CHAPTER SIX

Making Waves

We're not meant to rest solely at night. A decade after Nathaniel Kleitman gave the name "basic rest activity cycle" to the ninety-minute period during which we move through the five stages of sleep, he suggested that we experience a parallel ninety-minute cycle in our waking life. At night we move from light to deep sleep. During the day we oscillate every ninety minutes or so from higher to lower alertness. We call these "ultradian" cycles, which literally means "less than a day."

In effect, our bodies are asking us for a break every ninety minutes or so. More often than not, and especially in the face of high demand, we ignore signals such as physical restlessness, wandering attention, and greater irritability. Instead, we grab a cup of coffee or unconsciously call up our emergency reserves, in the form of stress hormones such as adrenaline and cortisol. These hormones generate energy, but they also prompt a higher level of anxiety and reactivity, which ultimately undermine our effectiveness.

The Israeli sleep researcher Peretz Lavie found fascinating evidence for the ultradian rhythm in a series of experiments he conducted. Groups of subjects were asked to come into his lab during the evening, so that he could keep them awake throughout the night. The next morning at 7 A.M., the subjects were taken into bedrooms and given an opportunity to go to sleep for seven minutes at a time. Whether or not they succeeded, they were then asked to get out of bed and spend the next thirteen minutes awake. Over the subsequent twenty-four hours, the bedraggled subjects repeated this pattern every twenty minutes, or seventy-two times in all.

Having been kept up all of the previous night, it wouldn't have been surprising if the exhausted subjects found it easy to fall asleep each time they put their heads on a pillow. That *was* the case during

the afternoons and from 10 P.M. on. At those times, it was far harder to wake subjects at the end of seven minutes. The surprising finding was a pattern that emerged throughout the earlier part of the day. Every ninety minutes or so, something that Lavie termed a "sleep gate" opened. During the subsequent half hour, his subjects were significantly more likely to fall asleep than at other times, clear evidence of the ultradian rhythm and the cyclical nature of our alertness and fatigue throughout the day.

Great performers intuitively understand their own cycles. That helps explain why the top violinists in the Ericsson study practiced for periods no longer than ninety minutes and why other researchers have found that top performers in fields ranging from chess to sports to scientific research tend to work in approximately ninety-minute cycles and then take a break. Most of us, however, continue to wrongly assume that working more continuously—hunkering down, staying the course, burning the midnight oil—is the best way to generate more productivity.

I spent my early career as a journalist, and I long operated from the assumption that when it came to writing, the longer I worked, the more I would accomplish. After learning about the ultradian rhythm a decade ago, I redesigned my workday, especially when I was writing books.

For years, my approach had been to sit down to work at seven A.M. and essentially remain there until seven P.M. It was like being chained to my desk. Like most writers, I found countless ways to avoid writing along the way, including taking phone calls, reading and responding to e-mails, sorting through the papers on my desk, and simply daydreaming. Without realizing it, I was pacing myself, and rarely fully engaging, because at some level I recognized I couldn't do so indefinitely. It was when I learned about the value of moving between intense effort and purposeful rest that I created a new schedule. I continued to begin my writing day at seven A.M. But instead of simply staying there as long as possible, I wrote in three or four separate periods of exactly ninety minutes and framed them as ultradian 'sprints.'

While I was writing, I turned off my e-mail, took no phone calls, and tried to focus as single-mindedly as possible. During my first renewal break I had breakfast. For my second, I took a thirty- or forty-

minute run, and for my third I had lunch and read the newspaper or a book for pleasure. If I did a fourth writing sprint, I lifted weights or meditated afterward. Then I spent the afternoon on phone calls and other work that didn't require such high concentration.

We derive recovery not only by literally stopping whatever it is we're doing, but also by simply changing channels. After ninety minutes of sitting in front of a computer, running is a way to build physical capacity, but it is also a reliable way to prompt mental and emotional recovery. That's partly because running prompts the release of endorphins, which generate a sense of well-being, but also because running tends to move us out of conscious analytical thinking, facilitating mental and emotional renewal.

On this writing schedule, I rarely spent more than four and a half hours a day writing at my desk, compared to more than double that number of hours for my previous books. By limiting each writing cycle to ninety minutes and building in periods of renewal, I was able to focus far more intensely. The result was that I accomplished significantly more in fewer hours and was able to complete my two most recent books, including this one, in far less time than I had my earlier ones.

RESISTANCE TO RENEWAL

From an early age, many of us are programmed to believe that rest is for slackers. Time spent "not doing" is time wasted. Building intermittent breaks into the workday is not only counterintuitive, it's also countercultural in the vast majority of organizations. That's why we work not only with individuals, to help them experience the value of renewal, but also at the organizational level, to change cultures.

When we first introduced the concept of taking intermittent breaks to traders at financial institutions, they looked at us as if we'd gone off the deep end. "Get real," they told us. "Do you have any idea what our lives are like? We sit down in front of our screens at eight-thirty in the morning, and we stay there until four P.M., when the market closes. We barely have time to stand up, much less to take a break." The implicit assumption was that effective renewal requires significant periods of time. In fact, the value of renewal depends less

on how much time we devote to it than on how effectively we do it, just as our productivity is less a function of how many hours we put in than of how productive we are during the hours we're working.

Because most of us neither value nor intentionally practice intermittent renewal, it's often something we don't do very well. In fact, we can systematically build our capacity to recover more efficiently. Professional tennis players, for example, build meticulous recovery rituals that allow them to drop as much as one heartbeat per second in the twenty to thirty seconds between points. That can mean a reduction in heart rate of 160 or 170 at the end of a point down to 130 or 140 before the next point, a powerful wave of recovery. Think of the advantage to a player who recovers that way throughout a match, playing against an opponent who doesn't understand the value of recovery.

In the workplace, we've helped our clients develop a variety of techniques for renewing themselves in very short periods of time. It's possible, for example, to significantly relax the body, quiet the mind, and calm the emotions simply by breathing more deeply and rhythmically. Breathing in through your nose to a count of three and out through your mouth to a count of six prompts a significant feeling of relaxation in as few as thirty to sixty seconds.

Meditators have understood this phenomenon for thousands of years. Hundreds of studies have confirmed meditation's broad-based benefits. At the most basic level, it's simply a means of relaxation and an antidote to stress. In one study conducted by Jon Kabat-Zinn, a leading meditation researcher, a group of twenty-two subjects who met the criteria for anxiety disorder or panic disorder participated in an eight-week group stress reduction program based on "mindfulness meditation." In repeated follow-up measures, twenty of the subjects—more than 90 percent—demonstrated significant reductions in anxiety. A substantial number also experienced diminished panic symptoms.

Breathing deeply, meditating, listening to music, and reading a novel are all forms of "passive" renewal, which involves lowering physiological arousal. "Active" renewal requires creating the opposite kind of physiological wave by raising the heart rate through aerobic exercise, weight lifting, or more strenuous forms of yoga and Pilates.

It's always challenging to convince people facing intense demand that they'd be more productive if they renewed more frequently. Mark, for example, is the CFO of a large manufacturing company that was experiencing severe financial stress when we met him. "Renewal sounds great," he told us at our first session together, "but with all the demands on my time, it just feels like I'm better off working another hour, rather than sleeping an extra hour or taking time to work out. Maybe the consequence is that I won't be as efficient in the twelfth hour of the day as I was in the second or the third, but I still feel like I'll get more accomplished than if I didn't work that twelfth hour at all."

No research we cite to the contrary is ever as convincing as getting clients to experiment for themselves. We suggested to Mark that he schedule one significant break a day, in the afternoon, and then monitor the impact on his energy and focus over the rest of the day.

"I decided to really put the idea to the test," Mark told us. "I inserted a thirty-minute break into my calendar at two thirty every afternoon, and I asked my assistant to protect the time and to remind me if I started to run over into it. My ritual was to take a walk by myself, outside, and to intentionally think about something other than work. The truth is, I don't succeed every day, but I do most days. I enjoy being outside, and the unexpected bonus is that I get lot of creative ideas when I am out walking.

"When I return to my office, I make it a point to purposely focus on something challenging—say, reading a dense document or writing a complicated memo or even having a difficult conversation. I choose the sort of things that I would have previously avoided in the afternoons, because I didn't have the energy for them. What's happened is undeniable: I've discovered I can concentrate far better in the hour or two following my walks than at any other time of the day besides the first couple of hours in the morning. I was a huge skeptic going in, but now it takes a true crisis to make me miss my afternoon walk. It's given me a whole second half to my workday that just wasn't there before. I've also added a shorter break most mornings when I walk around the office and stop in to talk to one or two people about something other than work."

Another obstacle to renewing intermittently is that it isn't culturally acceptable in many organizations, and in some cases it's explicitly

discouraged. Even then, it's possible to find ways to rest under the radar. One trader we worked with, who sat in a large open room, cheek by jowl with his colleagues, made it a practice to quietly slip away to the bathroom at least twice a day. There, he closeted himself in a stall, closed his eyes, and spent five minutes breathing quietly. Other clients, working in their own offices and with fewer peers watching over their shoulders, close their office doors and sit quietly for a few minutes, or put on a pair of headphones and listen to music, or take a walk the way Mark does.

THE UNDERVALUED POWER OF NAPS

Perhaps no single daytime renewal behavior more reliably influences performance—and is less common in the workplace—than taking a nap. "Our circadian clocks are programmed for long sleep during the night and short sleep during the day," says Sara Mednick, formerly a researcher at UC San Diego and the author of *Take a Nap! Change Your Life.* As far back as the first century B.C., the Romans divided their days into separate periods for activities, prayers, meals, and a midday rest, which they named the "Sexta" because it took place six hours after dawn, at noon. This short nap was eventually renamed a "siesta," and it became commonplace, first in Spain and Italy, and then in many Latin American countries, where the heat was especially intense during the middle of the day. Winston Churchill, a daily napper, instinctively understood what scientists would eventually confirm about the value of naps. "We were not made by Nature to work, or even to play, from eight o'clock in the morning till midnight," he said. "We ought to break our days and our marches into two."

Evidence for the circadian influence on naps first emerged from sleep research conducted by Jürgen Aschoff during the early 1950s in abandoned World War II German bunkers. He chose the bunkers—effectively small apartments—because they had no windows and therefore no natural light. Aschoff had his subjects move into the bunkers for days at a time, without access to watches or clocks. Told to sleep whenever they felt tired, he found that they typically slept for seven to eight hours out of every twenty-four. He also found that they slept in two separate segments: one long period of six to seven hours,

followed approximately twelve hours later after going to sleep by a shorter sleep of an hour or less.

Sara Mednick grew interested in naps as a graduate student at Harvard, when she took a course with Robert Stickgold, a professor of psychiatry who has extensively studied the effect of sleep on memory consolidation and various other kinds of learning. When Stickgold gave two sets of subjects the same memory challenge, he found that those who were permitted to sleep through the night improved in their performance the next day, while those who were kept awake did not. He also found that subjects who got eight hours of sleep significantly outperformed those who got only six hours and that those who got less than six hours showed no improvement in performing the task at all.

Mednick's simple but ingenious idea was to see if daytime naps prompted any comparable performance improvements on the same kind of task. Amazingly, she found that a sixty- to ninety-minute nap led to just as much improvement on the memory task as did eight full hours of sleep. Indeed, a daytime nap proved to be additive, so that when subjects took an afternoon nap following a full night of sleep, they did twice the amount of learning. In another experiment, Mednick gave subjects a visual task to practice on a computer screen at four intervals over the course of a day. The subjects who didn't nap along the way performed increasingly poorly as the day wore on. The subjects who were permitted to take a thirty-minute nap following the second session sustained the same level of performance for the third and fourth sessions.

Perhaps the most striking study was one conducted by NASA and the Federal Aviation Administration to study the effect of short naps on pilots flying long distances through the night. These pilots not only put in extended hours on duty but also crossed multiple time zones and had a tendency to fall into frequent, brief "microsleeps" lasting a few seconds. The pilots were randomly divided into two groups. One group was instructed to take a midflight forty-minute nap, during which their copilots took over for them. A control group of pilots was allowed no nap at all. The nonnapping pilots demonstrated reduced performance on night flights, at the end of flights, and following consecutive flights. The napping pilots got an average of twenty-six minutes of sleep and maintained consistent perfor-

mance both during the day and night and after consecutive flight legs. In vigilance tests following a nap, for example, their median reaction time improved by 16 percent. Tested at a similar point in the flight, the nonnapping pilots demonstrated a 34 percent deterioration in reaction time. During the critical final thirty minutes of the flight, the nonnapping pilots had an average of twenty-two "microsleeps" lasting between three and ten seconds. The nappers had none at all.

Mednick has taken this research a step further and developed a protocol for what she calls "the optimized napping formula." It's based on the notion that we can adjust the timing and length of naps to meet specific performance aims. It is during REM sleep, for example, that we embed complex learning and creativity appears to be enhanced. Perceptual skills also improve with increased REM sleep. To improve any of these capacities, Mednick concluded, it is best to nap earlier in the day, when REM activity is higher than it is as the day wears on.

By contrast, it is during slow-wave sleep (SWS) that the body most actively repairs itself. Cortisol, the catabolic hormone that breaks down tissue to make it available as energy for the body, is completely turned off during slow-wave sleep. Conversely, growth hormone, which builds and stimulates cell growth, is released during slow-wave sleep. If your goal is to get a deeper level of repair and restoration—say, after strenuous physical activity—it's better to nap in the later afternoon, when slow-wave cycles predominate. Because both the SWS and REM phases occur well into each ninety-minute sleep cycle, it's possible to derive their value only by napping for at least forty-five to sixty minutes.

The most powerful nap of all is one taken for ninety minutes between 1 and 3 P.M.—traditional siesta time—which is when the body most craves sleep. A ninety-minute nap also represents a full Basic Rest Activity Cycle, which guarantees the napper the benefits of all five sleep stages. In practical terms, few of us have the freedom to take such a long nap during workdays. In addition to the time longer naps require, a second drawback is the "sleep inertia" they can induce—the groggy feeling we sometimes feel upon awakening from them, which can persist for up to thirty minutes. The ninety-minute nap is likely a weekend option, when it can also be used, as a way to make up for sleep deprivation during the week.

The best option for a nap at work is one limited to stages 1 and 2 sleep. Mednick and other researchers have found that we begin to experience a nap's restorative effects after just ten minutes. Stage 1, the lightest, typically lasts just five minutes, while stage 2 takes a minimum of seventeen minutes. By napping for less than thirty minutes—the so-called Power Nap—we avoid going into the deeper sleep of stages 3 and 4. The result is that we tend to be alert almost as soon as we awaken, both refreshed and better able to focus. The evidence is inconclusive about whether insomniacs sleep better or worse at night if they nap during the day, but if you are one, you have little to lose by experimenting with a fifteen- to thirty-minute daytime nap. If doing so results in your staying up even later at night or waking up more frequently, you can simply abandon the nap.

THE VACATION EFFECT

Much as we perform better with several short cycles of rest during the day and an extended period of sleep every night, so we are more productive when we regularly take vacations. But much as we are sleeping less, we're also taking less time off. On average, Americans now fail to use 439 million paid vacation days a year. In 2008, one-third of Americans said they intended to take no vacation at all. Another 33 percent planned a vacation of seven days or less. Only 14 percent scheduled a vacation of at least two weeks during 2008. "The idea of somebody going away for two weeks is really becoming a thing of the past," says a spokesman for the American Automobile Association. A congressional bill that would require companies with fifteen employees or more to provide at least seven paid sick days a year has languished in Congress for more than five years.

Europeans continue to enjoy far more vacation time than Americans, not least because European governments mandate companies to provide it. The European Union requires members to offer a minimum of four weeks paid vacation, plus holidays. Workers in countries such as Finland and France are entitled to six weeks of vacation, although in an increasingly global economy, workers at multinational companies across Europe increasingly feel the pressure to work more hours and vacation less.

The health costs from too little vacation are comparable to those from inadequate sleep. As part of the Framingham Heart Study, 750 women with no previous heart disease were tracked over twenty years. Those who took the fewest vacations proved to be twice as likely to get a heart attack as those who took the most vacations. A comparable study of 12,000 men in the Multiple Risk Factor Intervention Trial found that infrequent vacationers were 50 percent more likely to die of a heart attack than frequent vacationers. Overall, infrequent vacationers had a 20 percent higher risk of dying from any cause over the nine-year period of the study. Emotional health is similarly influenced by length of vacation. A 2005 study of 1,500 women found that the risk of depression diminished as they took more vacation. Those who took vacations twice a year were half as likely to be depressed as those who took a vacation once every two to five years.

There is also accumulating evidence that performance itself is closely correlated with vacation time. A 2006 study of employees at Ernst & Young, the accounting firm, found that for each ten hours of vacation employees took each month, their performance reviews were 8 percent higher the following year. The more vacation they took, the more their performance reviews improved and the more likely they were to stay at the firm.

Even tiny increments of time off seem to have very positive effects. Two Harvard Business School professors recently undertook a project among consultants at Boston Consulting Group. Consultants were asked to take off one evening a week—not one day, but one evening—from all work. It's a measure of how out of control work has become in some professions that such a project was even possible. Amazingly, the experiment actually met with considerable resistance from the consultants themselves. The notion of not checking their BlackBerrys, and not making themselves available to clients even one night a week provoked concern and anxiety. But six months later, the consultants who managed to take the evening off reported higher job satisfaction, more open communication, better work/life balance, and a greater likelihood that they'd stay at the firm than the consultants who continued to work as they always had.

Whether it's evenings and weekends truly off, longer and more regular vacations, brief breaks during the day at ninety-minute intervals, short afternoon naps, or a minimum of seven to eight hours of sleep

a night, the overwhelming evidence is that our health and productivity are enhanced by a rhythmic movement between work and rest. The best model for how we ought to operate as adults may be the way we did as young children: alternating time spent actively learning with naps, playtime and gym periods, recesses and snacks—as well as with long periods of sleep at night. A recent study of 11,000 children ages eight and nine, published in the journal *Pediatrics,* found that children who were given at least fifteen minutes of recess a day behaved significantly better in class than those who had little or no recess time. "We should understand that kids need that break because the brain needs that break," said Dr. Romina M. Barros, a pediatrician and assistant clinical professor at Albert Einstein College of Medicine.

Unfortunately, recess and time allotted to renewal and play are diminishing in schools. The ethic of more, bigger, faster is increasingly being applied even to very young children. Thirty percent of schools now provide little or no daily recess. Many others are cutting out gym periods. At more than a dozen Achievement First charter schools in New York and Connecticut, the academic day is ninety minutes longer than at traditional schools, an attempt to close what the school's founders refer to as the "achievement gap" for disadvantaged kids. Kindergarteners at Achievement First work straight through from 7:30 in the morning until 1:45 in the afternoon. They're drilled in grammar, phonics and arithmetic, they learn to work on computers, and they even play vocabulary challenge games when they're waiting in lines for the bathroom. In the afternoons they take music and other classes until 4:30 P.M. and at night, these six-year-olds have homework to do.

The test scores of these children have increased significantly. Two questions remain unanswered, not just for them but for anyone who is being asked to work more and more hours and spend less and less time recovering and renewing. First, what long-term toll does working in this way take on satisfaction and productivity? Second, how much happier and more effective might we all be if we were taught how to effectively balance intense effort with deep renewal and became better at both?

CHAPTER SIX ACTION STEPS

- Reflect on how you work over the course of a typical day. We operate best when we make waves—focusing for ninety- to 120-minute cycles and then taking a break. How often do you build intermittent recovery into your day? What would give you the most efficient form of renewal?
- Is there any way you could take a twenty- to thirty-minute nap between 1 and 4 P.M., especially on days when you work very intensely during the mornings? You'll discover a remarkable impact on your ability to focus later in the afternoon. If it's not practical or permissible to take a nap, try simply leaning back in your chair with your eyes closed for five to ten minutes. That's still an effective form of renewal.
- When was the last time you completely disconnected from work, including checking e-mail, for any extended period of time? Designate at least one night a week to totally let go of the office from the time you leave work until you get up the following morning.