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THE HIDDEN PATTERN OF EVERYDAY LIFE

What men daily do, not knowing what they do!

—WILLIAM SHAKESPEARE,
Much Ado About Nothing

If you want to measure the world's emotional state, to find a mood ring large enough to encircle the globe, you could do worse than Twitter. Nearly one billion human beings have accounts, and they post roughly 6,000 tweets every second.¹ The sheer volume of these minimessages—what people say and how they say it—has produced an ocean of data that social scientists can swim through to understand human behavior.

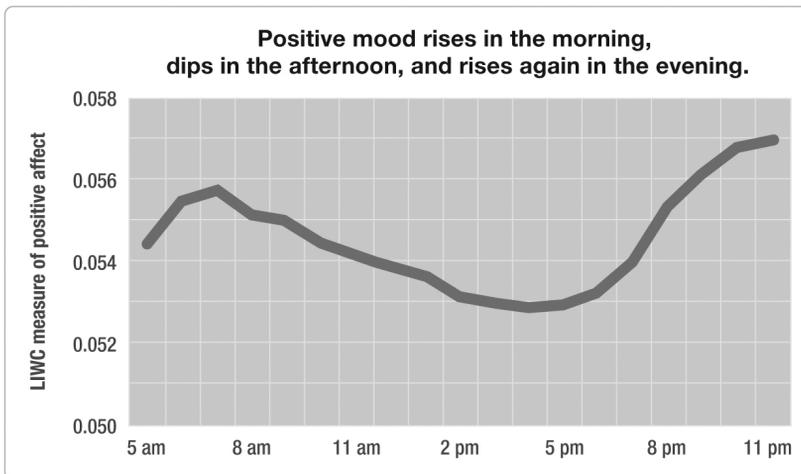
A few years ago, two Cornell University sociologists, Michael Macy and Scott Golder, studied more than 500 million tweets that 2.4 million users in eighty-four countries posted over a two-year period. They hoped to use this trove to measure people's emotions—in particular, how “positive affect” (emotions such as enthusiasm, confidence, and alertness) and “negative affect” (emotions such as anger, lethargy, and guilt) varied over time. The researchers didn't read those half a billion tweets one by one, of course. Instead, they fed the posts into a powerful and widely used computerized text-



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analysis program called LIWC (Linguistic Inquiry and Word Count) that evaluated each word for the emotion it conveyed.

What Macy and Golder found, and published in the eminent journal *Science*, was a remarkably consistent pattern across people's waking hours. Positive affect—language revealing that tweeters felt active, engaged, and hopeful—generally rose in the morning, plummeted in the afternoon, and climbed back up again in the early evening. Whether a tweeter was North American or Asian, Muslim or atheist, black or white or brown, didn't matter. "The temporal affective pattern is similarly shaped across disparate cultures and geographic locations," they write. Nor did it matter whether people were tweeting on a Monday or a Thursday. Each weekday was basically the same. Weekend results differed slightly. Positive affect was generally a bit higher on Saturdays and Sundays—and the morning peak began about two hours later than on weekdays—but the overall shape stayed the same.² Whether measured in a large, diverse country like the United States or a smaller, more homogenous country like the United Arab Emirates, the daily pattern remained weirdly similar. It looked like this:



Across continents and time zones, as predictable as the ocean tides, was the same daily oscillation—a peak, a trough, and a rebound. Beneath the surface of our everyday life is a hidden pattern: crucial, unexpected, and revealing.

Understanding this pattern—where it comes from and what it means—begins with a potted plant, a *Mimosa pudica*, to be exact, that perched on the windowsill of an office in eighteenth-century France. Both the office and the plant belonged to Jean-Jacques d’Ortous de Mairan, a prominent astronomer of his time. Early one summer evening in 1729, de Mairan sat at his desk doing what both eighteenth-century French astronomers and twenty-first-century American writers do when they have serious work to complete: He was staring out the window. As twilight approached, de Mairan noticed that the leaves of the plant sitting on his windowsill had closed up. Earlier in the day, when sunlight streamed through the window, the leaves were spread open. This pattern—leaves unfurled during the sunny morning and furled as darkness loomed—spurred questions. How did the plant sense its surroundings? And what would happen if that pattern of light and dark was disrupted?

So in what would become an act of historically productive procrastination, de Mairan removed the plant from the windowsill, stuck it in a cabinet, and shut the door to seal off light. The following morning, he opened the cabinet to check on the plant and—*mon Dieu!*—the leaves had unfurled despite being in complete darkness. He continued his investigation for a few more weeks, draping black curtains over his windows to prevent even a sliver of light from penetrating the office. The pattern remained. The *Mimosa pudica*’s leaves opened in the morning, closed in the evening. The plant wasn’t reacting to external light. It was abiding by its own internal clock.³

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Since de Mairan's discovery nearly three centuries ago, scientists have established that nearly all living things—from single-cell organisms that lurk in ponds to multicellular organisms that drive minivans—have biological clocks. These internal timekeepers play an essential role in proper functioning. They govern a collection of what are called circadian rhythms (from the Latin *circa* [around] and *diem* [day]) that set the daily backbeat of every creature's life. (Indeed, from de Mairan's potted plant eventually bloomed an entirely new science of biological rhythms known as chronobiology.)

For you and me, the biological Big Ben is the suprachiasmatic nucleus, or SCN, a cluster of some 20,000 cells the size of a grain of rice in the hypothalamus, which sits in the lower center of the brain. The SCN controls the rise and fall of our body temperature, regulates our hormones, and helps us fall asleep at night and awaken in the morning. The SCN's daily timer runs a bit longer than it takes for the Earth to make one full rotation—about twenty-four hours and eleven minutes.⁴ So our built-in clock uses social cues (office schedules and bus timetables) and environmental signals (sunrise and sunset) to make small adjustments that bring the internal and external cycles more or less in synch, a process called “entrainment.”

The result is that, like the plant on de Mairan's windowsill, human beings metaphorically “open” and “close” at regular times during each day. The patterns aren't identical for every person—just as my blood pressure and pulse aren't exactly the same as yours or even the same as mine were twenty years ago or will be twenty years hence. But the broad contours are strikingly similar. And where they're not, they differ in predictable ways.

Chronobiologists and other researchers began by examining physiological functions such as melatonin production and metabolic response, but the work has now widened to include emotions and behavior. Their research is unlocking some surprising time-based

patterns in how we feel and how we perform—which, in turn, yields guidance on how we can configure our own daily lives.

MOOD SWINGS AND STOCK SWINGS

For all their volume, hundreds of millions of tweets cannot provide a perfect window into our daily souls. While other studies using Twitter to measure mood have found much the same patterns that Macy and Golder discovered, both the medium and the methodology have limits.⁵ People often use social media to present an ideal face to the world that might mask their true, and perhaps less ideal, emotions. In addition, the industrial-strength analytic tools necessary to interpret so much data can't always detect irony, sarcasm, and other subtle human tricks.

Fortunately, behavioral scientists have other methods to understand what we are thinking and feeling, and one is especially good for charting hour-to-hour changes in how we feel. It's called the Day Reconstruction Method (DRM), the creation of a quintet of researchers that included Daniel Kahneman, winner of the Nobel Prize in Economics, and Alan Krueger, who served as chairman of the White House Council of Economic Advisers under Barack Obama. With the DRM, participants reconstruct the previous day—chronicling everything they did and how they felt while doing it. DRM research, for instance, has shown that during any given day people typically are least happy while commuting and most happy while canoodling.⁶

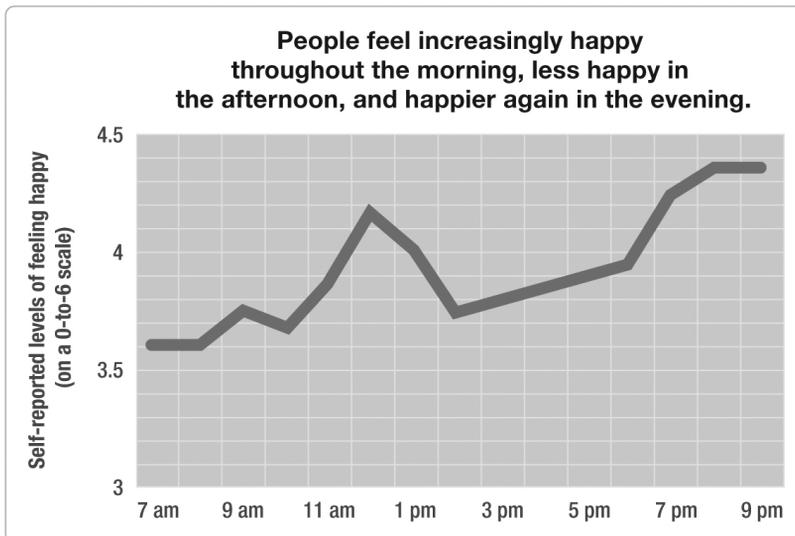
In 2006, Kahneman, Krueger, and crew enlisted the DRM to measure “a quality of affect that is often overlooked: its rhythmicity over the course of a day.” They asked more than nine hundred American women—a mix of races, ages, household incomes, and education

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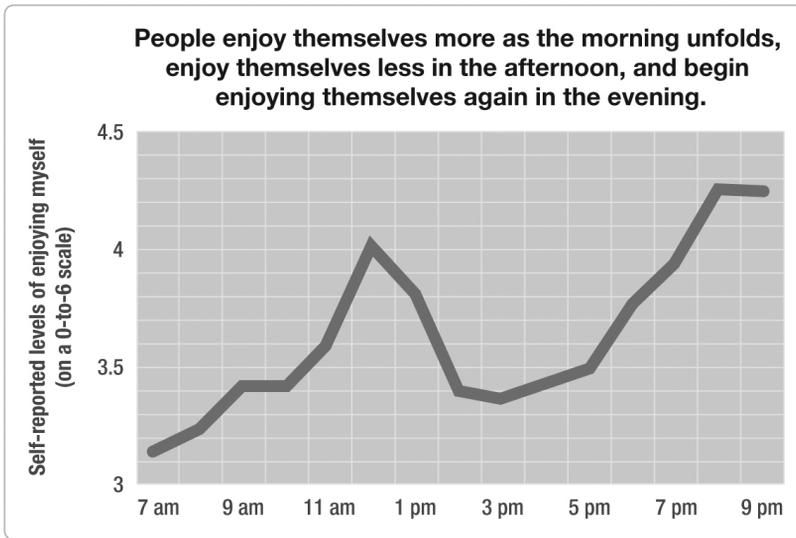
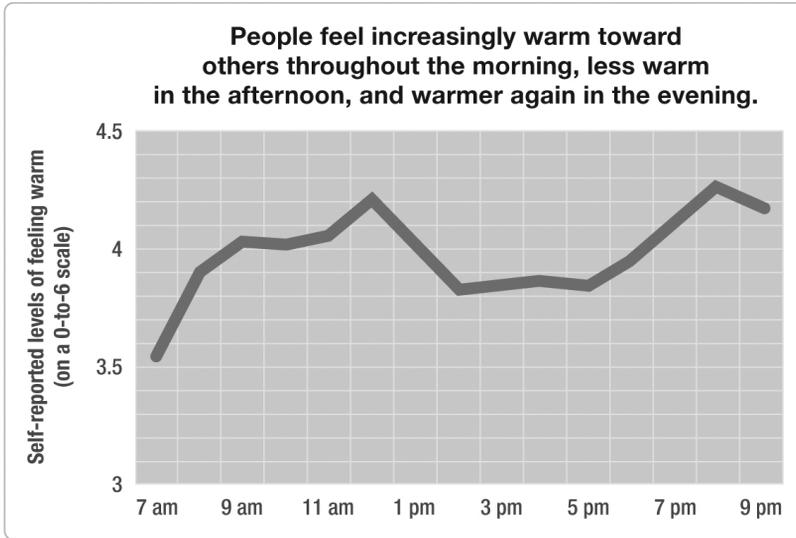
levels—to think about the previous “day as a continuous series of scenes or episodes in a film,” each one lasting between about fifteen minutes and two hours. The women then described what they were doing during each episode and chose from a list of twelve adjectives (happy, frustrated, enjoying myself, annoyed, and so on) to characterize their emotions during that time.

When the researchers crunched the numbers, they found a “consistent and strong bimodal pattern”—twin peaks—during the day. The women’s positive affect climbed in the morning hours until it reached an “optimal emotional point” around midday. Then their good mood quickly plummeted and stayed low throughout the afternoon only to rise again in the early evening.⁷

Here, for example, are charts for three positive emotions—happy, warm, and enjoying myself. (The vertical axis represents the participants’ measure of their mood, with higher numbers being more positive and lower numbers less positive. The horizontal axis shows the time of day, from 7 a.m. to 9 p.m.)



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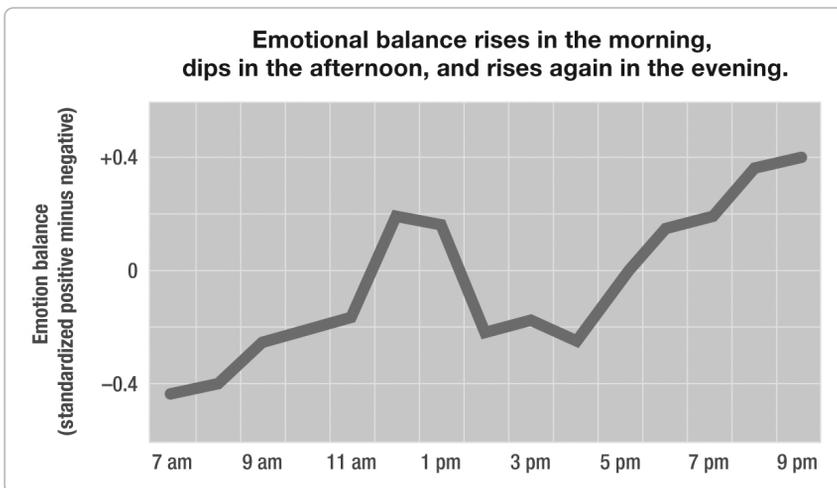


The three charts are obviously not identical, but they all share the same essential shape. What's more, that shape—and the cycle of the day it represents—looks a lot like the one on page 10. An early spike, a big drop, and a subsequent recovery.

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On a matter as elusive as human emotion, no study or methodology is definitive. This DRM looked only at women. In addition, *what* and *when* can be difficult to untangle. One reason “enjoying myself” is high at noon and low at 5 p.m. is that we tend to dig socializing (which people do around lunchtime) and detest battling traffic (which people often do in the early evening). Yet the pattern is so regular, and has been replicated so many times, that it’s difficult to ignore.

So far I’ve described only what DRM researchers found about positive affect. The ups and downs of *negative* emotions—feeling frustrated, worried, or hassled—were not as pronounced, but they typically showed a reverse pattern, rising in the afternoon and sinking as the day drew to a close. But when the researchers combined the two emotions, the effect was especially stark. The following graph depicts what you might think of as “net good mood.” It takes the hourly ratings for happiness and subtracts the ratings for frustration.



Once again, a peak, a trough, and a rebound.

Moods are an internal state, but they have an external impact. Try as we might to conceal our emotions, they inevitably leak—and that shapes how others respond to our words and actions.

Which leads us inexorably to canned soup.

If you've ever prepared a bowl of cream of tomato soup for lunch, Doug Conant might be the reason why. From 2001 to 2011, Conant was the CEO of Campbell Soup Company, the iconic brand with those iconic cans. During his tenure, Conant helped to revitalize the company and return it to steady growth. Like all CEOs, Conant juggled multiple duties. But one he handled with particular calm and aplomb is the rite of corporate life known as the quarterly earnings call.

Every three months, Conant and two or three lieutenants (usually the company's chief financial officer, controller, and head of investor relations) would walk into a boardroom in Campbell's Camden, New Jersey, headquarters. Each person would take a seat along one of the sides of a long rectangular table. At the center of the table sat a speakerphone, the staging ground for a one-hour conference call. At the other end of the speakerphone were one hundred or so investors, journalists, and, most important, stock analysts, whose job is to assess a company's strengths and weaknesses. In the first half hour, Conant would report on Campbell's revenue, expenses, and earnings the previous quarter. In the second half hour, the executives would answer questions posed by analysts, who would probe for clues about the company's performance.

At Campbell Soup and all public companies, the stakes are high for earnings calls. How analysts react—did the CEO's comments leave them bullish or bearish about the company's prospects?—can send a stock soaring or sinking. "You have to thread the needle," Conant told me. "You have to be responsible and unbiased, and report the facts. But you also have a chance to champion the company

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and set the record straight.” Conant says his goal was always to “take uncertainty out of an uncertain marketplace. For me, these calls introduced a sense of rhythmic certainty into my relationships with investors.”

CEOs are human beings, of course, and therefore presumably subject to the same daily changes in mood as the rest of us. But CEOs are also a stalwart lot. They’re tough-minded and strategic. They know that millions of dollars ride on every syllable they utter in these calls, so they arrive at these encounters poised and prepared. Surely it couldn’t make any difference—to the CEO’s performance or the company’s fortunes—*when* these calls occur?

Three American business school professors decided to find out. In a first-of-its-kind study, they analyzed more than 26,000 earnings calls from more than 2,100 public companies over six and a half years using linguistic algorithms similar to the ones employed in the Twitter study. They examined whether the time of day influenced the emotional tenor of these critical conversations—and, as a consequence, perhaps even the price of the company’s stock.

Calls held first thing in the morning turned out to be reasonably upbeat and positive. But as the day progressed, the “tone grew more negative and less resolute.” Around lunchtime, mood rebounded slightly, probably because call participants recharged their mental and emotional batteries, the professors conjectured. But in the afternoon, negativity deepened again, with mood recovering only after the market’s closing bell. Moreover, this pattern held “even after controlling for factors such as industry norms, financial distress, growth opportunities, and the news that companies were reporting.”⁸ In other words, even when the researchers factored in economic news (a slowdown in China that hindered a company’s exports) or firm fundamentals (a company that reported abysmal quarterly earnings), afternoon calls “were more negative, irritable, and combative” than morning calls.⁹

Perhaps more important, especially for investors, the time of the call and the subsequent mood it engendered influenced companies' stock prices. Shares declined in response to negative tone—again, even after adjusting for actual good news or bad news—“leading to temporary stock mispricing for firms hosting earnings calls later in the day.”

While the share prices eventually righted themselves, these results are remarkable. As the researchers note, “call participants represent the near embodiment of the idealized *homo economicus*.” Both the analysts and the executives know the stakes. It's not merely the people on the call who are listening. It's the entire market. The wrong word, a clumsy answer, or an unconvincing response can send a stock's price spiraling downward, imperiling the company's prospects and the executives' paychecks. These hardheaded businesspeople have every incentive to act rationally, and I'm sure they believe they do. But economic rationality is no match for a biological clock forged during a few million years of evolution. Even “sophisticated economic agents acting in real and highly incentivized settings are influenced by diurnal rhythms in the performance of their professional duties.”¹⁰

These findings have wide implications, say the researchers. The results “are indicative of a much more pervasive phenomenon of diurnal rhythms influencing corporate communications, decision-making and performance across all employee ranks and business enterprises throughout the economy.” So stark were the results that the authors do something rare in academic papers: They offer specific, practical advice.

“[A]n important takeaway from our study for corporate executives is that communications with investors, and probably other critical managerial decisions and negotiations, should be conducted earlier in the day.”¹¹

Should the rest of us heed this counsel? (Campbell, as it happens, typically held its earnings calls in the morning.) Our moods cycle in

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a regular pattern—and, almost invisibly, that affects how corporate executives do their job. So should those of us who haven't ascended to the C-suite also frontload our days and tackle our important work in the morning?

The answer is yes. And no.

VIGILANCE, INHIBITION, AND THE DAILY SECRET TO HIGH PERFORMANCE

Meet Linda. She's thirty-one years old, single, outspoken, and very bright. In college, Linda majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and participated in antinuclear demonstrations.

Before I tell you more about Linda, let me ask you a question about her. Which is more likely?

- a. Linda is a bank teller.
- b. Linda is a bank teller and is active in the feminist movement.

Faced with this question, most people answer (b). It makes intuitive sense, right? A justice-seeking, antinuke philosophy major? That sure sounds like someone who would be an active feminist. But (a) is—and must be—the correct response. The answer isn't a matter of fact. Linda isn't real. Nor is it a matter of opinion. It's entirely a matter of logic. Bank tellers who are also feminists—just like bank tellers who yodel or despise cilantro—are *a subset* of all bank tellers, and subsets can never be larger than the full set they're a part of.* In 1983

* We can also explain this with some simple math. Suppose there's a 2 percent chance (.02) that Linda is a bank teller. If there's even a whopping 99 percent chance (.99) that she's a feminist, the probability of her being both a bank teller and a feminist is .0198 (.02 x .99)—which is less than 2 percent.