–2005," *Journal of Economic Geography* 8, no. 5 (2008): 593–614. Wenting, in a response to fact-checking questions, wrote: "Nelson and Winter speak of organisational routines as repetitive collective actions which determine firm behaviour and performance. Notably they argue that routines are hard to codify and part of company culture, and as such are hard to change. Also, routines are a major reason why firms differ in their performance and the continued difference over time between firms. The literature started by Steven Klepper interpreted this aspect of routines as part of the reason why spinoffs are in performance similar to their parents. I use this same reasoning in the fashion design industry: fashion design entrepreneurs form to a large extent their new firm's blueprint based on the organisational routines learned at their former employer. In my PhD research, I found evidence that from the start of the haute couture industry (1858 Paris), spinoff designer firms (whether located in NY, Paris, Milan or London, etc.) do indeed have a similar performance as their motherfirms."

**165 and found the right alliances** Details regarding truces—as opposed to routines—within the fashion industry draw on interviews with designers themselves. Wenting, in a response to fact-checking questions, wrote: "Note that I do not speak of truces between entrepreneur and former employer. This is an extension of the organisational routines literature I did not specifically explore. However, in my research on the 'inheritance' effect between mother-firm and spinoff, the role of 'reputation' and 'social network' are often times mentioned by designers in how they experience advantages of their mother company."

**166 Philip Brickell, a forty-three-year-old** Rodney Cowton and Tony Dawe, "Inquiry Praises PC Who Helped to Fight King's Cross Blaze," *The Times*, February 5, 1988.

**166 at the bottom of a nearby escalator** Details on this incident come from a variety of sources, including interviews, as well as D. Fennell, *Investigation into the King's Cross Underground Fire* (Norwich, U.K.: Stationery Office Books,

1988); P. Chambers, *Body 115: The Story of the Last Victim of the King's Cross Fire* (New York: John Wiley and Sons, 2006); K. Moodie, "The King's Cross Fire: Damage Assessment and Overview of the Technical Investigation," *Fire Safety Journal* 18 (1992): 13–33; A. F. Roberts, "The King's Cross Fire: A Correlation of the Eyewitness Accounts and Results of the Scientific Investigation," *Fire Safety Journal*, 1992; "Insight: Kings Cross," *The Sunday Times*, November 22, 1987; "Relatives Angry Over Tube Inquest; King's Cross Fire," *The Times*, October 5, 1988.

**169 if they aren't designed just right** In the Fennell report, the investigator was ambiguous about how much of the tragedy could have been averted if the burning tissue had been reported. The Fennell report is deliberately agnostic about this point: "It will remain a matter of conjecture what would have happened if the London Fire Brigade had been summoned to deal with the burning tissue. . . . It is a matter of speculation what course things would have taken if he had followed the new procedure and called the London Fire Brigade immediately."

**173 "Why didn't someone take charge?"** "Answers That Must Surface—The King's Cross Fire Is Over but the Controversy Continues," *The Times*, December 2, 1987; "Businessman Praised for Rescuing Two from Blazing Station Stairwell; King's Cross Fire Inquest," *The Times*, October 6, 1998.

**175 responsibility for passengers' safety** In a statement in response to fact-checking questions, a spokesman for London Underground and Rail wrote: "London Underground has given this careful consideration and will not, on this occasion, be able to provide further comment or assistance on this. LU's response to the King's Cross fire and the organisational changes made to address the issues are well-documented, and the sequence of events leading to the fire is covered in great detail in Mr Fennell's report, so LU does not consider it necessary to add more comment to the already large body of work on the matter. I appreciate this is not the response you were hoping for."

**176 the hospital was fined another \$450,000** Felice Freyer, "Another Wrong-Site Surgery at R.I. Hospital," *The Providence Journal*, October 28, 2009; "Investigators Probing 5th Wrong-Site Surgery at Rhode Island Hospital Since 2007," Associated Press, October 23, 2009; "R.I. Hospital Fined \$150,000 in 5th Wrong-Site Surgery Since 2007, Video Cameras to Be Installed," Associated Press, November 2, 2009; Letter to Rhode Island Hospital from Rhode Island Department of Health, November 2, 2009; Letter to Rhode Island Hospital from Rhode Island Department of Health, October 26, 2010; Letter to Rhode Island Hospital from Centers for Medicare and Medicaid Services, October 25, 2010.

**176 "The problem's not going away,"** "The Problem's Not Going Away": Mis-

takes Lead to Wrong-Side Brain Surgeries at R.I. Hospital," Associated Press, December 15, 2007.

**176 "everything was out of control."** In a statement, a Rhode Island Hospital spokeswoman wrote: "I never heard of any reporter 'ambushing' a doctor—and never saw any such incident on any of the news stations. While I can't comment on individual perceptions, the quote implies a media frenzy, which did not happen. While the incidents received national attention, none of the national media came to Rhode Island."

**176 a sense of crisis emerged** In a statement, a Rhode Island Hospital spokeswoman wrote: "I would not describe the atmosphere as being one of crisis—it was more accurately one of demoralization among many. Many people felt beleaguered."

**177 to make sure time-outs occurred** The cameras were installed as part of a consent order with the state's department of health.

**177 A computerized system** Rhode Island Hospital Surgical Safety Backgrounder, provided by hospital administrators. More information on Rhode Island Hospital's safety initiatives is available at <http://rhodeislandhospital.org/>.

**177 But once a sense of crisis gripped** For more on how crises can create an atmosphere where change is possible in medicine, and how wrong-site surgeries occur, see Douglas McCarthy and David Blumenthal, "Stories from the Sharp End: Case Studies in Safety Improvement," *Milbank Quarterly* 84 (2006): 165–200; J. W. Senders et al., "The Ego-centric Surgeon or the Roots of Wrong Side Surgery," *Quality and Safety in Health Care* 17 (2008): 396–400; Mary R. Kwaan et al., "Incidence, Patterns, and Prevention of Wrong-Site Surgery," *Archives of Surgery* 141, no. 4 (April 2006): 353–57.

**177 Other hospitals have made similar** For a discussion on this topic, see McCarthy and Blumenthal, "Stories from the Sharp End"; Atul Gawande, *Better: A Surgeon's Notes on Performance* (New York: Metropolitan Books, 2008); Atul Gawande, *The Checklist Manifesto: How to Get Things Right* (New York: Metropolitan Books, 2009).

**178 In the wake of that tragedy** NASA, "Report to the President: Actions to Implement the Recommendations of the Presidential Commission on the Space Shuttle Challenger Accident," July 14, 1986; Matthew W. Seeger, "The Challenger Tragedy and Search for Legitimacy," *Communication Studies* 37, no. 3 (1986): 147–57; John Noble Wilford, "New NASA System Aims to Encourage Blowing the Whistle," *The New York Times*, June 5, 1987; Joseph Lorenzo Hall, "Columbia and Challenger: Organizational Failure at NASA," *Space Policy* 19, no. 4 (November 2003), 239–47; Barbara Romzek and Melvin Dubnick, "Ac-

countability in the Public Sector: Lessons from the Challenger Tragedy," *Public Administration Review* 47, no. 3 (May–June 1987): 227–38.

**178 Then, a runaway error** Karl E. Weick, "The Vulnerable System: An Analysis of the Tenerife Air Disaster," *Journal of Management* 16, no. 3 (1990): 571–93; William Evan and Mark Manion, *Minding the Machines: Preventing Technological Disasters* (Upper Saddle River, N.J.: Prentice Hall Professional, 2002); Raimo P. Hämmäläinen and Esa Saarinen, *Systems Intelligence: Discovering a Hidden Competence in Human Action and Organizational Life* (Helsinki: Helsinki University of Technology, 2004).

## CHAPTER SEVEN

**186 grab an extra box** The details on subconscious tactics retailers use comes from Jeremy Caplan, "Supermarket Science," *Time*, May 24, 2007; Paco Underhill, *Why We Buy: The Science of Shopping* (New York: Simon and Schuster, 2000); Jack Hitt, "The Theory of Supermarkets," *The New York Times*, March 10, 1996; "The Science of Shopping: The Way the Brain Buys," *The Economist*, December 20, 2008; "Understanding the Science of Shopping," *Talk of the Nation*, National Public Radio, December 12, 2008; Malcolm Gladwell, "The Science of Shopping," *The New Yorker*, November 4, 1996.

**186 to buy almost anything** There are literally thousands of studies that have scrutinized how habits influence consumer behaviors—and how unconscious and semi-conscious urges influence decisions that might otherwise seem immune from habitual triggers. For more on these fascinating topics, see H. Aarts, A. van Knippenberg, and B. Verplanken, "Habit and Information Use in Travel Mode Choices," *Acta Psychologica* 96, nos. 1–2 (1997): 1–14; J. A. Bargh, "The Four Horsemen of Automaticity: Awareness, Efficiency, Intention, and Control in Social Cognition," in *Handbook of Social Cognition*, ed. R. S. Wyer, Jr., and T. K. Srull (Hillsdale, N.J.: Lawrence Erlbaum Associates, 1994); D. Bell, T. Ho, and C. Tang, "Determining Where to Shop: Fixed and Variable Costs of Shopping," *Journal of Marketing Research* 35, no. 3 (1998): 352–69; T. Betsch, S. Haberstroh, B. Molter, A. Glöckner, "Oops, I Did It Again—Relapse Errors in Routinized Decision Making," *Organizational Behavior and Human Decision Processes* 93, no. 1 (2004): 62–74; M. Cunha, C. Janiszewski, Jr., and J. Laran, "Protection of Prior Learning in Complex Consumer Learning Environments," *Journal of Consumer Research* 34, no. 6 (2008): 850–64; H. Aarts, U. Danner, and N. de Vries, "Habit Formation and Multiple Means to Goal Attainment: Repeated Retrieval of Target Means Causes Inhibited Access to Competitors," *Personality and Social Psychology Bulletin* 33, no. 10 (2007): 1367–79; E. Ferguson and P. Bibby, "Predicting Future Blood Donor Returns: Past Behavior, Inten-

sumer Research 34, no. 4 (2007): 556–66; C. Cole, M. Lee, and C. Yoon, "Consumer Decision Making and Aging: Current Knowledge and Future Directions," *Journal of Consumer Psychology* 19 (2009): 2–16; S. Dhar, A. Krishna, and Z. Zhang, "The Optimal Choice of Promotional Vehicles: Front-Loaded or Rear-Loaded Incentives?" *Management Science* 46, no. 3 (2000): 348–62.

**186 "potato chips are on sale!"** C. Park, E. Iyer, and D. Smith, "The Effects of Situational Factors on In-Store Grocery Shopping Behavior: The Role of Store Environment and Time Available for Shopping," *The Journal of Consumer Research* 15, no. 4 (1989): 422–33. For more on this topic, see J. Belyavsky Bayuk, C. Janiszewski, and R. Leboeuf, "Letting Good Opportunities Pass Us By: Examining the Role of Mind-set During Goal Pursuit," *Journal of Consumer Research* 37, no. 4 (2010): 570–83; Ab Litt and Zakary L. Tormala, "Fragile Enhancement of Attitudes and Intentions Following Difficult Decisions," *Journal of Consumer Research* 37, no. 4 (2010): 584–98.

**187 University of Southern California** D. Neal and W. Wood, "The Habitual Consumer," *Journal of Consumer Psychology* 19, no. 4 (2009): 579–92. For more on similar research, see R. Fazio and M. Zanna, "Direct Experience and Attitude–Behavior Consistency," in *Advances in Experimental Social Psychology*, ed. L. Berkowitz (New York: Academic Press, 2005); R. Abelson and R. Schank, "Knowledge and Memory: The Real Story," in *Knowledge and Memory: The Real Story*, ed. R. S. Wyer, Jr. (Hillsdale, N.J.: Lawrence Erlbaum, 2004); Nobert Schwarz, "Meta-Cognitive Experiences in Consumer Judgment and Decision Making," *Journal of Consumer Psychology* 14, no. 4 (September 2004): 332–48; R. Wyer and A. Xu, "The Role of Behavioral Mindsets in Goal-Directed Activity: Conceptual Underpinnings and Empirical Evidence," *Journal of Consumer Psychology* 20, no. 2 (2010): 107–25.

**188 news or deals on cigarettes** Julia Angwin and Steve Stecklow, "'Scrapers' Dig Deep for Data on Web," *The Wall Street Journal*, October 12, 2010; Mark Maremont and Leslie Scism, "Insurers Test Data Profiles to Identify Risky Clients," *The Wall Street Journal*, November 19, 2010; Paul Sonne and Steve Stecklow, "Shunned Profiling Technology on the Verge of Comeback," *The Wall Street Journal*, November 24, 2010.

**189 Pole flashed a slide** This slide is from a keynote speech by Pole at Predicted Analytics World, New York, October 20, 2009. It is no longer available online. Additionally, see Andrew Pole, "Challenges of Incremental Sales Modeling in Direct Marketing."

**192 buying different brands of beer** It's difficult to make specific correlations between types of life changes and specific products. So, while we know that people who move or get divorced will change their buying patterns, we don't know that divorce always influences beer, or that a new home always in-

fluences cereal purchases. But the general trend holds. Alan Andreasen, "Life Status Changes and Changes in Consumer Preferences and Satisfaction," *Journal of Consumer Research* 11, no. 3 (1984): 784–94. For more on this topic, see E. Lee, A. Mathur, and G. Moschis, "A Longitudinal Study of the Effects of Life Status Changes on Changes in Consumer Preferences," *Journal of the Academy of Marketing Science* 36, no. 2 (2007): 234–46; L. Euehun, A. Mathur, and G. Moschis, "Life Events and Brand Preferences Changes," *Journal of Consumer Behavior* 3, no. 2 (2003): 129–41.

**192 and they care quite a bit** For more on the fascinating topic of how particular moments offer opportunities for marketers (or government agencies, health activists, or anyone else, for that matter) to influence habits, see Bas Verplanken and Wendy Wood, "Interventions to Break and Create Consumer Habits," *Journal of Public Policy and Marketing* 25, no. 1 (2006): 90–103; D. Albarracín, A. Earl, and J. C. Gillette, "A Test of Major Assumptions About Behavior Change: A Comprehensive Look at the Effects of Passive and Active HIV-Prevention Interventions Since the Beginning of the Epidemic," *Psychological Bulletin* 131, no. 6 (2005): 856–97; T. Betsch, J. Brinkmann, and K. Fiedler, "Behavioral Routines in Decision Making: The Effects of Novelty in Task Presentation and Time Pressure on Routine Maintenance and Deviation," *European Journal of Social Psychology* 28, no. 6 (1998): 861–78; L. Breslow, "Social Ecological Strategies for Promoting Healthy Lifestyles," *American Journal of Health Promotion* 10, no. 4 (1996): 253–57; H. Buddelmeyer and R. Wilkins, "The Effects of Smoking Ban Regulations on Individual Smoking Rates," Melbourne Institute Working Paper Series no. 1737, Melbourne Institute of Applied Economic and Social Research, University of Melbourne, 2005; P. Butterfield, "Thinking Upstream: Nurturing a Conceptual Understanding of the Societal Context of Health Behavior," *Advances in Nursing Science* 12, no. 2 (1990): 1–8; J. Derzon and M. Lipsey, "A Meta-Analysis of the Effectiveness of Mass Communication for Changing Substance-Use Knowledge, Attitudes, and Behavior," in *Mass Media and Drug Prevention: Classic and Contemporary Theories and Research*, ed. W. D. Crano and M. Burgoon (East Sussex, U.K.: Psychology, 2001); R. Fazio, J. Ledbetter, and T. Ledbetter, "On the Costs of Accessible Attitudes: Detecting That the Attitude Object Has Changed," *Journal of Personality and Social Psychology* 78, no. 2 (2000): 197–210; S. Fox et al., "Competitive Food Initiatives in Schools and Overweight in Children: A Review of the Evidence," *Wisconsin Medical Journal* 104, no. 8 (2005): 38–43; S. Fujii, T. Gärling, and R. Kitamura, "Changes in Drivers' Perceptions and Use of Public Transport During a Freeway Closure: Effects of Temporary Structural Change on Cooperation in a Real-Life Social Dilemma," *Environment and Behavior* 33, no. 6 (2001): 796–808; T. Heatherton and P. Nichols, "Personal Accounts of Successful Versus Failed Attempts at Life Change," *Personality and Social Psy-*

*Journal of Neuroscience* 27, no. 2 (2007): 308–14; D. Levitin and V. Menon, "Musical Structure Is Processed in 'Language' Areas of the Brain: A Possible Role for Brodmann Area 47 in Temporal Coherence," *NeuroImage* 20, no. 4 (2003): 2142–52; J. Chen, V. Penhume, and R. Zatorre, "When the Brain Plays Music: Auditory-Motor Interactions in Music Perception and Production," *Nature Reviews Neuroscience* 8, 547–58.

**202 a cacophony of noise** N. S. Rickard and D. Ritossa, "The Relative Utility of 'Pleasantness' and 'Liking' Dimensions in Predicting the Emotions Expressed by Music," *Psychology of Music* 32, no. 1 (2004): 5–22; G. Berns, C. Capra, and S. Moore, "Neural Mechanisms of the Influence of Popularity on Adolescent Ratings of Music," *NeuroImage* 49, no. 3 (2010): 2687–96; David Hargreaves and Adrian North, "Subjective Complexity, Familiarity, and Liking for Popular Music," *Psychomusicology* 14, no. 1996 (1995): 77–93. For more on this fascinating topic of how familiarity influences attractiveness across numerous senses, see also G. Berns, S. McClure, and G. Pagnoni, "Predictability Modulates Human Brain Response to Reward," *Journal of Neuroscience* 21, no. 8 (2001): 2793–98; D. Brainard, "The Psychophysics Toolbox," *Spatial Vision* 10 (1997): 433–36; J. Cloutier, T. Heatherton, and P. Whalen, "Are Attractive People Rewarding? Sex Differences in the Neural Substrates of Facial Attractiveness," *Journal of Cognitive Neuroscience* 20, no. 6 (2008): 941–51; J. Kable and P. Glimcher, "The Neural Correlates of Subjective Value During Intertemporal Choice," *Nature Neuroscience* 10, no. 12 (2007): 1625–33; S. McClure et al., "Neural Correlates of Behavioral Preference for Culturally Familiar Drinks," *Neuron* 44, no. 2 (2004): 379–87; C. J. Assad and Padoa-Schioppa, "Neurons in the Orbitofrontal Cortex Encode Economic Value," *Nature* 441, no. 7090 (2006): 223–26; H. Plassmann et al., "Marketing Actions Can Modulate Neural Representations of Experienced Pleasantness," *Proceedings of the National Academy of Science* 105, no. 3 (2008): 1050–54; Muzafer Sherif, *The Psychology of Social Norms* (New York: Harper and Row, 1936); Wendy Wood, "Attitude Change: Persuasion and Social Influence," *Annual Review of Psychology* 51 (2000): 539–70; Gustave Le Bon, *The Crowd: A Study of the Popular Mind* (Mineola, N.Y.: Dover Publications, 2001); G. Berns et al., "Neural Mechanisms of Social Influence in Consumer Decisions," working paper, 2009; G. Berns et al., "Nonlinear Neurobiological Probability Weighting Functions for Aversive Outcomes," *NeuroImage* 39, no. 4 (2008): 2047–57; G. Berns et al., "Neurobiological Substrates of Dread," *Science* 312, no. 5 (2006): 754–58; G. Berns, J. Chappelow, and C. Zink, "Neurobiological Correlates of Social Conformity and Independence During Mental Rotation," *Biological Psychiatry* 58, no. 3 (2005): 245–53; R. Bettman, M. Luce, and J. Payne, "Constructive Consumer Choice Processes," *Journal of Consumer Research* 25, no. 3 (1998): 187–217; A. Blood and R. Zatorre, "Intensely Pleasurable Responses to Music

Correlate with Activity in Brain Regions Implicated in Reward and Emotion," *Proceedings of the National Academy of Science* 98, no. 20 (2001): 11818–23; C. Camerer, G. Loewenstein, and D. Prelec, "Neuroeconomics: How Neuroscience Can Inform Economics," *Journal of Economic Literature* 43, no. 1 (2005): 9–64; C. Capra et al., "Neurobiological Regret and Rejoice Functions for Aversive Outcomes," *NeuroImage* 39, no. 3 (2008): 1472–84; H. Critchley et al., "Neural Systems Supporting Interoceptive Awareness," *Nature Neuroscience* 7, no. 2 (2004): 189–95; H. Bayer, M. Dorris, and P. Glimcher, "Physiological Utility Theory and the Neuroeconomics of Choice," *Games and Economic Behavior* 52, no. 2, 213–56; M. Brett and J. Grahn, "Rhythm and Beat Perception in Motor Areas of the Brain," *Journal of Cognitive Neuroscience* 19, no. 5 (2007): 893–906; A. Hampton and J. O'Doherty, "Decoding the Neural Substrates of Reward-Related Decision-Making with Functional MRI," *Proceedings of the National Academy of Science* 104, no. 4 (2007): 1377–82; J. Birk et al., "The Cortical Topography of Tonal Structures Underlying Western Music," *Science* 298 (2002): 2167–70; B. Knutson et al., "Neural Predictors of Purchases," *Neuron* 53, no. 1 (2007): 147–56; B. Knutson et al., "Distributed Neural Representation of Expected Value," *Journal of Neuroscience* 25, no. 19 (2005): 4806–12; S. Koelsch, "Neural Substrates of Processing Syntax and Semantics in Music," *Current Opinion in Neurobiology* 15, no. 2 (2005): 207–12; T. Fritz et al., "Adults and Children Processing Music: An fMRI Study," *NeuroImage* 25 (2005): 1068–76; T. Fritz et al., "Investigating Emotion with Music: An fMRI Study," *Human Brain Mapping* 27 (2006): 239–50; T. Koyama et al., "The Subjective Experience of Pain: Where Expectations Becomes Reality," *Proceedings of the National Academy of Science* 102, no. 36 (2005): 12950–55; A. Lahav, E. Saltzman, and G. Schlaug, "Action Representation of Sound: Audiomotor Recognition Network While Listening to Newly Acquired Actions," *Journal of Neuroscience* 27, no. 2 (2007): 308–14; D. Levitin and V. Menon, "Musical Structure Is Processed in 'Language' Areas of the Brain: A Possible Role for Brodmann Area 47 in Temporal Coherence," *NeuroImage* 20, no. 4 (2003): 2142–52; G. Berns and P. Montague, "Neural Economics and the Biological Substrates of Valuation," *Neuron* 36 (2002): 265–84; C. Camerer, P. Montague, and A. Rangel, "A Framework for Studying the Neurobiology of Value-Based Decision Making," *Nature Reviews Neuroscience* 9 (2008): 545–56; C. Chafe et al., "Neural Dynamics of Event Segmentation in Music: Converging Evidence for Dissociable Ventral and Dorsal Networks," *Neuron* 55, no. 3 (2007): 521–32; Damian Ritossa and Nikki Rickard, "The Relative Utility of 'Pleasantness' and 'Liking' Dimensions in Predicting the Emotions Expressed by Music," *Psychology of Music* 32, no. 1 (2004): 5–22; Gregory S. Berns et al., "Neural Mechanisms of the Influence of Popularity on Adolescent Ratings of Music," *NeuroImage* 49, no. 3 (2010): 2687–96; Adrian North and David Hargreaves, "Subjective Complexity, Famil-

ilarity, and Liking for Popular Music," *Psychomusicology* 14, nos. 1–2 (1995): 77–93; Walter Ritter, Elyse Sussman, and Herbert Vaughan, "An Investigation of the Auditory Streaming Effect Using Event-Related Brain Potentials," *Psychophysiology* 36, no. 1 (1999): 22–34; Elyse Sussman, Rika Takegata, and István Winkler, "Event-Related Brain Potentials Reveal Multiple Stages in the Perceptual Organization of Sound," *Cognitive Brain Research* 25, no. 1 (2005): 291–99; Isabelle Peretz and Robert Zatorre, "Brain Organization for Music Processing," *Annual Review of Psychology* 56, no. 1 (2005): 89–114.

**204 a black market for poultry** Charles Grutzner, "Horse Meat Consumption by New Yorkers Is Rising," *The New York Times*, September 25, 1946.

**205 camouflage it in everyday garb** It is worth noting that this was only one of the committee's many findings (which ranged far and wide). For a fascinating study on the committee and its impacts, see Brian Wansink, "Changing Eating Habits on the Home Front: Lost Lessons from World War II Research," *Journal of Public Policy and Marketing* 21, no. 1 (2002): 90–99.

**205 present-day researcher** Wansink, "Changing Eating Habits on the Home Front."

**206 cheer for steak and kidney pie** Brian Wansink, *Marketing Nutrition: Soy, Functional Foods, Biotechnology, and Obesity* (Champaign: University of Illinois, 2007).

**206 it was up 50 percent** Dan Usher, "Measuring Real Consumption from Quantity Data, Canada 1935–1968," in *Household Production and Consumption*, ed. Nestor Terleckyj (New York: National Bureau of Economic Research, 1976). It's very hard to get U.S. data on offal consumption, and so these calculations are based on Canadian trends, where data on the topic is more plentiful. In interviews, U.S. officials said that Canada is a fair proxy for U.S. trends. The calculations in Usher's paper draw on calculations of "canned meat," which contained offal.

**210 "sizable increases in trips and sales"** Target Corporation Analyst Meeting, October 18, 2005.

## CHAPTER EIGHT

**215 a ten-cent fare into the till** For my understanding of the Montgomery bus boycott, I am indebted to those historians who have made themselves available to me, including John A. Kirk and Taylor Branch. My understanding of these events also draws on John A. Kirk, *Martin Luther King, Jr.: Profiles in Power* (New York: Longman, 2004); Taylor Branch, *Parting the Waters: America in the King Years, 1954–63* (New York: Simon and Schuster, 1988); Taylor Branch, *Pillar of Fire: America in the King Years, 1963–65* (New York:

Simon and Schuster, 1998); Taylor Branch, *At Canaan's Edge: America in the King Years, 1965–68* (New York: Simon and Schuster, 2006); Douglas Brinkley, *Mine Eyes Have Seen the Glory: The Life of Rosa Parks* (London: Weidenfeld and Nicolson, 2000); Martin Luther King, Jr., *Stride Toward Freedom: The Montgomery Story* (New York: Harper and Brothers, 1958); Clayborne Carson, ed., *The Papers of Martin Luther King, Jr.*, vol. 1, *Called to Serve* (Berkeley: University of California, 1992), vol. 2, *Rediscovering Precious Values* (1994), vol. 3, *Birth of a New Age* (1997), vol. 4, *Symbol of the Movement* (2000), vol. 5, *Threshold of a New Decade* (2005); Aldon D. Morris, *The Origins of the Civil Rights Movement* (New York: Free Press, 1986); James Forman, *The Making of Black Revolutionaries* (Seattle: University of Washington, 1997). Where not cited, facts draw primarily from those sources.

**216 "You may do that," Parks said** Henry Hampton and Steve Fayer, eds., *Voices of Freedom: An Oral History of the Civil Rights Movement from the 1950s Through the 1980s* (New York: Bantam Books, 1995); Rosa Parks, *Rosa Parks: My Story* (New York: Puffin, 1999).

**216 "the law is the law"** John A. Kirk, *Martin Luther King, Jr.: Profiles in Power* (New York: Longman, 2004).

**217 a three-part process** For more on the sociology of movements, see G. Davis, D. McAdam, and W. Scott, *Social Movements and Organizations* (New York: Cambridge University, 2005); Robert Crain and Rita Mahard, "The Consequences of Controversy Accompanying Institutional Change: The Case of School Desegregation," *American Sociological Review* 47, no. 6 (1982): 697–708; Azza Salama Layton, "International Pressure and the U.S. Government's Response to Little Rock," *Arkansas Historical Quarterly* 56, no. 3 (1997): 257–72; Brendan Nelligan, "The Albany Movement and the Limits of Nonviolent Protest in Albany, Georgia, 1961–1962," Providence College Honors Thesis, 2009; Charles Tilly, *Social Movements, 1768–2004* (London: Paradigm, 2004); Andrew Walder, "Political Sociology and Social Movements," *Annual Review of Sociology* 35 (2009): 393–412; Paul Almeida, *Waves of Protest: Popular Struggle in El Salvador, 1925–2005* (Minneapolis: University of Minnesota, 2008); Robert Benford, "An Insider's Critique of the Social Movement Framing Perspective," *Sociological Inquiry* 67, no. 4 (1997): 409–30; Robert Benford and David Snow, "Framing Processes and Social Movements: An Overview and Assessment," *Annual Review of Sociology* 26 (2000): 611–39; Michael Burawoy, *Manufacturing Consent: Changes in the Labor Process Under Monopoly Capitalism* (Chicago: University of Chicago, 1979); Carol Conell and Kim Voss, "Formal Organization and the Fate of Social Movements: Craft Association and Class Alliance in the Knights of Labor," *American Sociological Review* 55, no. 2 (1990): 255–69; James Davies, "Toward a Theory of Revolution," *American Sociological Review* 27, no. 1 (1962): 5–18; William Gamson, *The Strategy of Social Protest* (Homewood,



- Ill.: Dorsey, 1975); Robert Benford, "An Insider's Critique of the Social Movement Framing Perspective," *Sociological Inquiry* 67, no. 4 (1997): 409–30; Jeff Goodwin, *No Other Way Out: States and Revolutionary Movements, 1945–1991* (New York: Cambridge University, 2001); Jeff Goodwin and James Jasper, eds., *Rethinking Social Movements: Structure, Meaning, and Emotion* (Lanham, Md.: Rowman and Littlefield, 2003); Roger Gould, "Multiple Networks and Mobilization in the Paris Commune, 1871," *American Sociological Review* 56, no. 6 (1991): 716–29; Joseph Gusfield, "Social Structure and Moral Reform: A Study of the Woman's Christian Temperance Union," *American Journal of Sociology* 61, no. 3 (1955): 221–31; Doug McAdam, *Political Process and the Development of Black Insurgency, 1930–1970* (Chicago: University of Chicago, 1982); Doug McAdam, "Recruitment to High-Risk Activism: The Case of Freedom Summer," *American Journal of Sociology* 92, no. 1 (1986): 64–90; Doug McAdam, "The Biographical Consequences of Activism," *American Sociological Review* 54, no. 5 (1989): 744–60; Doug McAdam, "Conceptual Origins, Current Problems, Future Directions," in *Comparative Perspectives on Social Movements: Political Opportunities, Mobilizing Structures, and Cultural Framings*, ed. Doug McAdam, John McCarthy, and Mayer Zald (New York: Cambridge University, 1996); Doug McAdam and Ronnelle Paulsen, "Specifying the Relationship Between Social Ties and Activism," *American Journal of Sociology* 99, no. 3 (1993): 640–67; D. McAdam, S. Tarrow, and C. Tilly, *Dynamics of Contention* (Cambridge: Cambridge University, 2001); Judith Stepan-Norris and Judith Zeitlin, "'Who Gets the Bird?' or, How the Communists Won Power and 'Trust in America's Unions,'" *American Sociological Review* 54, no. 4 (1989): 503–23; Charles Tilly, *From Mobilization to Revolution* (Reading, Mass.: Addison-Wesley, 1978).
- 218 **talking back to a Montgomery bus driver** Phillip Hoose, *Claudette Colvin: Twice Toward Justice* (New York: Farrar, Straus and Giroux, 2009).
- 218 **and refusing to move** Ibid.
- 218 **sitting next to a white man** Russell Freedman, *Freedom Walkers: The Story of the Montgomery Bus Boycott* (New York: Holiday House, 2009).
- 218 **"indignities which came with it"** Martin Luther King, Jr., *Stride Toward Freedom* (New York: Harper and Brothers, 1958).
- 219 **"a dozen or so sociopaths"** Taylor Branch, *Parting the Waters: America in the King Years, 1954–63* (New York: Simon and Schuster, 1988).
- 221 **"white folks will kill you"** Douglas Brinkley, *Mine Eyes Have Seen the Glory: The Life of Rosa Parks* (London: Weidenfeld and Nicolson, 2000).
- 221 **"happy to go along with it"** John A. Kirk, *Martin Luther King, Jr.: Profiles in Power* (New York: Longman, 2004).
- 221 **in protest of the arrest and trial** Carson, *Papers of Martin Luther King, Jr.*

- 223 **how 282 men had found their** Mark Granovetter, *Getting a Job: A Study of Contacts and Careers* (Chicago: University of Chicago, 1974).
- 224 **we would otherwise never hear about** Andreas Flache and Michael Macy, "The Weakness of Strong Ties: Collective Action Failure in a Highly Cohesive Group," *Journal of Mathematical Sociology* 21 (1996): 3–28. For more on this topic, see Robert Axelrod, *The Evolution of Cooperation* (New York: Basic Books, 1984); Robert Bush and Frederick Mosteller, *Stochastic Models for Learning* (New York: Wiley, 1984); I. Erev, Y. Bereby-Meyer, and A. E. Roth, "The Effect of Adding a Constant to All Payoffs: Experimental Investigation and Implications for Reinforcement Learning Models," *Journal of Economic Behavior and Organization* 39, no. 1 (1999): 111–28; A. Flache and R. Hegselmann, "Rational vs. Adaptive Egoism in Support Networks: How Different Micro Foundations Shape Different Macro Hypotheses," in *Game Theory, Experience, Rationality: Foundations of Social Sciences, Economics, and Ethics in Honor of John C. Harsanyi* (Yearbook of the Institute Vienna Circle), ed. W. Leinfellner and E. Köhler (Boston: Kluwer, 1997), 261–75; A. Flache and R. Hegselmann, "Rationality vs. Learning in the Evolution of Solidarity Networks: A Theoretical Comparison," *Computational and Mathematical Organization Theory* 5, no. 2 (1999): 97–127; A. Flache and R. Hegselmann, "Dynamik Sozialer Dilemma-Situationen," final research report of the DFG-Project Dynamics of Social Dilemma Situations, University of Bayreuth, Department of Philosophie, 2000; A. Flache and Michael Macy, "Stochastic Collusion and the Power Law of Learning," *Journal of Conflict Resolution* 46, no. 5 (2002): 629–53; Michael Macy, "Learning to Cooperate: Stochastic and Tacit Collusion in Social Exchange," *American Journal of Sociology* 97, no. 3 (1991): 808–43; E. P. H. Zeggelink, "Evolving Friendship Networks: An Individual-Oriented Approach Implementing Similarity," *Social Networks* 17 (1996): 83–110; Judith Blau, "When Weak Ties Are Structured," unpublished manuscript, Department of Sociology, State University of New York, Albany, 1980; Peter Blau, "Parameters of Social Structure," *American Sociological Review* 39, no. 5 (1974): 615–35; Scott Boorman, "A Combinatorial Optimization Model for Transmission of Job Information Through Contact Networks," *Bell Journal of Economics* 6, no. 1 (1975): 216–49; Ronald Breiger and Philippa Pattison, "The Joint Role Structure of Two Communities' Elites," *Sociological Methods and Research* 7, no. 2 (1978): 213–26; Daryl Chubin, "The Conceptualization of Scientific Specialties," *Sociological Quarterly* 17, no. 4 (1976): 448–76; Harry Collins, "The TEA Set: Tacit Knowledge and Scientific Networks," *Science Studies* 4, no. 2 (1974): 165–86; Rose Coser, "The Complexity of Roles as Seedbed of Individual Autonomy," in *The Idea of Social Structure: Essays in Honor of Robert Merton*, ed. L. Coser (New York: Harcourt, 1975); John Delany, "Aspects of Donative Resource Allocation and the Efficiency of Social Networks: Simulation Models of Job Vacancy Information Transfers

Through Personal Contacts," PhD diss., Yale University, 1980; E. Ericksen and W. Yancey, "The Locus of Strong Ties," unpublished manuscript, Department of Sociology, Temple University, 1980.

224 **most of the population will be untouched** Mark Granovetter, "The Strength of Weak Ties: A Network Theory Revisited," *Sociological Theory* 1 (1983): 201–33.

226 **registering black voters in the South** McAdam, "Recruitment to High-Risk Activism."

226 **more than three hundred of those invited** Ibid.; Paulsen, "Specifying the Relationship Between Social Ties and Activism."

226 **participated in Freedom Summer** In a fact-checking email, McAdam provided a few details about the study's genesis: "My initial interest was in trying to understand the links between the civil rights movement and the other early new left movements, specifically the student movement, the anti-war movement, and women's liberation movement. It was only after I found the applications and realized that some were from volunteers and others from 'no shows' that I got interested in explaining (a) why some made it to Mississippi and others didn't, and (b) the longer term impact of going/not-going on the two groups."

229 **impossible for them to withdraw** In another fact-checking email, McAdam wrote: "For me the significance of the organizational ties is not that they make it 'impossible' for the volunteer to withdraw, but that they insure that the applicant will likely receive lots of support for the link between the salient identity in question (i.e., Christian) and participation in the summer project. As I noted in [an article] 'it is a strong subjective identification with a particular identity, reinforced by organizational ties that is especially likely to encourage participation.'"

230 **"getting together there without you"** Tom Mathews and Roy Wilkins, *Standing Fast: The Autobiography of Roy Wilkins* (Cambridge, Mass.: Da Capo, 1994).

230 **"boycott of city buses Monday"** Branch, *Parting the Waters*.

231 **"singing out, 'No riders today'"** King, *Stride Toward Freedom*; James M. Washington, *A Testament of Hope: The Essential Writings and Speeches of Martin Luther King, Jr.* (New York: HarperCollins, 1990).

232 **was in doubt** King, *Stride Toward Freedom*.

233 **drawing circles around major U.S. cities** For understanding Pastor Warren's story, I am indebted to Rick Warren, Glenn Kruen, Steve Gladen, Jeff Sheler, Anne Krumm, and the following books: Jeffrey Sheler, *Prophet of Purpose: The Life of Rick Warren* (New York: Doubleday, 2009); Rick War-

ren, *The Purpose-Driven Church* (Grand Rapids, Mich.: Zondervan, 1995); and the following articles: Barbara Bradley, "Marketing That New-Time Religion," *Los Angeles Times*, December 10, 1995; John Wilson, "Not Just Another Mega Church," *Christianity Today*, December 4, 2000; "Therapy of the Masses," *The Economist*, November 6, 2003; "The Glue of Society," *The Economist*, July 14, 2005; Malcolm Gladwell, "The Cellular Church," *The New Yorker*, September 12, 2005; Alex MacLeod, "Rick Warren: A Heart for the Poor," *Presbyterian Record*, January 1, 2008; Andrew, Ann, and John Kuzma, "How Religion Has Embraced Marketing and the Implications for Business," *Journal of Management and Marketing Research* 2 (2009): 1–10.

233 **"our destination was a settled issue"** Warren, *Purpose-Driven Church*.

234 **"any chance of liberating multitudes"** Donald McGavran, *The Bridges of God* (New York: Friendship Press, 1955). Italics added.

235 **"How to Survive Under Stress"** Sheler, *Prophet of Purpose*.

236 **"I'm going to have to sit down"** In a fact-checking email a Saddleback spokesperson, provided additional details: "Rick suffers from a brain chemistry disorder that makes him allergic to adrenaline. This genetic problem resists medication and makes public speaking painful, with blurred vision, headaches, hot flashes, and panic. Symptoms usually last around fifteen minutes; by that time, enough adrenaline is expended so the body can return to normal function. (His adrenaline rushes, like any speaker might experience, whenever he gets up to preach.) Pastor Rick says this weakness keeps him dependent on God."

238 **"habits that will help you grow"** *Discovering Spiritual Maturity*, Class 201, published by Saddleback Church, <http://www.saddlebackresources.com/CLASS-201-Discovering-Spiritual-Maturity-Complete-Kit-Download-P3532.aspx>.

239 **"we just . . . get out of your way"** In a fact-checking email a Saddleback spokesperson said that while an important tenet of Saddleback is teaching people to guide themselves, "this implies that each person can go in any direction they choose. Biblical principles/guidelines have a clear direction. The goal of small group study is to teach people the spiritual disciplines of faith and everyday habits that can be applied to daily life."

239 **"community to continue the struggle"** Martin Luther King, Jr., *The Autobiography of Martin Luther King, Jr.*, ed. Clayborne Carson (New York: Grand Central, 2001).

240 **"shall perish by the sword"** Carson; King,

243 **segregation law violated the Constitution** *Browder v. Gayle*, 352 U.S. 903 (1956).

243 **and sat in the front** Washington, *Testament of Hope*.

243 **"glad to have you"** Kirk, *Martin Luther King, Jr.*

243 **"work and worry of the boycott"** Ibid.

## CHAPTER NINE

245 **reorganizing the silverware drawer** "Angie Bachmann" is a pseudonym. Reporting for her story is based on more than ten hours of interviews with Bachmann, additional interviews with people who know Bachmann, and dozens of news articles and court filings. However, when Bachmann was presented with fact-checking questions, she declined to participate except to state that almost all details were inaccurate—including those she had previously confirmed, as well as facts confirmed by other sources, in court records, or by public documents—and then she cut off communication.

247 **"while thousands are injured"** *The Writings of George Washington*, vol. 8, ed. Jared Sparks (1835).

248 **swelled by more than \$269 million** Iowa Racing and Gaming Commission, Des Moines, Iowa, 2010.

251 **"What have I done?"** Simon de Bruxelles, "Sleepwalker Brian Thomas Admits Killing Wife While Fighting Intruders in Nightmare," *The Times*, November 18, 2009.

252 **"I thought somebody had broken in"** Jane Mathews, "My Horror, by Husband Who Strangled Wife in Nightmare," *Daily Express*, December 16, 2010.

252 **"She's my world"** Simon de Bruxelles, "Sleepwalker Brian Thomas Admits Killing Wife While Fighting Intruders in Nightmare." *The Times*, November 18, 2009.

254 **annoying but benign problem** In some instances, people sleepwalk while they experience dreams, a condition known as REM sleep behavior disorder (see C. H. Schenck et al., "Motor Dyscontrol in Narcolepsy: Rapid-Eye-Movement [REM] Sleep Without Atonia and REM Sleep Behavior Disorder," *Annals of Neurology* 32, no. 1 [July 1992]: 3–10). In other instances, people are not dreaming, but move nonetheless.

254 **something called sleep terrors** C. Bassetti, F. Siclari, and R. Urbaniok, "Violence in Sleep," *Schweizer Archiv Fur Neurologie und Psychiatrie* 160, no. 8 (2009): 322–33.

255 **the higher brain to put things** C. A. Tassinari et al., "Biting Behavior, Aggression, and Seizures," *Epilepsia* 46, no. 5 (2005): 654–63; C. Bassetti et al., "SPECT During Sleepwalking," *The Lancet* 356, no. 9228 (2000): 484–85;

K. Schindler et al., "Hypoperfusion of Anterior Cingulate Gyrus in a Case of Paroxysmal Nocturnal Dystonia," *Neurology* 57, no. 5 (2001): 917–20; C. A. Tassinari et al., "Central Pattern Generators for a Common Semiology in Fronto-Limbic Seizures and in Parasomnias," *Neurological Sciences* 26, no. 3 (2005): 225–32.

256 **"64% of cases, with injuries in 3%"** P. T. D'Orban and C. Howard, "Violence in Sleep: Medico-Legal Issues and Two Case Reports," *Psychological Medicine* 17, no. 4 (1987): 915–25; B. Boeve, E. Olson, and M. Silber, "Rapid Eye Movement Sleep Behavior Disorder: Demographic, Clinical, and Laboratory Findings in 93 Cases," *Brain* 123, no. 2 (2000): 331–39.

256 **both the United States and the United Kingdom** John Hudson, "Common Law—Henry II and the Birth of a State," BBC, February 17, 2011; Thomas Morawetz, "Murder and Manslaughter: Degrees of Seriousness, Common Law and Statutory Law, the Model Penal Code," Law Library—American Law and Legal Information, <http://law.jrank.org/pages/18652/Homicide.html>.

257 **would have never consciously carried out** M. Diamond, "Criminal Responsibility of the Addiction: Conviction by Force of Habit," *Fordham Urban Law Journal* 1, no. 3 (1972); R. Broughton et al., "Homicidal Somnambulism: A Case Report," *Sleep* 17, no. 3 (1994): 253–64; R. Cartwright, "Sleepwalking Violence: A Sleep Disorder, a Legal Dilemma, and a Psychological Challenge," *American Journal of Psychiatry* 161, no. 7 (2004): 1149–58; P. Fenwick, "Automatism, Medicine, and the Law," *Psychological Medicine Monograph Supplement*, no. 17 (1990): 1–27; M. Hanson, "Toward a New Assumption in Law and Ethics," *The Humanist* 66, no. 4 (2006).

257 **attack occurred during a sleep terror** L. Smith-Spark, "How Sleepwalking Can Lead to Killing," *BBC News*, March 18, 2005.

257 **later acquitted of attempted murder** Beth Hale, "Sleepwalk Defense Clears Woman of Trying to Murder Her Mother in Bed," *Daily Mail*, June 3, 2009.

257 **sleep terrors and was found not guilty** John Robertson and Gareth Rose, "Sleepwalker Is Cleared of Raping Teenage Girl," *The Scotsman*, June 22, 2011.

257 **"Why did I do it?"** Stuart Jeffries, "Sleep Disorder: When the Lights Go Out," *The Guardian*, December 5, 2009.

259 **"his mind had no control"** Richard Smith, "Grandad Killed His Wife During a Dream," *The Mirror*, November 18, 2009.

259 **"a straight not guilty verdict"** Anthony Stone, "Nightmare Man Who Strangled His Wife in a 'Night Terror' Walks Free," *Western Mail*, November 21, 2009.

259 **you bear no responsibility** Ibid.

**261 to perfect their methods** Christina Binkley, "Casino Chain Mines Data on Its Gamblers, and Strikes Pay Dirt," *The Wall Street Journal*, November 22, 2004; Rajiv Lal, "Harrah's Entertainment, Inc.," Harvard Business School, case no. 9-604-016, June 14, 2004; K. Ahsan et al., "Harrah's Entertainment, Inc.: Real-Time CRM in a Service Supply Chain," *Harvard Business Review*, case no. GS50, May 8, 2006; V. Chang and J. Pfeffer, "Gary Loveman and Harrah's Entertainment," *Harvard Business Review*, case no. OB45, November 4, 2003; Gary Loveman, "Diamonds in the Data Mine," *Harvard Business Review*, case no. R0305H, May 1, 2003.

**261 to the cent and minute** In a statement, Caesars Entertainment wrote: "Under the terms of the settlement reached in May of 2011 between Caesars Riverboat Casino and [Bachmann], both sides (including their representatives) are precluded from discussing certain details of the case. . . . There are many specific points we would contest, but we are unable to do so at this point. You have asked several questions revolving around conversations that allegedly took place between [Bachmann] and unnamed Caesars affiliated employees. Because she did not provide names, there is no independent verification of her accounts, and we hope your reporting will reflect that, either by omitting the stories or by making it clear that they are unverified. Like most large companies in the service industry, we pay attention to our customers' purchasing decisions as a way of monitoring customer satisfaction and evaluating the effectiveness of our marketing campaigns. Like most companies, we look for ways to attract customers, and we make efforts to maintain them as loyal customers. And like most companies, when our customers change their established patterns, we try to understand why, and encourage them to return. That's no different than a hotel chain, an airline, or a dry cleaner. That's what good customer service is about. . . . Caesars Entertainment (formerly known as Harrah's Entertainment) and its affiliates have long been an industry leader in responsible gaming. We were the first gaming company to develop a written Code of Commitment that governs how we treat our guests. We were the first casino company with a national self-exclusion program that allows customers to ban themselves from all of our properties if they feel they have a problem, or for any other reason. And we are the only casino company to fund a national television advertising campaign to promote responsible gaming. We hope your writing will reflect that history, as well as the fact that none of [Bachmann's] statements you cite have been independently verified."

**262 "did do those nice things for me"** In a statement, Caesars Entertainment wrote: "We would never fire or penalize a host if one of their guests stopped visiting (unless it was the direct result of something the host did). And none

of our hosts would be allowed to tell a guest that he or she would be fired or otherwise penalized if that guest did not visit."

**264 watch a slot machine spin around** M. Dixon and R. Habib, "Neurobehavioral Evidence for the 'Near-Miss' Effect in Pathological Gamblers," *Journal of the Experimental Analysis of Behavior* 93, no. 3 (2010): 313-28; H. Chase and L. Clark, "Gambling Severity Predicts Midbrain Response to Near-Miss Outcomes," *Journal of Neuroscience* 30, no. 18 (2010): 6180-87; L. Clark et al., "Gambling Near-Misses Enhance Motivation to Gamble and Recruit Win-Related Brain Circuitry," *Neuron* 61, no. 3 (2009): 481-90; Luke Clark, "Decision-Making During Gambling: An Integration of Cognitive and Psychobiological Approaches," *Philosophical Transactions of the Royal Society of London, Series B: Biological Sciences* 365, no. 1538 (2010): 319-30.

**264 bounced checks at a casino** H. Lesieur and S. Blume, "The South Oaks Gambling Screen (SOGS): A New Instrument for the Identification of Pathological Gamblers," *American Journal of Psychiatry* 144, no. 9 (1987): 1184-88. In a fact-checking letter, Habib wrote, "Many of our subjects were categorized as pathological gamblers based on other types of behavior that the screening form asks about. For example, it would have been sufficient for a participant to have been counted as a pathological gambler if they simply: 1) had gambled to win money that they had previously lost gambling, and 2) on some occasions they gambled more than they had intended to. We used a very low threshold to classify our subjects as pathological gamblers."

**266 circuitry involved in the habit loop** M. Potenza, V. Voon, and D. Weintraub, "Drug Insight: Impulse Control Disorders and Dopamine Therapies in Parkinson's Disease," *Nature Clinical Practice Neurology* 12, no. 3 (2007): 664-72; J. R. Cornelius et al., "Impulse Control Disorders with the Use of Dopaminergic Agents in Restless Legs Syndrome: A Case Control Study," *Sleep* 22, no. 1 (2010): 81-87.

**266 Hundreds of similar cases are pending** Ed Silverman, "Compulsive Gambler Wins Lawsuit Over Mirapex," *Pharmalot*, July 31, 2008.

**266 "gamblers are in control of their actions"** For more on the neurology of gambling, see A. J. Lawrence et al., "Problem Gamblers Share Deficits in Impulsive Decision-Making with Alcohol-Dependent Individuals," *Addiction* 104, no. 6 (2009): 1006-15; E. Cognat et al., "'Habit' Gambling Behaviour Caused by Ischemic Lesions Affecting the Cognitive Territories of the Basal Ganglia," *Journal of Neurology* 257, no. 10 (2010): 1628-32; J. Emshoff, D. Gilmore, and J. Zorland, "Veterans and Problem Gambling: A Review of the Literature," Georgia State University, February 2010, [http://www2.gsu.edu/~psyjge/Rsrc/PG\\_IPV\\_Veterans.pdf](http://www2.gsu.edu/~psyjge/Rsrc/PG_IPV_Veterans.pdf); T. van Eimeren et al., "Drug-Induced Deactivation of

Inhibitory Networks Predicts Pathological Gambling in PD," *Neurology* 75, no. 19 (2010): 1711–16; L. Cottler and K. Leung, "Treatment of Pathological Gambling," *Current Opinion in Psychiatry* 22, no. 1 (2009): 69–74; M. Roca et al., "Executive Functions in Pathologic Gamblers Selected in an Ecologic Setting," *Cognitive and Behavioral Neurology* 21, no. 1 (2008): 1–4; E. D. Driver-Dunckley et al., "Gambling and Increased Sexual Desire with Dopaminergic Medications in Restless Legs Syndrome," *Clinical Neuropharmacology* 30, no. 5 (2007): 249–55; Erin Gibbs Van Brunschot, "Gambling and Risk Behaviour: A Literature Review," University of Calgary, March 2009.

268 **"they're acting without choice"** In an email, Habib clarified his thoughts on this topic: "It is a question about free will and self-control, and one that falls as much in the domain of philosophy as in cognitive neuroscience. . . . If we say that the gambling behavior in the Parkinson's patient is out of their own hands and driven by their medication, why can't we (or don't we) make the same argument in the case of the pathological gambler given that the same areas of the brain seem to be active? The only (somewhat unsatisfactory) answer that I can come up with (and one that you mention yourself) is that as a society we are more comfortable removing responsibility if there is an external agent that it can be placed upon. So, it is easy in the Parkinson's case to say that the gambling pathology resulted from the medication, but in the case of the pathological gambler, because there is no external agent influencing their behavior (well, there is—societal pressures, casino billboards, life stresses, etc.—but, nothing as pervasive as medication that a person must take), we are more reluctant to blame the addiction and prefer to put the responsibility for their pathological behavior on themselves—'they should know better and not gamble,' for example. I think as cognitive neuroscientists learn more—and 'modern' brain imaging is only about 20–25 years old as a field—perhaps some of these misguided societal beliefs (that even we cognitive neuroscientists sometimes hold) will slowly begin to change. For example, from our data, while I can comfortably conclude that there are definite differences in the brains of pathological gamblers versus non-pathological gamblers, at least when they are gambling, and I might even be able to make some claims such as the near-misses appear more win-like to the pathological gambler but more loss-like to the non-pathological gambler, I cannot state with any confidence or certainty that these differences therefore imply that the pathological gambler does not have a choice when they see a billboard advertising a local casino—that they are a slave to their urges. In the absence of hard direct evidence, I guess the best we can do is draw inferences by analogy, but there is much uncertainty associated with such comparisons."

- 272 **"whatever the latter may be"** William James, *Talks to Teachers on Psychology: and to Students on Some of Life's Ideals*.
- 272 **the Metaphysical Club** Louis Menand, *The Metaphysical Club: A Story of Ideas in America* (New York: Farrar, Straus, and Giroux, 2002).
- 274 **"traced by itself before"** James is quoting the French psychologist and philosopher Léon Dumont's essay "De l'habitude."