

"Scarcity is a captivating book, overflowing with new ideas, fantastic stories, and simple suggestions that just might change the way you live."
—Steven D. Levitt, coauthor of *Freakonomics*

Scarcity

Why
Having
Too Little
Means
So Much

Sendhil
Mullainathan
Eldar Shafir



PENGUIN

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INTRODUCTION

If ants are such busy workers, how come they find time to go to all the picnics?

—MARIE DRESSLER,
ACADEMY AWARD-WINNING ACTRESS

We wrote this book because we were too busy not to.

Sendhil was grumbling to Eldar. He had more to-dos than time to do them in. Deadlines had matured from “overdue” to “alarmingly late.” Meetings had been sheepishly rescheduled. His in-box was swelling with messages that needed his attention. He could picture his mother’s hurt face at not getting even an occasional call. His car registration had expired. And things were getting worse. That conference one connecting flight away seemed like a good idea six months ago. Not so much now. Falling behind had turned into a vicious cycle. Re-registering the car was now one more thing to do. A project had taken a wrong direction because of a tardy e-mail response; getting it back on track meant yet more work. The past-due pile of life was growing dangerously close to toppling.

The irony of spending time lamenting the lack of time was not lost on Eldar. It was only partly lost on Sendhil who, undeterred, described his plan for getting out.

He would first stem the tide. Old obligations would need to be

fulfilled, but new ones could be avoided. He would say no to every new request. He would prevent further delays on old projects by working meticulously to finish them. Eventually, this austerity would pay off. The to-do pile would shrink to a manageable level. Only then would he even think about new projects. And of course he would be more prudent going forward. “Yes” would be rare and uttered only after careful scrutiny. It would not be easy, but it was necessary.

Having made the plan felt good. Of course it did. As Voltaire noted long ago, “Illusion is the first of all pleasures.”

A week later, another call from Sendhil: Two colleagues were putting together a book on the lives of low-income Americans. “This is a great opportunity. We should write a chapter,” he said. His voice, Eldar recalls, lacked even a trace of irony.

Predictably, the chapter was “too good to pass up,” and we agreed to do it. Just as predictably, it was a mistake, written in a rush and behind schedule. Unpredictably, it was a worthwhile mistake, creating an unexpected connection that eventually led to this book.

Here is an excerpt from our background notes for that chapter:

Shawn, an office manager in Cleveland, was struggling to make ends meet. He was late on a bunch of bills. His credit cards were maxed out. His paycheck ran out quickly. As he said, “There is always more month than money.” The other day, he accidentally bounced a check after overestimating the money in his account; he had forgotten a \$22 purchase. Every phone call made him tense: another creditor calling to “remind” him? Being out of money was also affecting his personal life. Sometimes at dinner he would put in less than his fair share because he was short. His friends understood, but it didn’t feel good.

And there was no end in sight. He had bought a Blu-ray player on credit, with no payments for the first six months. That was five months ago. How would he pay this extra bill next month? Already, more and more money went to paying off old debts. The bounced

check had a hefty overdraft charge. The late bills meant late fees. His finances were a mess. He was in the deep end of the debt pool and barely staying afloat.

Shawn, like many people in his situation, got financial advice from many sources, all of it pretty similar:

Don't sink any deeper. Stop borrowing. Cut your spending to the minimum. Some expenses may be tough to cut, but you'll have to learn how. Pay off your old debts as quickly as possible. Eventually, with no new debts, your payments will become manageable. After this, remain vigilant so as not to fall back in. Spend and borrow wisely. Avoid unaffordable luxuries. If you must borrow, be clear about what it takes to pay it back.

This advice worked better in theory than in practice for Shawn. Resisting temptation is hard. Resisting all temptations was even harder. A leather jacket he had coveted went on sale at a great price. Skimping on his daughter's birthday gift felt less sensible as the day got closer. There were too many ways to spend more than he planned. Shawn eventually sank back into the debt pool.

It did not take long for us to notice the resemblance between Sendhil's and Shawn's behavior. Missed deadlines are a lot like overdue bills. Double-booked meetings (committing time you do not have) are a lot like bounced checks (spending money you do not have). The busier you are, the greater the need to say no. The more indebted you are, the greater the need to not buy. Plans to escape sound reasonable but prove hard to implement. They require constant vigilance—about what to buy or what to agree to do. When vigilance flags—the slightest temptation in time or in money—you sink deeper. Shawn ended up stuck with accumulating debt. Sendhil ended up stuck under mounting commitments.

This resemblance is striking because the circumstances are so different. We normally think of time management and money

management as distinct problems. The consequences of failing are different: bad time management leads to embarrassment or poor job performance; bad money management leads to fees or eviction. The cultural contexts are different: falling behind and missing a deadline means one thing to a busy professional; falling behind and missing a debt payment means something else to an urban low-wage worker. The surroundings differ. The education levels differ. Even aspirations can differ. Yet despite these differences, the end behavior is remarkably similar.

Sendhil and Shawn did have one thing in common: each of them was feeling the effects of scarcity. By scarcity, we mean *having less than you feel you need*. Sendhil felt harried; he felt he had too little time to do all the things he needed to do. Shawn felt cash strapped, with too little money for all the bills he needed to pay. Could this common connection explain their behavior? Could it be that scarcity itself led Sendhil and Shawn to behave in such similar ways?

Uncovering a common logic to scarcity would have big implications. Scarcity is a broad concept that extends well beyond these personal anecdotes. The problem of unemployment, for example, is also the problem of financial scarcity. The loss of a job makes a household's budget suddenly tight—too little income to cover the mortgage, car payments, and day-to-day expenses. The problem of increasing social isolation—“bowling alone”—is a form of social scarcity, of people having too few social bonds. The problem of obesity is also, perhaps counterintuitively, a problem of scarcity. Sticking to a diet requires coping with the challenge of having less to eat than you feel accustomed to—a tight calorie budget or calorie scarcity. The problem of global poverty—the tragedy of multitudes of people around the world making do with a dollar or two a day—is another kind of financial scarcity. Unlike the sudden and possibly fleeting tightening of one's budget due to job loss, poverty means a perpetually tight budget.

Scarcity connects more than just Sendhil's and Shawn's problems: it forms a common chord across so many of society's problems.

These problems occur in different cultures, economic conditions, and political systems, but they all feature scarcity. Could there be a common logic to scarcity, one that operates across these diverse backdrops?

We had to answer this question. We were too busy not to.

SCARCITY CAPTURES THE MIND

Our interest in scarcity led us to a remarkable study from more than a half century ago. The authors of that study did not think of themselves as studying scarcity, but to our eyes they were studying an extreme form of it—starvation. It was toward the end of World War II, and the Allies realized they had a problem. As they advanced into German-occupied territories, they would encounter great numbers of people on the edge of starvation. The problem was not food; the Americans and British had enough to feed the prisoners and the civilians they were liberating. Their problem was more technical. How do you begin feeding people who have been on the edge of starvation for so long? Should they be given full meals? Should they be allowed to eat as much as they want? Or should you start by underfeeding them and slowly increase their intake? What was the safest way to bring people back from the edge of starvation?

The experts at the time had few answers. So a team at the University of Minnesota conducted an experiment to find out. Understanding how to feed people, though, requires first starving them. The experiment started with healthy male volunteers in a controlled environment where their calories were reduced until they were subsisting on just enough food so as not to permanently harm themselves. After a few months of this, the real experiment began: finding out how their bodies responded to different feeding regimens. Not an easy experiment to be a subject in, but this was “the Good War,” and conscientious objectors who did not go to the front were willing to do their part.

The thirty-six subjects in the study were housed in a dormitory and were carefully monitored, with every behavior observed and noted. Though the researchers cared most about the feeding part of the study, they also measured the impact of starvation. Much of what happens to starving bodies is quite graphic. Subjects lost so much fat on their butts that sitting became painful; the men had to use pillows. Actual weight loss was complicated by edema—the men accumulated as much as fourteen pounds of extra fluid due to starvation. Their metabolism slowed down by 40 percent. They lost strength and endurance. As one subject put it, “I notice the weakness in my arms when I wash my hair in the shower; they become completely fatigued in the course of this simple operation.”

Not only did their bodies weaken; their minds changed as well. Sharman Apt Russell describes a lunch scene in her book *Hunger*:

The men became impatient waiting in line if the service was slow. They were possessive about their food. Some hunched over their trays using their arms to protect their meal. Mostly they were silent, with the concentration that eating deserved. . . . Dislikes for certain foods, such as rutabagas, disappeared. All food was eaten to the last bite. Then they licked their plates.

This is largely what you might expect of people who are starving. But some mental changes they showed were more unexpected:

Obsessions developed around cookbooks and menus from local restaurants. Some men could spend hours comparing the prices of fruits and vegetables from one newspaper to the next. Some planned now to go into agriculture. They dreamed of new careers as restaurant owners. . . . They lost their will for academic problems and became far more interested in cookbooks. . . . When they went to the movies, only the scenes with food held their interest.

They were focused on food. Of course if you are starving, getting more food should be a priority. But their minds focused in a way

that transcended practical benefits. The delusions of starting a restaurant, comparing food prices, and researching cookbooks will not alleviate hunger. If anything, all this thinking about food—almost a fixation—surely heightened the pain of hunger. They did not choose this. Here is how one participant in the Minnesota study recalled the frustration of constantly thinking about food:

I don't know many other things in my life that I looked forward to being over with any more than this experiment. And it wasn't so much . . . because of the physical discomfort, but because it made food the most important thing in one's life . . . food became the one central and only thing really in one's life. And life is pretty dull if that's the only thing. I mean, if you went to a movie, you weren't particularly interested in the love scenes, but you noticed every time they ate and what they ate.

The hungry men did not choose to ignore the plot in favor of the food. They did not choose to put food at the top of their mind. Instead, hunger captured their thinking and their attention. These behaviors were only a footnote in the Minnesota study, not at all what the researchers were interested in. To us, they illustrate how scarcity changes us.

Scarcity captures the mind. Just as the starving subjects had food on their mind, when we experience scarcity of any kind, we become absorbed by it. The mind orients automatically, powerfully, toward unfulfilled needs. For the hungry, that need is food. For the busy it might be a project that needs to be finished. For the cash-strapped it might be this month's rent payment; for the lonely, a lack of companionship. Scarcity is more than just the displeasure of having very little. It changes how we think. It imposes itself on our minds.

This is a lot to infer from just one study. Starvation is an extreme case: it involves scarcity but it also involves many other physiological changes. The study had only thirty-six subjects. The evidence we cite consists largely of the mutterings of hungry men, not hard numbers.

But many other, more precise studies have shown the same results. Not only that, they give a window into exactly how scarcity captures the mind.

One recent study asked subjects to come to a lab around lunchtime, not having eaten for three to four hours. Half of these hungry subjects were sent out to grab lunch, the others weren't. So half were hungry and half were sated. Their task in the study was simple: Watch a screen. A word will flash. Identify the word you just saw. So, for example, *TAKE* might flash and the subjects would have to decide whether they just saw *TAKE* or *RAKE*. This seems a trivial task and it would have been except that everything happened quickly. Very quickly. The word itself flashes for 33 milliseconds—that is, 1/30 of a second.

Now you might think that the hungry subjects might do worse, being tired and unfocused from their hunger. But on this particular task, they did as well as the sated subjects. Except in one case. The hungry did much *better* on food-related words. They were much more likely to accurately detect the word *CAKE*. Tasks such as these are designed to tell us what is at the top of someone's mind. When a concept occupies our thoughts, we see words related to it more quickly. So when the hungry recognize *CAKE* more quickly, we see directly that food is at the top of their minds. Here we do not rely on odd behaviors such as leafing through cookbooks or making plans to be a restaurateur to infer their fixation. The speed and accuracy of their responses directly show us that scarcity has captured the hungry subjects' minds.

And it does so on a subconscious level. The tiny time scales in this task—outcomes measured in milliseconds—were devised to observe fast processes, fast enough to remain beyond conscious control. We now know enough about the brain to know what these time scales mean. Complex higher-order calculations require more than 300 milliseconds. Faster responses rely on more automatic subconscious processes. So when the hungry recognize *CAKE* more quickly, it is not because they *choose* to focus more on this word. It happens

faster than they could choose to do anything. This is why we use the word *capture* when describing how scarcity focuses the mind.

This phenomenon is not specific to hunger. One study finds that when subjects are thirsty, they are much quicker (again at the level of tens of milliseconds) to recognize the word *WATER*. In all these cases, scarcity operates unconsciously. It captures attention whether the mind's owner wishes it or not.

Now, both thirst and hunger are physical cravings. Other, less visceral forms of scarcity also capture the mind. In one study, children were asked to estimate from memory, by adjusting a physical device, the size of regular U.S. coins—from a penny to a half-dollar. The coins “looked” largest to the poorer children, who significantly overestimated the size of the coins. The most valuable coins—the quarter and half-dollar—were the most distorted. Just as food captures the focus of the hungry, the coins captured the focus of poor children. The increased focus made these coins “look” bigger. Now, it's possible that poor children are simply unskilled at remembering size. So the researchers had the kids estimate sizes with the coins in front of them, an even simpler task. In fact, the poor children made even *bigger* errors with the coins in front of them. The real coins drew even more focus than did the abstract ones in memory. (And with no coins around, the kids were highly accurate at estimating similarly sized cardboard disks.)

The capture of attention can alter experience. During brief and highly focused events, such as car accidents and robberies, for example, the increased engagement of attention brings about what researchers call the “subjective expansion of time,” a feeling that such events last longer, precisely because of the greater amount of information that is processed. Similarly, scarcity's capture of attention affects not only what we see or how fast we see it but also how we interpret the world. One study of the lonely flashed pictures of faces for one second and asked subjects to describe which emotion was being expressed. Were the faces conveying anger, fear, happiness, or sadness? This simple task measures a key social skill: the ability to understand

what others are feeling. Remarkably, the lonely do *better* at this task. You might have thought they would do worse—after all, their loneliness might imply social ineptitude or inexperience. But this superior performance makes sense when you consider the psychology of scarcity. It is just what you would predict if the lonely focus on their own form of scarcity, on managing social contacts. They ought to be particularly attuned to reading emotions.

This implies that the lonely should also show greater recall for social information. One study asked people to read from someone's diary and to form an impression of the writer. Later they were asked to recall details from the diary entries. The lonely did about as well as the nonlonely. Except in one case: they were much better at remembering the entries that involved social content, such as interactions with others.

The authors of this study relay an anecdote that nicely summarizes how loneliness changes focus: Bradley Smith, unlucky in love and lacking close friends, finds his perception changes after a divorce.

Suddenly, Bradley cannot escape noticing connections between people—couples and families—in exquisite and painful detail. At one time or another, Bradley's plight may have befallen most of us. Perhaps, similar to Bradley, a romantic relationship ends, and you find yourself noticing lovers holding hands in the park. Or your first days in a new school or job place you in a world of strangers, in which each smile, scowl, or glance in your direction assumes added significance.

Bradley, you might say, is the social equivalent of the starving men, leafing through his own cookbooks.

THE ORIGINAL SCIENCE OF SCARCITY

When we told an economist colleague that we were studying scarcity, he remarked, "There is already a science of scarcity. You might

have heard of it. It's called economics." He was right, of course. Economics is the study of how we use our limited means to achieve our unlimited desires; how people and societies manage physical scarcity. If you spend money on a new coat, you have less money for a dinner out. If the government spends money on an experimental procedure for prostate cancer, there is less money for highway safety. It is remarkable how frequently otherwise clever discussions tend to overlook trade-offs (an oversight that our theory helps explain). Other economic insights come from the recognition that physical scarcity responds to prices, sometimes in unexpected ways. European paleontologists in nineteenth-century China learned this the hard way. Seeking to acquire scarce dinosaur bones, they paid villagers for bone fragments. The result? Supply responded. More bone fragments. When peasants found bones, they would smash them to increase the number of pieces they could sell. Not quite what the paleontologists were hoping for.

Our approach to scarcity is different. In economics, scarcity is ubiquitous. All of us have a limited amount of money; even the richest people cannot buy everything. But we suggest that while physical scarcity is ubiquitous, the feeling of scarcity is not. Imagine a day at work where your calendar is sprinkled with a few meetings and your to-do list is manageable. You spend the unscheduled time by lingering at lunch or at a meeting or calling a colleague to catch up. Now, imagine another day at work where your calendar is chock-full of meetings. What little free time you have must be sunk into a project that is overdue. In both cases time was physically scarce. You had the same number of hours at work and you had more than enough activities to fill them. Yet in one case you were acutely aware of scarcity, of the finiteness of time; in the other it was a distant reality, if you felt it at all. The feeling of scarcity is distinct from its physical reality.

Where does the feeling of scarcity come from? Physical limits, of course, play a role—the money in our savings account, the debts we owe, the tasks we must complete. But so does our subjective perception of what matters: how much do we need to accomplish? How

important is that purchase? Such desires are shaped by culture, upbringing, even genetics. We may deeply desire something because of our physiology or because our neighbor has it. Just as how cold we feel depends not only on absolute temperature but also on our own private metabolism, so the feeling of scarcity depends on both what is available and on our own tastes. Many scholars—sociologists, psychologists, anthropologists, neuroscientists, psychiatrists, and even marketers—have tried to decipher what accounts for these tastes. In this book, we largely avoid that discussion. We let preferences be what they are and focus instead on the logic and the consequences of scarcity: What happens to our minds when we feel we have too little, and how does that shape our choices and our behaviors?

As a blunt approximation, most disciplines, including economics, say the same thing about this question. The consequence of having less than we want is simple: we are unhappy. The poorer we are, the fewer nice things we can afford—be it a house in a good school district or as little as salt and sugar to flavor our food. The busier we are, the less leisure time we can enjoy—be it watching television or spending time with our families. The fewer calories we can afford, the fewer foods we can savor. And so on. Having less is unpleasant. And it can have repercussions, for example, on health, safety, or education. Scarcity leads to dissatisfaction and struggle.

While certainly true, we think this misses something critical. Scarcity is not just a physical constraint. It is also a mindset. When scarcity captures our attention, it changes how we think—whether it is at the level of milliseconds, hours, or days and weeks. By staying top of mind, it affects what we notice, how we weigh our choices, how we deliberate, and ultimately what we decide and how we behave. When we function under scarcity, we represent, manage, and deal with problems differently. Some fields have studied mindsets created by particular instances of scarcity: how dieting affects mood, or how a particular cultural context might affect the attitudes of the local poor. We are proposing something much more universal: Scar-

city, in every form, creates a similar mindset. And this mindset can help explain many of the behaviors and the consequences of scarcity.

When scarcity captures the mind, we become more attentive and efficient. There are many situations in our lives where maintaining focus can be challenging. We procrastinate at work because we keep getting distracted. We buy overpriced items at the grocery store because our minds are elsewhere. A tight deadline or a shortage of cash focuses us on the task at hand. With our minds riveted, we are less prone to careless error. This makes perfect sense: scarcity captures us because it is important, worthy of our attention.

But we cannot fully choose when our minds will be riveted. We think about that impending project not only when we sit down to work on it but also when we are at home trying to help our child with her homework. The same automatic capture that helps us focus becomes a burden in the rest of life. Because we are preoccupied by scarcity, because our minds constantly return to it, we have less mind to give to the rest of life. This is more than a metaphor. We can directly measure mental capacity or, as we call it, *bandwidth*. We can measure fluid intelligence, a key resource that affects how we process information and make decisions. We can measure executive control, a key resource that affects how impulsively we behave. And we find that scarcity reduces all these components of bandwidth—it makes us less insightful, less forward-thinking, less controlled. And the effects are large. Being poor, for example, reduces a person's cognitive capacity more than going one full night without sleep. It is not that the poor have less bandwidth as individuals. Rather, it is that the experience of poverty reduces anyone's bandwidth.

When we think of the poor, we naturally think of a shortage of money. When we think of the busy, or the lonely, we think of a shortage of time, or of friends. But our results suggest that scarcity of all varieties also leads to a shortage of bandwidth. And because bandwidth affects all aspects of behavior, this shortage has consequences. We saw this with Sendhil and Shawn. The challenges of sticking to a plan, the inability to resist a new leather jacket or a new project, the

forgetfulness (the car registration, making a phone call, paying a bill) and the cognitive slips (the misestimated bank account balance, the mishandled invitation) all happen because of a shortage of bandwidth. There is one particularly important consequence: it further perpetuates scarcity. It was not a coincidence that Sendhil and Shawn fell into a trap and stayed there. Scarcity creates its own trap.

This provides a very different explanation for why the poor stay poor, why the busy stay busy, why the lonely stay lonely, and why diets often fail. To understand these problems, existing theories turn to culture, personality, preferences, or institutions. What attitudes do the indebted have toward money and credit? What are the work habits of the overly busy? What cultural norms and constructed preferences guide the food choices of the obese? Our results suggest something much more fundamental: many of these problems can be understood through the mindset of scarcity. This is not to say that culture, economic forces, and personality do not matter. They surely do. But scarcity has its own logic, one that operates on top of these other forces.

Analyzing these scarcity traps together does not imply that all forms of scarcity have consequences of the same magnitude. The scarcity mindset can operate with far greater import in one context than in another. The structure of human memory, for example, can be used to understand everything from the trivial (why we forget our keys) to the important (the credibility of eyewitnesses) to the tragic (the onset of Alzheimer's). Likewise, though the logic of scarcity can be similar across different domains, its impact can be quite different. This will be particularly true when we analyze the case of poverty. The circumstances of poverty can be far more extreme, often associated with contexts that are more challenging and less forgiving. The bandwidth tax, for example, is likely to be larger for the poor than for the busy or for dieters. For this reason, we will later pay special attention to the poor.

In a way, our argument in this book is quite simple. Scarcity captures our attention, and this provides a narrow benefit: we do a bet-

ter job of managing pressing needs. But more broadly, it costs us: we neglect other concerns, and we become less effective in the rest of life. This argument not only helps explain how scarcity shapes our behavior; it also produces some surprising results and sheds new light on how we might go about managing our scarcity.

AN INVITATION

This book describes a “science in the making,” an attempt to unravel the psychological underpinnings of scarcity and to use that knowledge to understand a large variety of social and behavioral phenomena. Much of the book draws on original research conducted in settings ranging from university laboratories, shopping malls, and train stations, to soup kitchens in New Jersey and sugar cane fields in India. We also revisit older studies (such as the hunger study) through the lens of our new hypothesis, reinterpreting them in ways that the original authors probably did not anticipate. We use this evidence to build our case, to put forward a new perspective.

One advantage of working on something so new is that it can be presented to experts and nonexperts alike. Because our argument relies on a variety of fields, from cognitive science to development economics, few people will be experts in all these areas, and most will be novices for at least some of the material we present. To accommodate this, we have worked hard to make the whole book, even the technical parts, easily accessible to a wide audience. We also use anecdotes and vignettes extensively. Of course, these never serve as substitutes for careful evidence, but they are used to make concepts intuitive, to bring ideas to life. Ultimately, the strength of our argument will naturally rely on the evidence we present. For the readers who would like greater technical detail, we have included extensive endnotes. More than merely providing references, these discuss details of studies presented, mention other studies that seemed too tangential to include but still relevant, and generally

allow you to go even deeper should you find something of particular interest.

This book is not meant to be the final word. It raises a new perspective on an age-old problem, one that ought to be seriously entertained. Anytime there is a new way of thinking, there are also new implications to be derived, new magnitudes to be deciphered, and new consequences to be understood. There is much more to be done, and in that sense our book is an invitation—a front-row seat to a process of discovery.