Contents

An Explanatory Note
In which we admit to lying in our previous book.

Introduction: Putting the Freak in Economics
In which the global financial meltdown is entirely ignored in favor of more engaging topics.

The perils of walking drunk…The unlikely savior of Indian women…Drowning in horse manure…What is “freakonomics,” anyway?…Toothless sharks and bloodthirsty elephants…Things you always thought you knew but didn’t.

Chapter 1
How is a Street Prostitute Like a Department-Store Santa?
In which we explore the various costs of being a woman.

Meet LaSheena, a part-time prostitute…One million dead “witches”…The many ways in which females are punished for being born female…Even Radcliffe women pay the price…Title IX creates jobs for women; men take them…1 of every 50 women a prostitute…The booming sex trade in old-time Chicago…A survey like no other…The erosion of prostitute pay…Why did oral sex get so cheap?…Pimps versus Realtors…Why cops love prostitutes…Where did all the schoolteachers go?…What really accounts for the male-female wage gap?…Do men love money the way women love kids?…Can a sex change boost your salary?…Meet Allie, the happy prostitute; why aren’t there more women like her?

Chapter 2
Why Should Suicide Bombers Buy Life Insurance?
In which we discuss compelling aspects of birth and death, though primarily death.

The worst month to have a baby…The natal roulette affects horses too…Why Albert Aab will outshine Albert Zyzmor…The birthdate bulge…Where does talent come from?…Some families produce baseball players; others produce terrorists…Why terrorism is so cheap and easy…The trickle-down effects of September 11…The man who fixes hospitals…Why the newest ERs are already obsolete…How can you tell a good doctor from a bad one?…“Bitten by a client at work”…Why you want your ER doc to be a woman…A variety of ways to postpone death…Why is chemotherapy so widely used when it so rarely works?…”We’re still getting our butts kicked by cancer”…War: not as dangerous as you think?…How to catch a terrorist.

Chapter 3
Unbelievable Stories About Apathy and Altruism
In which people are revealed to be less good than previously thought, but also less bad.

Why did 38 people watch Kitty Genovese be murdered?…With neighbors like these…What caused the 1960s crime explosion?…How the ACLU encourages crime…Leave It to Beaver: not as innocent as you think…The roots of altruism, pure and impure…Who visits retirement homes?…Natural disasters and slow news days…Economists make like Galileo and hit the lab…The brilliant simplicity of the Dictator game…People are so generous!…Thank goodness for “donorcycles”…The great Iranian kidney experiment…From driving a truck to the ivory tower…Why don’t real people behave like people in the lab?…The dirty rotten truth about altruism…Scarecrows work on people too…Kitty Genovese revisited.

Chapter 4
The Fix is in—and It’s Cheap and Simple
In which big, seemingly intractable problems are solved in surprising ways.
Chapter 5

What Do Al Gore and Mount Pinatubo Have in Common?
In which we take a cool, hard look at global warming.

Let’s melt the ice cap!…What’s worse: car exhaust or cow farts?…If you love the earth, eat more kangaroo…It all comes down to negative externalities…The Club versus LoJack…Mount Pinatubo teaches a lesson…The obscenely smart, somewhat twisted gentlemen of Intellectual Ventures…Assassinating mosquitoes…”Sir, I am every kind of scientist!”…An inconvenient truthiness…What climate models miss…Is carbon dioxide the wrong villain?…“Big-ass volcanoes” and climate change…How to cool the earth…The “garden hose to the sky”…Reasons to hate geoengineering…Jumping the repugnance barrier…”Soggy mirrors” and the puffy-cloud solution…Why behavior change is so hard…Dirty hands and deadly doctors…Foreskins are falling.

Epilogue

Monkeys are People Too
In which it is revealed that—aw, hell, you have to read it to believe it.

Acknowledgments
Notes
Searchable Terms
About the Authors
Other Books by Steven D. Levitt & Stephen J. Dubner
Credits
Copyright
About the Publisher
The time has come to admit that in our first book, we lied. Twice.

The first lie appeared in the introduction, where we wrote that the book had no “unifying theme.” Here’s what happened. Our publishing house—nice people, smart people—read the first draft of our book and cried out in alarm: “This book has no unifying theme!” Instead, the manuscript was a random heap of stories about cheating teachers, self-dealing Realtors, and crack-selling mama’s boys. There was no nifty theoretical foundation upon which these stories could be piled to miraculously add up to more than the sum of their parts.

Our publisher’s alarm only grew when we proposed a title for this mishmash of a book: *Freakonomics*. Even over the phone, you could hear the sound of palms smacking foreheads: *This pair of bozos just delivered a manuscript with no unifying theme and a nonsensical, made-up title!* It was duly suggested that in the published book we concede right up front, in the introduction, that we had no unifying theme. And so, in the interest of keeping the peace (and our book advance), that’s what we did.

But in truth, the book *did* have a unifying theme, even if it wasn’t obvious at the time, even to us. If pressed, you could boil it down to four words: *People respond to incentives.* If you wanted to get more expansive, you might say this: *People respond to incentives, although not necessarily in ways that are predictable or manifest. Therefore, one of the most powerful laws in the universe is the law of unintended consequences. This applies to schoolteachers and Realtors and crack dealers as well as expectant mothers, sumo wrestlers, bagel salesmen, and the Ku Klux Klan.*

The issue of the book’s title, meanwhile, still lay unresolved. After several months and dozens of suggestions, including *Unconventional Wisdom* (eh), *Ain’t Necessarily So* (bleh), and *E-Ray Vision* (don’t ask), our publisher finally decided that perhaps *Freakonomics* wasn’t so bad after all—or, more precisely, it was so bad it might actually be good.

Or maybe they were simply exhausted.

The subtitle promised that the book would explore “the hidden side of everything.” This was our second lie. We were sure reasonable people would view such a phrase as intentional hyperbole. But some readers took it literally, complaining that our stories, as motley a collection as they were, did not in fact address “everything.” And so, while the subtitle was not intended as a lie, it turned out to be one. We apologize.

Our failure to include “everything” in the first book, however, had an unintended consequence of its own: it created the need for a second book. But let it be noted straightforwardly that this second book and the first book combined still do not literally comprise “everything.”

The two of us have now been collaborators for several years. It began when one of us (Dubner, an author and journalist) wrote a magazine article about the other (Levitt, an academic economist). Adversaries in the beginning, albeit civil ones, we joined forces only when several publishers began to offer significant sums of money for a book. (Remember: *people respond to incentives*—and, despite the common perception, economists and journalists are people too.)

We discussed how the money should be divided. Almost immediately we came to an impasse, for each of us insisted on a 60–40 split. Upon realizing that we each thought the other guy should get 60 percent, we knew we’d have a good partnership. So we settled on 50–50 and got to work.

We didn’t feel much pressure writing that first book because we genuinely thought few people would read it. (Levitt’s father agreed and said it was “immoral” to accept even a penny up front.) These low expectations liberated us to write about any-and-everything we found worthwhile. So we had a pretty good time.

We were surprised and thrilled when the book became a hit. As profitable as it might have been to pump out a quick follow-up—think *Freakonomics for Dummies or Chicken Soup for the Freakonomics Soul*—we wanted to wait until we had done enough research that we couldn’t help but write it all down. So here we finally are, more than four years later, with a second book that we believe is easily better than the first. Of course it is up to you, not us, to say if that is true—or perhaps if it’s as bad as some people feared our first book might be.

If nothing else, our publishers have resigned themselves to our unyielding bad taste: when we proposed that this new book be called *SuperFreakonomics*, they didn’t even blink.

If this book is any good, you have yourselves to thank as well. One of the benefits of writing books in an age of such cheap and easy communication is that authors hear directly from their readers, loudly and clearly and in great number. Good feedback is hard to come by, and extremely valuable. Not only did we receive feedback on what we’d already written but also many suggestions for future topics. Some of you who sent e-mails will see your thoughts reflected in this book. Thank you.

The success of *Freakonomics* had one particularly strange by-product: we were regularly invited, together and separately, to give lectures to all sorts of groups. Often we were presented as the very sort of “experts” that in *Freakonomics* we warned you to watch out for—people who enjoy an informational advantage and have an incentive to exploit it. (We tried our best to disabuse audiences of the notion that we are actually expert in anything.)

These encounters also produced material for future writings. During a lecture at UCLA, one of us (Dubner) talked about how people wash their hands after using the bathroom far less often than they admit. Afterward, a gentleman approached the podium, offered his hand, and said he was a urologist. Despite this unappetizing introduction, the urologist had a fascinating story to tell about hand-washing failures in a high-stakes setting—the hospital where he worked—and the creative incentives the hospital used to overcome these failures. You’ll find that story in this book, as well as the heroic story of another, long-ago doctor who also fought poor hand hygiene.

At another lecture, to a group of venture capitalists, Levitt discussed some new research he was doing with Sudhir Venkatesh, the sociologist whose adventures with a crack-selling gang were featured in *Freakonomics*. The new research concerned the hour-by-hour activities of street prostitutes in Chicago. As it happened, one of the venture capitalists (we’ll call him John) had a date later that evening with a $300-an-hour prostitute (who goes by the name of Allie). When John arrived at Allie’s apartment, he saw a copy of *Freakonomics* on her coffee table.

“Where’d you get that?” John asked.
Allie said a girlfriend of hers who was also “in the business” had sent it to her. Hoping to impress Allie—the male instinct to impress the female is apparently strong even when the sex is already bought and paid for—John said he’d attended a lecture that very day by one of the book’s authors. As if that weren’t coincidence enough, Levitt mentioned he was doing some research on prostitution.

A few days later, this e-mail landed in Levitt’s in-box:

I heard through a mutual acquaintance that you are working on a paper about the economics of prostitution, correct? Since I am not really sure if this is a serious project or if my source was putting me on, I just thought I would put myself out there and let you know I would love to be of assistance.

Thanks, Allie

One complication remained: Levitt had to explain to his wife and four kids that he wouldn’t be home the following Saturday morning, that instead he’d be having brunch with a prostitute. It was vital, he argued, to meet with her in person to accurately measure the shape of her demand curve. Somehow, they bought it.

And so you will read about Allie in this book as well.

The chain of events that led to her inclusion might be attributed to what economists call cumulative advantage. That is, the prominence of our first book produced a series of advantages in writing a second book that a different author may not have enjoyed. Our greatest hope is that we have taken proper advantage of this advantage.

Finally, while writing this book we have tried to rely on a bare minimum of economics jargon, which can be abstruse and unmemorable. So instead of thinking about the Allie affair as an example of cumulative advantage, let’s just call it…well, freaky.
PUTTING THE FREAK IN ECONOMICS

Many of life’s decisions are hard. What kind of career should you pursue? Does your ailing mother need to be put in a nursing home? You and your spouse already have two kids; should you have a third?

Such decisions are hard for a number of reasons. For one, the stakes are high. There’s also a great deal of uncertainty involved. Above all, decisions like these are rare, which means you don’t get much practice making them. You’ve probably gotten pretty good at buying groceries, since you do it so often, but buying your first house is another thing entirely.

Some decisions, meanwhile, are really, really easy.

Imagine you’ve gone to a party at a friend’s house. He lives only a mile away. You have a great time, perhaps because you drank four glasses of wine. Now the party is breaking up. While draining your last glass, you dig out your car keys. Abruptly you conclude this is a bad idea: you are in no condition to drive home.

For the past few decades, we’ve been rigorously educated about the risks of driving under the influence of alcohol. A drunk driver is thirteen times more likely to cause an accident than a sober one. And yet a lot of people still drive drunk. In the United States, more than 30 percent of all fatal crashes involve at least one driver who has been drinking. During the late-night hours, when alcohol use is greatest, that proportion rises to nearly 60 percent. Overall, 1 of every 140 miles is driven drunk, or 21 billion miles each year.

Why do so many people get behind the wheel after drinking? Maybe because—and this could be the most sobering statistic yet—drunk drivers are rarely caught. There is just one arrest for every 27,000 miles driven while drunk. That means you could expect to drive all the way across the country, and then back, and then back and forth three more times, chugging beers all the while, before you got pulled over. As with most bad behaviors, drunk driving could probably be wiped out entirely if a strong enough incentive were instituted—regular roadblocks, for instance, where drunk drivers are executed on the spot—but our society probably doesn’t have the appetite for that.

Meanwhile, back at your friend’s party, you have made what seems to be the easiest decision in history: instead of driving home, you’re going to walk. After all, it’s only a mile. You find your friend, thank him for the party, and tell him the plan. He heartily applauds your good judgment.

But should he? We all know that drunk driving is terribly risky, but what about drunk walking? Is this decision so easy?

Let’s look at some numbers. Each year, more than 1,000 drunk pedestrians die in traffic accidents. They step off sidewalks into city streets; they lie down to rest on country roads; they make mad dashes across busy highways. Compared with the total number of people killed in alcohol-related traffic accidents each year—about 13,000—the number of drunk pedestrians is relatively small. But when you’re choosing whether to walk or drive, the overall number isn’t what counts. Here’s the relevant question: on a per-mile basis, is it more dangerous to drive drunk or walk drunk?

The average American walks about a half-mile per day outside the home or workplace. There are some 237 million Americans sixteen and older; all told, that’s 43 billion miles walked each year by people of driving age. If we assume that 1 of every 140 of those miles are walked drunk—the same proportion of miles that are driven drunk—then 307 million miles are walked drunk each year.

Doing the math, you find that on a per-mile basis, a drunk walker is eight times more likely to get killed than a drunk driver.

There’s one important caveat: a drunk walker isn’t likely to hurt or kill anyone other than her-or himself. That can’t be said of a drunk driver. In fatal accidents involving alcohol, 36 percent of the victims are either passengers, pedestrians, or other drivers. Still, even after factoring in the deaths of those innocents, walking drunk leads to five times as many deaths per mile as driving drunk.

So as you leave your friend’s party, the decision should be clear: driving is safer than walking. (It would be even safer, obviously, to drink less, or to call a cab.) The next time you put away four glasses of wine at a party, maybe you’ll think through your decision a bit differently. Or, if you’re too far gone, maybe your friend will help sort things out. Because friends don’t let friends walk drunk.

If you had the option of being born anywhere in the world today, India might not be the wisest choice. Despite its vaunted progress as a major player in the global economy, the country as a whole remains excruciatingly poor. Life expectancy and literacy rates are low; pollution and corruption are high. In the rural areas where more than two-thirds of Indians live, barely half of the households have electricity and only one in four homes has a toilet.

It is especially unlucky to be born female, because many Indian parents express a strong “son preference.” Only 10 percent of Indian families with two sons want another child, whereas nearly 40 percent of families with two daughters want to try again. Giving birth to a baby boy is like giving birth to a 401(k) retirement fund. He will grow up to be a wage-earning man who can provide for his parents in their sunset years and, when the time comes, light the funeral pyre. Having a baby girl, meanwhile, means relabeling the retirement fund a dowry fund. Although the dowry system has long been under assault, it is still common for a bride’s parents to give the groom or his family cash, cars, or real estate. The bride’s family is also expected to pay for the wedding.

The U.S. charity Smile Train, which performs cleft-repair surgery on poor children around the world, recently spent some time in Chennai, India. When one local man was asked how many children he had, he answered “one.” The organization later learned that the man did have a son—but he also had five daughters, who apparently didn’t warrant a mention. Smile Train also learned that midwives in Chennai were sometimes paid $2.50 to smother a baby girl born with a cleft deformity—and so, putting the lure of incentives to good use, the charity began offering midwives as much as $10 for each baby girl they took to a hospital for cleft surgery.

Girls are so undervalued in India that there are roughly 35 million fewer females than males in the population. Most of these “missing women,” as the economist Amartya Sen calls them, are presumed dead, either by indirect means (the girl’s parents withheld nutrition or medical care, perhaps to the benefit of a brother), direct harm (the baby girl was killed after birth, whether by a midwife or a parent), or, increasingly, a pre-birth decision. Even in India’s smallest villages, where electricity might be sporadic and clean water hard to find, a pregnant woman can pay a

INTRODUCTION
The horse, a versatile and powerful helpmate since the days of antiquity, was put to work in many ways as modern cities expanded: pulling streetcars and private coaches, hauling construction materials, unloading freight from ships and trains, even powering the machines that churned out furniture, rope, beer, and clothing. If your young daughter took gravely ill, the doctor rushed to your home on horseback. When a fire broke out, a team of horses charged through the streets with a pumping truck. At the turn of the twentieth century, some 200,000 horses lived and worked in New York City, or 1 for every 17 people.

No, we’re not. We are talking about the automobile—aren’t we?

But as this swarm of humanity moved itself, and its goods, from place to place, a problem emerged. The main mode of transportation produced a slew of the by-products that economists call negative externalities, including gridlock, high insurance costs, and far too many traffic fatalities. Crops that would have landed on a family’s dinner table were sometimes converted into fuel, driving up food prices and causing shortages. Then there were the air pollutants and toxic emissions, endangering the environment as well as individuals’ health. The horse—declared one of the researchers, “is not optimized for India.”

With such a multitude of problems, what should be done to improve the lives of Indian women, especially the majority who live in the countryside?

The government has tried to help by banning dowries and sex-selective abortions, but these laws have largely been ignored. A number of monetary interventions have also been designed for Indian women. These include Apni Beta, Apna Dhan (“My Daughter, My Pride”), a project that pays rural women not to abort female babies; a vast micro-credit industry that makes small-business loans to women; and an array of charitable programs launched by a veritable alphabet soup of international aid agencies.

Unfortunately, most of these projects have proven complicated, costly, and, at best, nominally successful.

A different sort of intervention, meanwhile, does seem to have helped. This one, like the ultrasound machine, relies on technology, but it had little to do with women per se and even less to do with baby-making. Nor was it administered by the Indian government or some multinational charity. In fact, it wasn’t even designed to help anyone at all, at least not the way we normally think of “help.” It was just a plain old entrepreneurial development, called television.

State-run broadcast TV had been around for decades, but poor reception and a dearth of programming meant there simply wasn’t much reason to watch. But lately, thanks to a steep fall in the price of equipment and distribution, great swaths of India have been wired for cable and satellite TV. Between 2001 and 2006, some 150 million Indians received cable for the first time, their villages suddenly crackling with the latest game shows and soap operas, newscasts and police procedurals, beamed from the big cities of India and abroad. TV gave many Indian villagers their first good look at the outside world.

But not every village got cable TV, and those that did received it at different times. This staggering introduction produced just the kind of data—a lovely natural experiment—that economists love to exploit. The economists in this case were a pair of young Americans, Emily Oster and Robert Jensen. By measuring the changes in different villages based on whether (and when) each village got cable TV, they were able to tease out the effect of TV on Indian women.

They examined data from a government survey of 2,700 households, most of them rural. Women fifteen and older were asked about their lifestyles, preferences, and familial relationships. As it turned out, the women who recently got cable TV were significantly less willing to tolerate wife-beating, less likely to admit to having a son preference, and more likely to exercise personal autonomy. TV somehow seemed to be empowering women in a way that government interventions had not.

What caused these changes? Did rural Indian women become more autonomous after seeing cosmopolitan images on their TV sets—women who dressed as they pleased, handled their own money, and were treated as neither property nor baby-making machines? Or did such programming simply make the rural women feel embarrassed to admit to a government surveyor that they were treated so badly?

There is good reason to be skeptical of data from personal surveys. There is often a vast gulf between how people say they behave and how they actually behave. (In economist-speak, these two behaviors are known as declared preferences and revealed preferences.) Furthermore, when it costs almost nothing to fib—as in the case of a government survey like this one—a reasonable amount of fibbing is to be expected. The fibs might even be subconscious, with the subject simply saying what she expects the surveyor wants to hear.

But when you can measure the revealed preference, or the actual behavior, then you’re getting somewhere. That’s where Oster and Jensen found persuasive evidence of real change. Rural Indian families who got cable TV began to have a lower birthrate than families without TV. (In a country like India, a lower birthrate generally means more autonomy for women and fewer health risks.) Families with TV were also more likely to keep their daughters in school, which suggests that girls were seen as more valuable, or at least deserving of equal treatment. (The enrollment rate for boys, notably, didn’t change.) These hard numbers made the self-reported survey data more believable. It appears that cable TV really did empower the women of rural India, even to the point of no longer tolerating domestic abuse.

Or maybe their husbands were just too busy watching cricket.

When the world was lurching into the modern era, it grew magnificently more populous, and in a hurry. Most of this expansion took place in urban centers like London, Paris, New York, and Chicago. In the United States alone, cities grew by 30 million residents during the nineteenth century, with half of that gain in just the final twenty years.

But as this swarm of humanity moved itself, and its goods, from place to place, a problem emerged. The main mode of transportation produced a slew of the by-products that economists call negative externalities, including gridlock, high insurance costs, and far too many traffic fatalities. Crops that would have landed on a family’s dinner table were sometimes converted into fuel, driving up food prices and causing shortages. Then there were the air pollutants and toxic emissions, endangering the environment as well as individuals’ health.

We are talking about the automobile—aren’t we?

No, we’re not. We are talking about the horse.

Horse-drawn wagons clogged the streets terribly, and when a horse broke down, it was often put to death on the spot. This caused further problems.
of time, and the costs and benefits of marriage, child rearing, and divorce. Most of his colleagues wouldn't go anywhere near such stuff.

"The vanquishing of horse manure…the unintended consequences of cable TV…the perils of walking while drunk: what does any of this have to do with economics?"

Instead of thinking of such stories as "economics," it is better to see them as illustrating "the economic approach." That's a phrase made popular by Gary Becker, the longtime University of Chicago economist who was awarded a Nobel Prize in 1992. In his acceptance lecture, he explained that the economic approach "does not assert that individuals are motivated solely by selfishness or gain. It is a method of analysis, not an assumption about particular motivations…. Behavior is driven by a much richer set of values and preferences."

Becker started his career studying topics that weren't typically germane to economics: crime and punishment, drug addiction, the allocation of time, and the costs and benefits of marriage, child rearing, and divorce. Most of his colleagues wouldn't go anywhere near such stuff. "For a long time," he recalled, "my type of work was either ignored or strongly disliked by most of the leading economists. I was considered way out and perhaps not really an economist."

Well, if what Gary Becker was doing was "not really economics," then we want to do it too. Truth be told, what Becker was doing was actually freakonomics—marrying the economic approach to a rogue, freakish curiosity—but the word hadn't yet been invented.

In his Nobel address, Becker suggested that the economic approach is not a subject matter, nor is it a mathematical means of explaining the workings of the economy. Instead, it is a method of analysis that can be applied to any phenomenon, economic or not, that involves human behavior. He argued that economics is not just about the market, but about "how people interact with each other in the pursuit of their goals."
So despite its shortcomings, thinking in terms of the typical does have its advantages. We have therefore done our best to tell stories in this book that rely on accumulated data rather than on individual anecdotes, glaring anomalies, personal opinions, emotional outbursts, or moral leanings. Some people may argue that statistics can be made to say anything, to defend indefensible causes or tell pet lies. But the economic approach aims for the opposite: to address a given topic with neither fear nor favor, letting numbers speak the truth. We don’t take sides. The economic approach isn’t meant to describe the world as any one of us might want it to be, or fear that it is, or pray that it becomes—but rather to explain what it actually is. Most of us want to fix or change the world in some fashion. But to change the world, you first have to understand it.

As of this writing, we are roughly one year into a financial crisis that began with a subprime-mortgage binge in the United States and spread, like an extremely communicable disease, around the world. There will be hundreds, if not thousands, of books published on the topic. This is not one of them.

Why? Mainly because the macroeconomy and its multitude of complex, moving parts is simply not our domain. After recent events, one might wonder if the macroeconomy is the domain of any economist. Most economists the public encounters are presented as oracles who can tell you, with alluring certainty, where the stock market or inflation or interest rates are heading. But as we’ve seen lately, such predictions are generally worthless. Economists have a hard enough time explaining the past, much less predicting the future. (They are still arguing over whether Franklin Delano Roosevelt’s policy moves quelled the Great Depression or exacerbated it!) They are not alone, of course.

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can understand the incentives that lead a schoolteacher or a sumo wrestler to cheat, you can understand how the subprime-mortgage bubble came to pass.

The stories you will read are set in many realms, from the rarefied corridors of academia to the grimiest street corners. Many are based on Levitt’s recent academic research; others have been inspired by fellow economists as well as engineers and astrophysicists, psychotic killers and emergency-room doctors, amateur historians and transgender neuroscientists.* Most of the stories fall into one of two categories: things you always thought you knew but didn’t; and things you never knew you wanted to know but do.

Many of our findings may not be all that useful, or even conclusive. But that’s all right. We are trying to start a conversation, not have the last word. Which means you may find a few things in the following pages to quarrel with.

In fact, we’d be disappointed if you didn’t.
HOW IS A STREET PROSTITUTE LIKE A DEPARTMENT-STORE SANTA?

One afternoon not long ago, on a welcoming cool day toward the end of summer, a twenty-nine-year-old woman named LaSheena sat on the hood of an SUV outside the Dearborn Homes, a housing project on the South Side of Chicago. She had a beaten-down look in her eyes but otherwise seemed youthful, her pretty face framed by straightened hair. She was dressed in a baggy black-and-red tracksuit, the kind she’d worn since she was a kid. Her parents rarely had money for new clothes, so she used to get her male cousins’ hand-me-downs, and the habit stuck.

LaSheena was talking about how she earns her living. She described four main streams of income: “boosting,” “roosting,” cutting hair, and turning tricks.

“Boosting,” she explained, is shoplifting and selling the swag. “Roosting” means serving as a lookout for the local street gang that sells drugs. She gets $8 for a boy’s haircut and $12 for a man’s.

Which job is the worst of the four?

“Turning tricks,” she says, with no hesitation.

Why?

“Cause I don’t really like men. I guess it bothers me mentally.”

And what if prostitution paid twice as much?

“Would I do it more?” she asks. “Yeah!”

Throughout history, it has invariably been easier to be male than female. Yes, this is an overgeneralization and yes, there are exceptions, but by any important measure, women have had it rougher than men. Even though men handled most of the warfare, hunting, and brute-force labor, women had a shorter life expectancy. Some deaths were more senseless than others. Between the thirteenth and nineteenth centuries, as many as 1 million European women, most of them poor and many of them widowed, were executed for witchcraft, taking the blame for bad weather that killed crops.

Women have finally overtaken men in life expectancy, thanks mainly to medical improvements surrounding childbirth. In many countries, however, being female remains a serious handicap even in the twenty-first century. Young women in Cameroon have their breasts “ironed”—beaten or massaged by a wooden pestle or a heated coconut shell—to make them less sexually tempting. In China, foot binding has finally been done away with (after roughly one thousand years), but females are still far more likely than males to be abandoned after birth, to be illiterate, and to commit suicide. And women in rural India, as we wrote earlier, continue to face discrimination in just about every direction.

But especially in the world’s developed nations, women’s lives have improved dramatically. There is no comparing the prospects of a girl in twenty-first-century America or Britain or Japan with her counterpart from a century or two earlier. In any arena you look—education, legal and voting rights, career opportunities, and so on—it is far better to be a woman today than at any other point in history. In 1872, the earliest year for which such statistics are available, 21 percent of college students in the United States were female. Today, that number is 58 percent and rising. It has truly been a stunning ascendency.

And yet there is still a considerable economic price to pay for being a woman. For American women twenty-five and older who hold at least a bachelor’s degree and work full-time, the national median income is about $47,000. Similar men, meanwhile, make more than $66,000, a premium of 40 percent. The same is true even for women who attend the nation’s elite universities. The economists Claudia Goldin and Lawrence Katz found that women who went to Harvard earned less than half as much as the average Harvard man. Even when the analysis included only full-time, full-year employees and controlled for college major, profession, and other variables, Goldin and Katz found that the Harvard women still earned about 30 percent less than their male counterparts.

What can possibly account for such a huge wage gap?

There are a variety of factors. Women are more likely to leave the workforce or downshift their careers to raise a family. Even within high-paying occupations like medicine and law, women tend to choose specialties that pay less (general practitioner, for instance, or in-house counsel). And there is likely still a good amount of discrimination. This may range from the overt—denying a woman a promotion purely because she is not a man—to the insidious. A considerable body of research has shown that overweight women suffer a greater wage penalty than overweight men. The same is true for women with bad teeth.

There are some biological wild cards as well. The economists Andrea Ichino and Enrico Moretti, analyzing personnel data from a large Italian bank, found that female employees under forty-five years old tended to miss work consistently on twenty-eight-day cycles. Plotting these absences against employee productivity ratings, the economists determined that this menstrual absenteeism accounted for 14 percent of the difference between female and male earnings at the bank.

Or consider the 1972 U.S. law known as Title IX. While broadly designed to prohibit sex discrimination in educational settings, Title IX also required high schools and colleges to bring their women’s sports programs up to the level of their men’s programs. Millions of young women subsequently joined these new programs, and as the economist Betsey Stevenson discovered, girls who play high-school sports are more likely to attend college and land a solid job, especially in some of the high-skill fields traditionally dominated by men. That’s the good news.

But Title IX also brought some bad news for women. When the law was passed, more than 90 percent of college women’s sports teams had female head coaches. Title IX boosted the appeal of such jobs: salaries rose and there was more exposure and excitement. Like the lowly peasant food that is “discovered” by the culinary elite and promptly migrates from roadside stands into high-end restaurants, these jobs were soon snapped up by a new set of customers: men. These days, barely 40 percent of college women’s sports teams are coached by women. Among the most visible coaching jobs in women’s sports are those in the Women’s National Basketball Association (WNBA), founded thirteen years ago as a corollary to the men’s NBA. As of this writing, the WNBA has 13 teams and just 6 of them—again, fewer than 50 percent—are coached by women. This is actually an improvement from the league’s tenth anniversary season, when only 3 of the 14 coaches were women.

For all the progress women have made in the twenty-first-century labor market, the typical female would come out well ahead if she had simply had the foresight to be born male.
There is one labor market women have always dominated: prostitution.

Its business model is built upon a simple premise. Since time immemorial and all over the world, men have wanted more sex than they could get for free. So what inevitably emerges is a supply of women who, for the right price, are willing to satisfy this demand.

Today prostitution is generally illegal in the United States, albeit with a few exceptions and many inconsistencies in enforcement. In the early years of the nation, prostitution was frowned upon but not criminalized. It was during the Progressive Era, roughly from the 1890s to the 1920s, that this leniency ended. There was a public outcry against “white slavery,” in which thousands of women were imprisoned against their will to work as prostitutes.

The white slavery problem turned out to be a wild exaggeration. The reality was perhaps scarier: rather than being forced into prostitution, women were choosing it for themselves. In the early 1910s, the Department of Justice conducted a census of 310 cities in 26 states to tally the number of prostitutes in the United States: “We arrive at the conservative figure of approximately 200,000 women in the regular army of vice.”

At the time, the American population included 22 million women between the ages of fifteen and forty-four. If the DOJ numbers are to be believed, 1 of every 110 women in that age range was a prostitute. But most prostitutes, about 85 percent, were in their twenties. In that age range, 1 of every 50 American women was a prostitute.

The market was particularly strong in Chicago, which had more than a thousand known brothels. The mayor assembled a blue-ribbon Vice Commission, comprising religious leaders as well as civic, educational, legal, and medical authorities. Once they got their hands dirty, these good people realized they were up against an enemy even more venal than sex: economics.

“Is it any wonder,” the commission declared, “that a tempted girl who receives only $6 per week working with her hands sells her body for $25 per week when she learns that there is demand for it and men are willing to pay the price?”

Converted into today’s dollars, the $6-per-week shopgirl had an annual salary of only $6,500. The same woman who took up prostitution at $25 a week earned the modern equivalent of more than $25,000 a year. But the Vice Commission acknowledged that $25 per week was at the very low end of what Chicago prostitutes earned. A woman working in a “dollar house” (some brothels charged as little as 50 cents; others charged $5 or $10) took home an average weekly salary of $70, or the modern equivalent of about $76,000 annually.

At the heart of the Levee, the South Side neighborhood that housed block after block of brothels, stood the Everleigh Club, which the Vice Commission described as “the most famous and luxurious house of prostitution in the country.” Its customers included business titans, politicians, athletes, entertainers, and even a few anti-prostitution crusaders. The Everleigh’s prostitutes, known as “butterfly girls,” were not only attractive, hygienic, and trustworthy, but also good conversationalists who could cite classical poetry if that’s what floated a particular gentleman’s boat. In the book *Sin in the Second City*, Karen Abbott reports that the Everleigh also offered sexual delicacies that weren’t available elsewhere—“French” style, for instance, commonly known today as oral sex.

In an age when a nice dinner cost about $12 in today’s currency, the Everleigh’s customers were willing to pay the equivalent of $250 just to get into the club and $370 for a bottle of champagne. Relatively speaking, the sex was pretty cheap: about $1,250.

Ada and Minna Everleigh, the sisters who ran the brothel, guarded their assets carefully. Butterflies were provided with a healthful diet, excellent medical care, a well-rounded education, and the best wage going: as much as $400 a week, or the modern equivalent of about $430,000 a year.

To be sure, an Everleigh butterfly’s wages were off the charts. But why did even a typical Chicago prostitute one hundred years ago earn so much money?

The best answer is that wages are determined largely by the laws of supply and demand, which are often more powerful than laws made by legislators.

In the United States especially, politics and economics don’t mix well. Politicians have all sorts of reasons to pass all sorts of laws that, as well-meaning as they may be, fail to account for the way real people respond to real-world incentives.

When prostitution was criminalized in the United States, most of the policing energy was directed at the prostitutes rather than their customers. This is pretty typical. As with other illicit markets—think about drug dealing or black-market guns—most governments prefer to punish the people who are supplying the goods and services rather than the people who are consuming them.

But when you lock up a supplier, a scarcity is created that inevitably drives the price higher, and that entices more suppliers to enter the market. The U.S. “war on drugs” has been relatively ineffective precisely because it focuses on sellers and not buyers. While drug buyers obviously outnumber drug sellers, more than 90 percent of all prison time for drug convictions is served by dealers.

Why doesn’t the public support punishing users? It may seem unfair to punish the little guy, the user, when he can’t help himself from partaking in vice. The suppliers, meanwhile, are much easier to demonize.

But if a government really wanted to crack down on illicit goods and services, it would go after the people who demand them. If, for instance, men convicted of hiring a prostitute were sentenced to castration, the market would contract in a hurry.

In Chicago some one hundred years ago, the risk of punishment fell almost entirely on the prostitute. Besides the constant threat of arrest, there was also the deep social stigma of prostitution. Perhaps the greatest penalty was that a woman who worked as a prostitute would never be able to find a suitable husband. Combine these factors and you can see that a prostitute’s wages had to be high to entice enough women to satisfy the strong demand.

The biggest money, of course, was taken home by the women at the top of the prostitution pyramid. By the time the Everleigh Club was shut down—the Chicago Vice Commission finally got its way—Ada and Minna Everleigh had accumulated, in today’s currency, about $22 million.

The mansion that housed the Everleigh Club is long gone. So is the entire Levee district. The very street grid where the Everleigh stood was wiped away—the Chicago Vice Commission finally got its way—Ada and Minna Everleigh had accumulated, in today’s currency, about $22 million.

But this is still the South Side of Chicago and prostitutes still work there—like LaSheena, in the black-and-red track suit—although you can be pretty sure they won’t be quoting you any Greek poetry.

LaSheena is one of the many street prostitutes Sudhir Venkatesh has gotten to know lately. Venkatesh, a sociologist at Columbia University in New York, spent his grad-school years in Chicago and still returns there regularly for research.

When he first arrived, he was a naive, sheltered, Grateful Dead-loving kid who’d grown up in laid-back California, eager to take the temperature of an intense town where race—particularly black and white—played out with great zeal. Being neither black nor white (he was born in India) worked in Venkatesh’s favor, letting him slip behind the battle lines of both academia (which was overwhelmingly white) and the South Side ghettos (which were overwhelmingly black). Before long, he had embedded himself with a street gang that practically ran the neighborhood and made most of its living by selling crack cocaine. (Yes, it was Venkatesh’s research that figured prominently in the *Freakonomics* chapter about drug dealers, and yes, we are back now for a second helping.) Along the way, he became an authority on the neighborhood’s underground market. The U.S. “war on drugs” has been relatively ineffective precisely because it focuses on sellers and not buyers. While drug buyers obviously outnumber drug sellers, more than 90 percent of all prison time for drug convictions is served by dealers.
economy, and when he was done with the drug dealers he moved on to the prostitutes.

But an interview or two with a woman like LaSheena can reveal only so much. Anyone who wants to really understand the prostitution market needs to accumulate some real data.

That’s easier said than done. Because of the illicit nature of the activity, standard data sources (think of census forms or tax rolls) are no help. Even when prostitutes have been surveyed directly in previous studies, the interviews are often conducted long after the fact and by the kind of agency (a drug-rehab center, for instance, or a church shelter) that doesn’t necessarily elicit impartial results.

Moreover, earlier research has shown that when people are surveyed about stigmatizing behavior, they either downplay or exaggerate their participation, depending on what’s at stake or who is asking.

Consider the Mexican welfare program Oportunidades. To get aid, applicants have to itemize their personal possessions and household goods. Once an applicant is accepted, a caseworker visits his home and learns whether the applicant was telling the truth.

César Martinelli and Susan W. Parker, two economists who analyzed the data from more than 100,000 Oportunidades clients, found that applicants routinely underreported certain items, including cars, trucks, video recorders, satellite TVs, and washing machines. This shouldn’t surprise anyone. People hoping to get welfare benefits have an incentive to make it sound like they are poorer than they truly are. But as Martinelli and Parker discovered, applicants overreported other items: indoor plumbing, running water, a gas stove, and a concrete floor. Why on earth would welfare applicants say they had these essentials when they didn’t?

Martinelli and Parker attribute it to embarrassment. Even people who are poor enough to need welfare apparently don’t want to admit to a welfare clerk that they have a dirt floor or live without a toilet.

Venkatesh, knowing that traditional survey methods don’t necessarily produce reliable results for a sensitive topic like prostitution, tried something different: real-time, on-the-spot data collection. He hired trackers to stand on street corners or sit in brothels with the prostitutes, directly observing some facets of their transactions and gathering more intimate details from the prostitutes as soon as the customers were gone.

Most of the trackers were former prostitutes—an important credential because such women were more likely to get honest responses. Venkatesh also paid the prostitutes for participating in the study. If they were willing to have sex for money, he reasoned, surely they’d be willing to talk about having sex for money. And they were. Over the course of nearly two years, Venkatesh accumulated data on roughly 160 prostitutes in three separate South Side neighborhoods, logging more than 2,200 sexual transactions.

The tracking sheets recorded a considerable variety of data, including:

- The specific sexual act performed, and the duration of the trick
- Where the act took place (in a car, outdoors, or indoors)
- Amount received in cash
- Amount received in drugs
- The customer’s race
- The customer’s approximate age
- The customer’s attractiveness (10 = sexy, 1 = disgusting)
- Whether a condom was used
- Whether the customer was new or returning
- If it could be determined, whether the customer was married; employed; affiliated with a gang; from the neighborhood
- Whether the prostitute stole from the customer
- Whether the customer gave the prostitute any trouble, violent or otherwise
- Whether the sex act was paid for, or was a “freebie”

So what can these data tell us?

Let’s start with wages. It turns out that the typical street prostitute in Chicago works 13 hours a week, performing 10 sex acts during that period, and earns an hourly wage of approximately $27. So her weekly take-home pay is roughly $350. This includes an average of $20 that a prostitute steals from her customers and acknowledges that some prostitutes accept drugs in lieu of cash—usually crack cocaine or heroin, and usually at a discount. Of all the women in Venkatesh’s study, 83 percent were drug addicts.

Like LaSheena, many of these women took on other, non-prostitution work, which Venkatesh also tracked. Prostitution paid about four times more than those jobs. But as high as that wage premium may be, it looks pretty meager when you consider the job’s downsides. In a given year, a typical prostitute in Venkatesh’s study experienced a dozen incidents of violence. At least 3 of the 160 prostitutes who participated died during the course of the study. “Most of the violence by johns is when, for some reason, they can’t consummate or can’t get erect,” says Venkatesh.
It is no secret that sexual mores have evolved substantially in recent decades. The phrase "casual sex" didn't exist a century ago (to say nothing of "friends with benefits"). Sex outside of marriage was much harder to come by and carried significantly higher penalties than it does today.

Imagine a young man, just out of college but not ready to settle down, who wants to have some sex. In decades past, prostitution was a likely option. Although illegal, it was never hard to find, and the risk of arrest was minuscule. While relatively expensive in the short term, it provided good long-term value because it didn’t carry the potential costs of an unwanted pregnancy or a marriage commitment. At least 20 percent of American men born between 1933 and 1942 had their first sexual intercourse with a prostitute.

Now imagine that same young man twenty years later. The shift in sexual mores has given him a much greater supply of unpaid sex. In his generation, only 5 percent of men lose their virginity to a prostitute. And it’s not that he and his friends are saving themselves for marriage. More than 70 percent of the men in his generation have sex before they marry, compared with just 33 percent in the earlier generation.

So premarital sex emerged as a viable substitute for prostitution. And as the demand for paid sex decreased, so too did the wage of the people who provide it.

If prostitution were a typical industry, it might have hired lobbyists to fight against the encroachment of premarital sex. They would have pushed to have premarital sex criminalized or, at the very least, heavily taxed. When the steelmakers and sugar producers of America began to feel the heat of competition—in the form of cheaper goods from Mexico, China, or Brazil—they got the federal government to impose tariffs that protected their homegrown products.

Such protectionist tendencies are nothing new. More than 150 years ago, the French economist Frédéric Bastiat wrote "The Candlemakers’ Petition," said to represent the interests of "the Manufacturers of Candles, Tapers, Lanterns, Candlesticks, Street Lamps, Snuffers, and Extinguishers" as well as "the Producers of Tallow, Oil, Resin, Alcohol, and Generally Everything Connected with Lighting."

These industries, Bastiat complained, “are suffering from the ruinous competition of a foreign rival who apparently works under conditions so far superior to our own for the production of light that he is flooding the domestic market with it at an incredibly low price.”

Who was this dastardly foreign rival?

“None other than the sun,” wrote Bastiat. He begged the French government to pass a law forbidding all citizens to allow sunlight to enter their homes. (Yes, his petition was a satire; in economists’ circles, this is what passes for radical high jinks.)

Alas, the prostitution industry lacks a champion as passionate, even in jest, as Bastiat. And unlike the sugar and steel industries, it holds little sway in Washington’s corridors of power—despite, it should be said, its many, many connections with men of high government office. This explains why the industry’s fortunes have been so badly buffeted by the naked winds of the free market.

Prostitution is more geographically concentrated than other criminal activity: nearly half of all Chicago prostitution arrests occur in less than one-third of 1 percent of the city’s blocks. What do these blocks have in common? They are near train stations and major roads (prostitutes need to be where customers can find them) and have a lot of poor residents—although not, as is common in most poor neighborhoods, an overabundance of female-headed households.

This concentration makes it possible to take Venkatesh’s data and merge it with the Chicago Police Department’s citywide arrest data to estimate the scope of street prostitution citywide. The conclusion: in any given week, about 4,400 women are working as street prostitutes in Chicago, turning a combined 1.6 million tricks a year for 175,000 different men. That’s about the same number of prostitutes who worked in

### Table: Sexual Acts and Average Prices

<table>
<thead>
<tr>
<th>Sexual Act</th>
<th>Average Price</th>
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</thead>
<tbody>
<tr>
<td>Manual Stimulation</td>
<td>$26.70</td>
</tr>
<tr>
<td>Oral Sex</td>
<td>$37.26</td>
</tr>
<tr>
<td>Vaginal Sex</td>
<td>$80.05</td>
</tr>
<tr>
<td>Anal Sex</td>
<td>$94.13</td>
</tr>
</tbody>
</table>

It’s interesting to note that the price of oral sex has plummeted over time relative to “regular” sexual intercourse. In the days of the Everleigh Club, men paid double or triple for oral sex; now it costs less than half the price of intercourse. Why?
True, oral sex imposes a lower cost on the prostitute because it eliminates the possibility of pregnancy and lessens the risk of sexually transmitted disease. (It also offers what one public-health scholar calls “ease of exit,” whereby a prostitute can hurriedly escape the police or a threatening customer.) But oral sex always had those benefits. What accounted for the price difference in the old days?

The best answer is that oral sex carried a sort of taboo tax. At the time, it was considered a form of perversion, especially by religious-minded folks, since it satisfied the lust requirements of sex without fulfilling the reproductive requirements. The Everleigh Club was of course happy to profit from this taboo. Indeed, the club’s physician avidly endorsed oral sex because it meant higher profits for the establishment and less wear and tear on the butterflies.

But as social attitudes changed, the price fell to reflect the new reality. This shift in preferences has not been confined to prostitution. Among U.S. teenagers, oral sex is on the rise while sexual intercourse and pregnancy have fallen. Some might call it coincidence (or worse), but we call it economics at work.

The lower price for oral sex among prostitutes has been met by strong demand. Here is a breakdown of the market share of each sex act performed by the Chicago prostitutes:

<table>
<thead>
<tr>
<th>SEXUAL ACT</th>
<th>SHARE OF ALL TRICKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORAL SEX</td>
<td>55%</td>
</tr>
<tr>
<td>VAGINAL SEX</td>
<td>17%</td>
</tr>
<tr>
<td>MANUAL STIMULATION</td>
<td>15%</td>
</tr>
<tr>
<td>ANAL SEX</td>
<td>9%</td>
</tr>
<tr>
<td>OTHER</td>
<td>4%</td>
</tr>
</tbody>
</table>

Included in the “other” category are nude dancing, “just talk” (an extremely rare event, observed only a handful of times over more than two thousand transactions), and a variety of acts that are the complete opposite of “just talk,” so far out of bounds that they would tax the imagination of even the most creative reader. If nothing else, such acts suggest a prime reason that a prostitution market still thrives despite the availability of free sex: men hire prostitutes to do things a girlfriend or wife would never be willing to do. (It should also be said, however, that some of the most deviant acts in our sample actually include family members, with every conceivable combination of gender and generation.)

Prostitutes do not charge all customers the same price. Black customers, for instance, pay on average about $9 less per trick than white customers, while Hispanic customers are in the middle. Economists have a name for the practice of charging different prices for the same product: price discrimination.

In the business world, it isn’t always possible to price-discriminate. At least two conditions must be met:

- Some customers must have clearly identifiable traits that place them in the willing-to-pay-more category. (As identifiable traits go, black or white skin is a pretty good one.)
- The seller must be able to prevent resale of the product, thereby destroying any arbitrage opportunities. (In the case of prostitution, resale is pretty much impossible.)

If these circumstances can be met, most firms will profit from price discriminating whenever they can. Business travelers know this all too well, because they routinely pay three times more for a last-minute airline ticket than the vacationer in the next seat. Women who pay for a salon haircut know it too, since they pay twice as much as men for what is pretty much the same haircut. Or consider the online health-care catalog Dr. Leonard’s, which sells a Barber Magic hair trimmer for $12.99 and, elsewhere on its site, the Barber Magic Trim-a-Pet hair trimmer for $7.99. The two products appear to be identical—but Dr. Leonard seems to think that people will spend more to trim their own hair than their pet’s.

How do the Chicago street prostitutes price-discriminate? As Venkatesh learned, they use different pricing strategies for white and black customers. When dealing with blacks, the prostitutes usually name the price outright to discourage any negotiation. (Venkatesh observed that black customers are more likely than whites to haggle—perhaps, he reasoned, because they’re more familiar with the neighborhood and therefore know the market better.) When doing business with white customers, meanwhile, the prostitute makes the man name a price, hoping for a generous offer. As evidenced by the black-white price differential in the data, this strategy seems to work pretty well.

Other factors can knock down the price customers pay a Chicago prostitute. For instance:

<table>
<thead>
<tr>
<th>AVERAGE DISCOUNT</th>
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</thead>
<tbody>
<tr>
<td>PROSTITUTE PAID IN DRUGS RATHER THAN CASH</td>
</tr>
<tr>
<td>SEX ACT PERFORMED OUTDOORS</td>
</tr>
<tr>
<td>CUSTOMER USES A CONDOM</td>
</tr>
</tbody>
</table>

The drug discount isn’t much of a shock considering that most of the prostitutes are drug addicts. The outdoors discount is partially a time discount because tricks performed outdoors tend to be faster. But also, prostitutes charge more for an indoor trick because they usually have to pay for the indoor space. Some women rent a bedroom in someone’s home or keep a mattress in the basement; others use a cheap motel or a dollar store that has closed for the night.

The small discount for condom use is surprising. Even more surprising is how seldom condoms are used: less than 25 percent of the time.
than a Realtor’s. Or, for those who prefer their conclusions rendered mathematically:

The homes sold on FSBOMadison.com typically fetched about the same price as the homes sold by Realtors. That doesn’t make the

Realtor may have a better business head to start with. Finally, even though the FSBO homes sold for the same average price as those sold by

Realtors. That doesn’t make the FSBO homes a perfect substitute for the Realtor. But if you’re trying to sell street prostitution, the Internet isn’t very good—not yet, at least—at matching sellers to buyers.

One surefire way for a customer to get a big discount is to hire the prostitute directly rather than dealing with a pimp. If he does, he’ll get the same

sex act for about $16 less.

This estimate is based on data from the prostitutes in Roseland and West Pullman. The two neighborhoods are located next to each other and are similar in most regards. But in West Pullman, the prostitutes used pimps, whereas those in Roseland did not. West Pullman is slightly more residential, which creates community pressure to keep prostitutes off the streets. Roseland, meanwhile, has more street-gang activity. Even though Chicago’s gangs don’t typically get involved in pimping, they don’t want anyone else horning in on their black-market economy.

This key difference allows us to measure the impact of the pimp (henceforth known as the pimpact). But first, here’s an important question: how can we be sure the two populations of prostitutes are in fact comparable? Perhaps the prostitutes who work with pimps have different characteristics than the others. Maybe they’re savvier or less drug addicted. If that were the case, we’d merely be measuring two different populations of women rather than the pimpact.

But as it happened, many of the women in Venkatesh’s study went back and forth between the two neighborhoods, sometimes working with a pimp and sometimes solo. This enabled us to analyze the data in such a way that isolates the pimpact.

As just noted, customers pay about $16 more if they go through a pimp. But the customers who use pimps also tend to buy more expensive services—no manual stimulation for these gents—which further bumps up the women’s wages. So even after the pimps take their typical 25 percent commission, the prostitutes earn more money while turning fewer tricks:

<table>
<thead>
<tr>
<th>PROSTITUTE</th>
<th>WEEKLY SALARY</th>
<th>AVERAGE TRICKS PER WEEK</th>
</tr>
</thead>
<tbody>
<tr>
<td>WORKING SOLO</td>
<td>$325</td>
<td>7.8</td>
</tr>
<tr>
<td>WITH PIMP</td>
<td>$410</td>
<td>6.2</td>
</tr>
</tbody>
</table>

The secret to the pimps’ success is that they go after a different clientele than the street prostitutes can get on their own. As Venkatesh
learned, the pimps in West Pullman spent a lot of their time recruiting customers, mostly white ones, in downtown strip clubs and the riverboat casinos in nearby Indiana.

But as the data show, the pimpact goes well beyond producing higher wages. A prostitute who works with a pimp is less likely to be beaten up by a customer or forced into giving freebies to gang members.

So if you are a street prostitute in Chicago, using a pimp looks to be all upside. Even after paying the commission, you come out ahead on just about every front. If only every agent in every industry provided this kind of value.

Consider a different sales environment: residential real estate. Just as you can sell your body with or without the aid of a pimp, you can sell your house with or without a Realtor. While Realtors charge a much lower commission than the pimps—about 5 percent versus 25 percent—the Realtor’s cut is usually in the tens of thousands of dollars for a single sale.

So do Realtors earn their pay?

Three economists recently analyzed home-sales data in Madison, Wisconsin, which has a thriving for-sale-by-owner market (or FSBO, pronounced “fizz-bo”). This revolves around the website FSBOMadison.com, which charges homeowners $150 to list a house, with no commission when the home is sold. By comparing FSBO sales in Madison with Realtor-sold homes in Madison along several dimensions-price, house and neighborhood characteristics, time on market, and so on—the economists were able to gauge the Realtor’s impact (or, in the interest of symmetry, the Rimpact).

What did they find?

The only sensible explanation is that most customers view the women as what economists call perfect substitutes, or commodities that are easily interchanged. Just as a shopper in a grocery store may see one bunch of bananas as pretty much identical to the rest, the same principle seems to hold true for the men who frequent this market.

A Realtor and a pimp perform the same primary service: marketing your product to potential customers. As this study shows, the Internet is proving to be a pretty powerful substitute for the Realtor. But if you’re trying to sell street prostitution, the Internet isn’t very good—not yet, at least—at matching sellers to buyers.

So once you consider the value you get for each of these two agents, it seems clear that a pimp’s services are considerably more valuable than a Realtor’s. Or, for those who prefer their conclusions rendered mathematically:
During Venkatesh's study, six pimps managed the prostitution in West Pullman, and he got to know each of them. They were all men. In the old days, prostitution rings in even the poorest Chicago neighborhoods were usually run by women. But men, attracted by the high wages, eventually took over—yet another example in the long history of men stepping in to outearn women.

These six pimps ranged in age from their early thirties to their late forties and "were doing pretty well," Venkatesh says, making roughly $50,000 a year. Some also held legit jobs—car mechanic or store manager—and most owned their homes. None were drug addicts.

One of their most important roles was handling the police. Venkatesh learned that the pimps had a good working relationship with the police, particularly with one officer, named Charles. When he was new on the beat, Charles harassed and arrested the pimps. But this backfired. "When you arrest the pimps, there'll just be fighting to replace them," Venkatesh says, "and the violence is worse than the prostitution."

So instead, Charles extracted some compromises. The pimps agreed to stay away from the park when kids were playing there, and to keep the prostitution hidden. In return, the police would leave the pimps alone—and, importantly, they wouldn't arrest the prostitutes either. Over the course of Venkatesh's study, there was only one official arrest of a prostitute in an area controlled by pimps. Of all the advantages a prostitute gained by using a pimp, not getting arrested was one of the biggest.

But you don't necessarily need a pimp to stay out of jail. The average prostitute in Chicago will turn 450 tricks before she is arrested, and only 1 in 10 arrests leads to a prison sentence.

It's not that the police don't know where the prostitutes are. Nor have the police brass or mayor made a conscious decision to let prostitution thrive. Rather, this is a graphic example of what economists call the principal-agent problem. That's what happens when two parties in a given undertaking seem to have the same incentives but in fact may not.

In this case, you could think of the police chief as the principal. He would like to curtail street prostitution. The cop on the street, meanwhile, is the agent. He may also want to curtail prostitution, at least in theory, but he doesn't have a very strong incentive to actually make arrests. As some officers see it, the prostitutes offer something far more appealing than just another arrest tally: sex.

This shows up loud and clear in Venkatesh's study. Of all the tricks turned by the prostitutes he tracked, roughly 3 percent were freebies given to police officers.

The data don't lie: a Chicago street prostitute is more likely to have sex with a cop than to be arrested by one.

It would be hard to overemphasize how undesirable it is to be a street prostitute—the degradation, the risk of disease, the nearly constant threat of violence.

Nowhere were the conditions as bad as in Washington Park, the third neighborhood in Venkatesh's study, which lies about six miles north of Roseland and West Pullman. It is more economically depressed and less accessible to outsiders, especially whites. The prostitution is centered around four locations: two large apartment buildings, a five-block stretch of busy commercial street, and in the park itself, a 372-acre landmark designed in the 1870s by Frederick Law Olmsted and Calvert Vaux. The prostitutes in Washington Park work without pimps, and they earn the lowest wages of any prostitutes in Venkatesh's study.

This might lead you to think that such women would rather be doing anything else but turning tricks. But one feature of a market economy is that prices tend to find a level whereby even the worst conceivable job is worth doing. As bad off as these women are, they would seem to be worse off without prostitution.

Sound absurd?

The strongest evidence for this argument comes from an unlikely source: the long-loved American tradition known as the family reunion. Every summer around the Fourth of July holiday, Washington Park is thronged with families and other large groups who get together for cookouts and parties. For some of these visitors, catching up with Aunt Ida over lemonade isn't quite stimulating enough. It turns out that the demand for prostitutes in Washington Park skyrocket every year during this period.

And the prostitutes do what any good entrepreneur would do: they raise prices by about 30 percent and work as much overtime as they can handle.

Most interestingly, this surge in demand attracts a special kind of worker—a woman who steers clear of prostitution all year long but, during this busy season, drops her other work and starts turning tricks. Most of these part-time prostitutes have children and take care of their households; they aren't drug addicts. But like prospectors at a gold rush or Realtors during a housing boom, they see the chance to cash in and jump at it.

As for the question posed in this chapter's title—How is a street prostitute like a department-store Santa?—the answer should be obvious: they both take advantage of short-term job opportunities brought about by holiday spikes in demand.
Ben Barres, a Stanford neurobiologist, was born Barbara Barres and became a man in 1997, at the age of forty-two. Neurobiology, like most math and science disciplines, is heavily populated by men. His decision "came as a surprise to my colleagues and students," he notes, but "I decided to do it for the science." The "gender barrier," he says, was a "paradox in my life." As a neurobiologist, he realized that he could make a major contribution to science by being a man. When he left his job as a woman, he was startled to discover that "I had the same abilities."

So what happens when a man decides to employ surgery and hormone therapy to live as a woman (a so-called MTF, or male-to-female transgender) or when a woman decides to live as a man (an FTM, or female-to-male)?

Unfortunately, economists aren't allowed to conduct such experiments. (Yet.) But individuals can if they want to. It's called a sex-change operation.

Economists do their best they can by assembling data and using complex statistical techniques to tease out the reasons why women earn less than men. The fundamental difficulty, however, is that men and women differ in so many ways. What an economist would really like to do is perform an experiment, something like this: take a bunch of women and clone male versions of them; do the reverse for a bunch of men; now sit back and watch. By measuring the labor outcomes of each gender group against their own clones, you could likely gain some real insights.

Or, if cloning weren't an option, you could take a bunch of women, randomly select half of them, and magically switch their gender to male, leaving everything else about them the same, and do the opposite with a bunch of men.

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Ben Barres, a Stanford neurobiologist, was born Barbara Barres and became a man in 1997, at the age of forty-two. Neurobiology, like most math and science disciplines, is heavily populated by men. His decision "came as a surprise to my colleagues and students," he notes, but they "have all been terrific about it." Indeed, his intellectual stature seems to have increased. Once, after Barres gave a seminar, a fellow scientist joked, "It's much harder for men to transition to women than for women to transition to men," Barres admits. The problem, he says, is that males are presumed to be competent in certain fields—especially areas like science and finance—while females are not.
On the other hand, consider Deirdre McCloskey, a prominent economist at the University of Illinois at Chicago. She was born a male, Donald, and decided to become a woman in 1995, at the age of fifty-three. Economics, like neuroscience, is a heavily male field. "I was prepared to move to Spokane and become a secretary in a grain elevator," she says. That proved unnecessary, but McCloskey did "detect a queerness penalty toward me in some of the economics profession. I reckon I’d make a little more money now if I were still Donald."

McCloskey and Barres are just two data points. A pair of researchers named Kristen Schilt and Matthew Wiswall wanted to systematically examine what happens to the salaries of people who switched gender as adults. It is not quite the experiment we proposed above—after all, the set of folks who switch gender aren’t exactly a random sample, nor are they the typical woman or man before or after—but still, the results are intriguing. Schilt and Wiswall found that women who become men earn slightly more money after their gender transitions, while men who become women, on average, nearly one-third less than their previous wage.

Their conclusion comes with a number of caveats. For starters, the sample set was very small: just fourteen MTFs and twenty-four FTM s. Furthermore, the people they studied were mainly recruited at transgender conferences. That puts them in the category of what Deirdre McCloskey calls "professional gender crossers," who aren’t necessarily representative.

"One could easily believe," she says, "that people who do not just become women and then get on with their lives, but keep looking back, are not going to be the most successful people in the workplace." (She may have changed gender, but once an economist, always an economist.)

Back in Chicago, in a chic neighborhood just a few miles from where the street prostitutes work, lives someone who was born female, stayed that way, and makes more money than she ever thought possible.

She grew up in a large and largely dysfunctional family in Texas and left home to join the military. She trained in electronics and worked in research and development on navigation systems. When she rejoined the civilian world seven years later, she took a job in computer programming with one of the world’s largest corporations. She made a solid five-figure salary and married a man who earned well into six figures as a mortgage broker. Her life was a success, but it was also-well, it was boring.

She got divorced (the couple had no children) and moved back to Texas, in part to help care for a sick relative. Working once again as a computer programmer, she remarried but this marriage also failed.

Her career wasn’t going much better. She was smart, capable, technically sophisticated, and she also happened to be physically attractive, a curvaceous and friendly blonde whose attributes were always well appreciated in her corporate setting. But she just didn’t like working all that hard. So she became an entrepreneur, launching a one-woman business that enabled her to work just ten or fifteen hours a week and earn five times her old salary. Her name is Allie, and she is a prostitute.

She fell into the profession by accident, or at least on a lark. Her family was devout Southern Baptist, and Allie had grown up "very straitlaced," she says. As an adult, she was the same. "You know, yard-of-the-month in the suburbs, no more than two beers a night and never before seven." But as a young divorcée, she started visiting online dating sites—she liked men, and she liked sex—and just for fun listed "escort" on her profile. "I mean, it was so instantaneous," she recalls. "I just thought I’d put it up and see what happens."

Her computer was instantly flooded with replies. "I started hitting minimize, minimize, minimize, just so I could keep up!"

She arranged to meet a man at two o’clock on a weekday afternoon at a hotel, in the southwest corner of its parking lot. He’d be driving a black Mercedes. Allie had no idea what to charge. She was thinking about $50.

He was a dentist—physically unintimidating, married, and perfectly kind. Once inside the room, Allie undressed nervously. She can no longer recall the particulars of the sex ("it’s all a big blur by this point," she says) but does remember that "it was nothing really kinky or anything."

When they were done, the man put some money on the dresser. "You’ve never done this before, have you?" he asked.

Allie tried to fib, but it was useless.

"Okay," he said, "this is what you need to do." He began to lecture her. She had to be more careful; she shouldn’t be willing to meet a stranger in a parking lot; she needed to know something in advance about her clients.

"He was the perfect first date," Allie says. "To this day, I remain grateful."

Once he left the room, Allie counted the cash on the dresser: $200. "I’d been giving it away for years, and so the fact that someone was going to give me even a penny—well, that was shocking."

She was immediately tempted to take up prostitution full-time, but she was worried her family and friends would find out. So she eased into it, booking mainly out-of-town liaisons. She curtailed her programming hours but even so found the job stultifying. That’s when she decided to move to Chicago.

Yes, it was a big city, which Allie found intimidating, but unlike New York or Los Angeles, it was civil enough to make a southern girl feel at home. She built a website (those computer skills came in handy) and, through intensive trial and error, determined which erotic-services sites would help her attract the right kind of client and which ones would waste her ad dollars. (The winners were Eros.com and BigDoggie.net.)

Running a one-woman operation held several advantages, the main one being that she didn’t have to share her revenues with anyone. In the old days, Allie probably would have worked for someone like the Everleigh sisters, who paid their girls handsomely but took enough off the top to make themselves truly rich. The Internet let Allie be her own madam and accumulate the riches for herself. Much has been said of the Internet’s awesome ability to “disintermediate”—to cut out the agent or middleman—in industries like travel, real estate, insurance, and the sale of stocks and bonds. But it is hard to think of a market more naturally suited to disintermediation than high-end prostitution.

The downside was that Allie had no one but herself to screen potential clients and ensure they wouldn’t beat her up or rip her off. She hit upon a solution that was as simple as it was smart. When a new client contacted her online, she wouldn’t book an appointment until she had secured his real name and his work telephone number. Then she’d call him the morning of their date, ostensibly just to say how excited she was to meet him.

But the call also acknowledged that she could reach him at will and, if something were to go wrong, she could storm his office. "Nobody wants to see the ‘crazy ho’ routine," she says with a smile. To date, Allie has resorted to this tactic only once, after a client paid her in counterfeit cash. When Allie visited his office, he promptly located some real money.

She saw clients in her apartment, mainly during the day. Most of them were middle-aged white men, 80 percent of whom were married, and they found it easier to slip off during work hours than explain an evening absence. Allie loved having her evenings free to read, go to the movies, or just relax. She set her fee at $300 an hour—that’s what most other women of her caliber seemed to be charging—with a few discount options: $500 for two hours or $2,400 for a twelve-hour sleepover. About 60 percent of her appointments were for a single hour.

Her bedroom—"my office," she calls it with a laugh—is dominated by a massive Victorian four-poster, its carved mahogany pillars draped with an off-white silk crepe. It is not the easiest bed to mount. When asked if any of her clients have difficulty doing so, she confesses that one portly gentleman actually broke the bed not long ago.
Allie had mastered her domain. She was a shrewd entrepreneur who kept her overhead low, maintained quality control, learned to price-discriminate, and understood well the market forces of supply and demand. She also enjoyed her work. But all that said, Allie began looking for an exit strategy. She was in her early thirties by now, and while still attractive, she understood that her commodity was perishable. She felt sorry for older prostitutes who, like aging athletes, didn’t know when to quit. (One such athlete, a future Hall of Fame baseball player, had propositioned Allie while she was vacationing in South America, not knowing that she was a professional. Allie declined, uninterested in a busman’s holiday.)

She had also grown tired of living a secret life. Her family and friends didn’t know she was a prostitute, and the constant deception wore her out. The only people with whom she could be unguarded were other girls in the business, and they weren’t her closest friends.

She had saved money but not enough to retire. So she began casting about for her next career. She got her real-estate license. The housing boom was in full swing, and it seemed pretty simple to transition out of her old job and into the new, since both allowed a flexible schedule. But Allie had found that most people who bought her services were, in the language of economics, “a four-hour dinner date that ends with a twenty-minute sexual encounter,” she says, “even though I was the same girl, dressed the same, and had one-hour appointments with each man wanting to get in as much action as he could. But charging $500 an hour, she was often wined and dined out. The only people with whom she could be unguarded were other girls in the business, and they weren’t her closest friends.

Her price hikes revealed another surprise: the more she charged, the less actual sex she was having. At $300 an hour, she had a string of one-hour appointments with each man wanting to get in as much action as he could. But charging $500 an hour, she was often wined and dined—a “a four-hour dinner date that ends with a twenty-minute sexual encounter,” she says, “even though I was the same girl, dressed the same, and had the same conversations as when I charged $300.”

She figured she may have just been profiting from a strong economy. This was during 2006 and 2007, which were go-go years for many of the bankers, lawyers, and real-estate developers she saw. But Allie had found that most people who bought her services were, in the language of economics, price insensitive. Demand for sex seemed relatively uncoupled from the broader economy.

Our best estimate is that there are fewer than one thousand prostitutes like Allie in Chicago, either working solo or for an escort service. Street prostitutes like LaSheena might have the worst job in America. But for elite prostitutes like Allie, the circumstances are completely different: high wages, flexible hours, and relatively little risk of violence or arrest. So the real puzzle isn’t why someone like Allie becomes a prostitute, but rather why more women don’t choose this career.

Certainly, prostitution isn’t for every woman. You have to like sex enough, and be willing to make some sacrifices, like not having a husband (unless he is very understanding, or very greedy). Still, these negatives just might not seem that important when the wage is $500 an hour. Indeed, when Allie confided to one longtime friend that she had become a prostitute and described her new life, it was only a few weeks before the friend joined Allie in the business.

Allie has never had any trouble with the police, and doesn’t expect to. The truth is that she would be distraught if prostitution were legalized, because her stratospherically high wage stems from the fact that the service she provides cannot be gotten legally.

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She had saved money but not enough to retire. So she began casting about for her next career. She got her real-estate license. The housing boom was in full swing, and it seemed pretty simple to transition out of her old job and into the new, since both allowed a flexible schedule. But too many other people had the same idea. The barrier to entry for real-estate agents is so low that every boom inevitably attracts a swarm of new agents—in the previous ten years, membership in the National Association of Realtors had risen 75 percent—which has the effect of depressing their median income. And Allie was aghast when she realized she’d have to give half of her commission to the agency that employed her. That was a steeper cut than any pimp would dare take!
Finally Allie realized what she really wanted to do: go back to college. She would build on everything she’d learned by running her own business and, if all went well, apply this newfound knowledge to some profession that would pay an insanely high wage without relying on her own physical labor.

Her chosen field of study? Economics, of course.
WHY SHOULD SUICIDE BOMBERS BUY LIFE INSURANCE?

If you know someone in southeastern Uganda who is having a baby next year, you should hope with all your heart that the baby isn’t born in May. If so, it will be roughly 20 percent more likely to have visual, hearing, or learning disabilities as an adult.

Three years from now, however, May would be a fine month to have a baby. But the danger will have only shifted, not disappeared; April would now be the cruellest month.

What can possibly account for this bizarre pattern? Before you answer, consider this: the same pattern has been identified halfway across the world, in Michigan. In fact, a May birth in Michigan might carry an even greater risk than in Uganda.

The economists Douglas Almond and Bhaskar Mazumder have a simple answer for this strange and troubling phenomenon: Ramadan. Some parts of Michigan have a substantial Muslim population, as does southeastern Uganda. Islam calls for a daytime fast from food and drink for the entire month of Ramadan. Most Muslim women participate even while pregnant; it’s not a round-the-clock fast, after all. Still, as Almond and Mazumder found by analyzing years’ worth of natality data, babies that were in utero during Ramadan are more likely to exhibit developmental aftereffects. The magnitude of these effects depends on which month of gestation the baby is in when Ramadan falls. The effects are strongest when fasting coincides with the first month of pregnancy, but they can occur if the mother fasts at any time up to the eighth month.

Islam follows a lunar calendar, so the month of Ramadan begins eleven days earlier each year. In 2009, it ran from August 21 to September 19, which made May 2010 the unluckiest month in which to be born. Three years later, with Ramadan beginning on July 20, April would be the riskiest birth month. The risk is magnified when Ramadan falls during summertime because there are more daylight hours—and, therefore, longer periods without food and drink. That’s why the birth effects can be stronger in Michigan, which has fifteen hours of daylight during summer, than in Uganda, which sits at the equator and therefore has roughly equal daylight hours year-round.

It is no exaggeration to say that a person’s entire life can be greatly influenced by the fluke of his or her birth, whether the fluke is one of time, place, or circumstance. Even animals are susceptible to this natal roulette. Kentucky, the capital of Thoroughbred horse breeding, was hit by a mysterious disease in 2001 that left 500 foals stillborn and resulted in about 3,000 early fetal losses. In 2004, as this diminished cohort of three-year-olds came of age, two of the three Triple Crown races were won by Smarty Jones, a colt whose dam was impregnated in Kentucky but returned home to Pennsylvania before she could be afflicted.

Such birth effects aren’t as rare as you might think. Douglas Almond, examining U.S. Census data from 1960 to 1980, found one group of people whose terrible luck persisted over their whole lives. They had more physical ailments and lower lifetime income than people who’d been born just a few months earlier or a few months later. They stood out in the census record like a layer of volcanic ash stands out in the archaeological record, a thin stripe of ominous sediment nestled between two thick bands of normalcy.

What happened?

These people were in utero during the “Spanish flu” pandemic of 1918. It was a grisly plague, killing more than half a million Americans in just a few months—a casual toll, as Almond notes, greater than all U.S. combat deaths during all the wars fought in the twentieth century.

More than 25 million Americans, meanwhile, contracted the flu but survived. This included one of every three women of childbearing age. The infected women who were pregnant during the pandemic had babies who, like the Ramadan babies, ran the risk of carrying lifelong scars from being in their mothers’ bellies at the wrong time.

Other birth effects, while not nearly as dire, can exert a significant pull on one’s future. It is common practice, especially among economists, to co-write academic papers and list the authors alphabetically by last name. What does this mean for an economist who happened to be born Albert Zyzmor instead of, say, Albert Aab? Two (real) economists addressed this question and found that, all else being equal, Dr. Aab would be more likely to gain tenure at a top university, become a fellow in the Econometric Society (hooray!), and even win the Nobel Prize.

“Indeed,” the two economists concluded, “one of us is currently contemplating dropping the first letter of her surname.” The offending name: Yariv.

Or consider this: if you visit the locker room of a world-class soccer team early in the calendar year, you are more likely to interrupt a birthday celebration than if you arrive later in the year. A recent tally of the British national youth leagues, for instance, shows that fully half of the players were born between January and March, with the other half spread out over the nine remaining months. On a similar German team, 52 elite players were born between January and March, with just 4 players born between October and December.

Why such a severe birthdate bulge?

Most elite athletes begin playing their sports when they are quite young. Since youth sports are organized by age, the leagues naturally impose a cutoff birthdate. The youth soccer leagues in Europe, like many such leagues, use December 31 as the cutoff date.

Imagine now that you coach in a league for seven-year-old boys and are assessing two players. The first one (his name is Jan) was born on January 1, while the second one (his name is Tomas) was born 364 days later, on December 31. So even though they are both technically seven-year-olds, Jan is a year older than Tomas—which, at this tender age, confers substantial advantages. Jan is likely to be bigger, faster, and more mature than Tomas.

So while you may be seeing maturity rather than raw ability, it doesn’t much matter if your goal is to pick the best players for your team. It probably isn’t in a coach’s interest to play the scrawny younger kid who, if he only had another year of development, might be a star.

And thus the cycle begins. Year after year, the bigger boys like Jan are selected, encouraged, and given feedback and playing time, while boys like Tomas eventually fall away. This “relative-age effect,” as it has come to be known, is so strong in many sports that its advantages last all the way through to the professional ranks.

K. Anders Ericsson, an enthusiastic, bearded, and burly Swede, is the ringleader of a merry band of relative-age scholars scattered across the globe. He is now a professor of psychology at Florida State University, where he uses empirical research to learn what share of talent is
a future attack, even though such fear is grossly misplaced. The probability that an average American will die in a given year from a terrorist attack is

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percent of the populace.

Some families produce baseball players. Others produce terrorists.

Conventional wisdom holds that the typical terrorist comes from a poor family and is himself poorly educated. This seems sensible. Children who are born into low-income, low-education families are far more likely than average to become criminals, so wouldn't the same be true for terrorists?

To find out, the economist Alan Krueger combed through a Hezbollah newsletter called Al-Ahд (The Oath) and compiled biographical details on 129 dead shahids (martyrs). He then compared them with men from the same age bracket in the general populace of Lebanon. The terrorists, he found, were less likely to come from a poor family (28 percent versus 33 percent) and more likely to have at least a high-school education (47 percent versus 38 percent).

A similar analysis of Palestinian suicide bombers by Claude Berrebi found that only 16 percent came from impoverished families, versus more than 30 percent of male Palestinians overall. More than 60 percent of the bombers, meanwhile, had gone beyond high school, versus 15 percent of the populace.

In general, Krueger found, “terrorists tend to be drawn from well-educated, middle-class or high-income families.” Despite a few exceptions — the Irish Republican Army and perhaps the Tamil Tigers of Sri Lanka (there isn't enough evidence to say)—the trend holds true around the world, from Latin American terrorist groups to the al Qaeda members who carried out the September 11 attacks in the United States.

How can this be explained?

It may be that when you're hungry, you've got better things to worry about than blowing yourself up. It may be that terrorist leaders place a high value on competence, since a terrorist attack requires more orchestration than a typical crime.

Furthermore, as Krueger points out, crime is primarily driven by personal gain, whereas terrorism is fundamentally a political act. In his analysis, the kind of person most likely to become a terrorist is similar to the kind of person most likely to...vote. Think of terrorism as civic passion on steroids.

Anyone who has read some history will recognize that Krueger’s terrorist profile sounds quite a bit like the typical revolutionary. Fidel Castro and Che Guevara, Ho Chi Minh, Mohandas Gandhi, Leon Trotsky and Vladimir Lenin, Simón Bolívar, and Maximilien Robespierre—you won’t find a single lower-class, uneducated lad among them.

But a revolutionary and a terrorist have different goals. Revolutionaries want to overthrow and replace a government. Terrorists want to—well, it isn’t always clear. As one sociologist puts it, they might wish to remake the world in their own dystopian image; religious terrorists may want to cripple the secular institutions they despise. Krueger cites more than one hundred different scholarly definitions of terrorism. “At a conference in 2002,” he writes, “foreign ministers from over 50 Islamic states agreed to condemn terrorism but could not agree on a definition of what it was that they had condemned.”

What makes terrorism particularly maddening is that killing isn’t even the main point. Rather, it is a means by which to scare the pants off the living and fracture their normal lives. Terrorism is therefore devilishly efficient, exerting far more leverage than an equal amount of non-terrorist violence.

In October 2002, the Washington, D.C., metropolitan area experienced fifty murders, a fairly typical number. But ten of these murders were different. Rather than the typical domestic disputes or gang killings, these were random and inexplicable shootings. Ordinary people minding their own business were shot while pumping gas or leaving the store or mowing the lawn. After the first few killings, panic set in. As they continued, the region was virtually paralyzed. Schools were closed, outdoor events canceled, and many people wouldn’t leave their homes at all.

What kind of sophisticated and well-funded organization had wrought such terror?

Just two people, it turned out: a forty-one-year-old man and his teenage accomplice, firing a Bushmaster .223-caliber rifle from an old Chevy sedan, its roomy trunk converted into a sniper’s nest. So simple, so cheap, and so effective: that is the leverage of terror. Imagine that the nineteen hijackers from September 11, rather than going to the trouble of hijacking airplanes and flying them into buildings, had instead spread themselves around the country, nineteen men with nineteen rifles in nineteen cars, each of them driving to a new spot every day and shooting random people at gas stations and schools and restaurants. Had the nineteen of them synchronized their actions, they would have effectively set off a nationwide time bomb every day. They would have been hard to catch, and even if one of them was caught, the other eighteen would carry on. The entire country would have been brought to its knees.

Terrorism is effective because it imposes costs on everyone, not just its direct victims. The most substantial of these indirect costs is fear of a future attack, even though such fear is grossly misplaced. The probability that an average American will die in a given year from a terrorist attack
drums with a local band called the Grateful Dead. He had an aptitude for mechanics, taking apart and reassembling whatever looked interesting.

Feied grew up in Berkeley, California, during the very raucous 1960s, and he fit right in. He skateboarded everywhere; he occasionally jammed on drums with a local band called the Grateful Dead. He had an aptitude for mechanics, taking apart and reassembling whatever looked interesting.

The beauty of terrorism—if you’re a terrorist—is that you can succeed even by failing. We perform this shoe routine thanks to a bumbling British national named Richard Reid, who, even though he couldn’t ignite his shoe bomb, exacted a huge price. Let’s say it takes an average of one minute to remove and replace your shoes in the airport security line. In the United States alone, this procedure happens roughly 560 million times per year. Five hundred and sixty million minutes equals more than 1,065 years—which, divided by 77.8 years (the average U.S. life expectancy at birth), yields a total of nearly 14 person-lives. So even though Richard Reid failed to kill a single person, he levied a tax that is the time equivalent of 14 lives per year.

The direct costs of the September 11 attacks were massive—nearly three thousand lives and economic losses as high as $300 billion—as were the costs of the wars in Afghanistan and Iraq that the United States launched in response. But consider the collateral costs as well. In just the three months following the attacks, there were one thousand extra traffic deaths in the United States. Why?

One contributing factor is that people stopped flying and drove instead. Per mile, driving is much more dangerous than flying. Interestingly, however, the data show that most of these extra traffic deaths occurred not on interstates but on local roads, and they were concentrated in the Northeast, close to the terrorist attacks. Furthermore, these fatalities were more likely than usual to involve drunken and reckless driving. These facts, along with myriad psychological studies of terrorism’s aftereffects, suggest that the September 11 attacks led to a spike in alcohol abuse and post-traumatic stress that translated into, among other things, extra driving deaths.

Such trickle-down effects are nearly endless. Thousands of foreign-born university students and professors were kept out of the United States because of new visa restrictions after the September 11 attacks. At least 140 U.S. corporations exploited the ensuing stock-market decline by illegally backdating stock options. In New York City, so many police resources were shifted to terrorism that other areas—the Cold Case Squad, for one, as well as anti-Mafia units—were neglected. A similar pattern was repeated on the national level. Money and manpower that otherwise would have been spent chasing financial scoundrels were instead diverted to chasing terrorists—perhaps contributing to, or at least exacerbating, the recent financial meltdown.

Not all of the September 11 aftereffects were harmful. Thanks to decreased airline traffic, influenza—which travels well on planes—was slower to spread and less dangerous. In Washington, D.C., crime fell whenever the federal terror-alert level went up (thanks to extra police flooding the city). And an increase in border security was a boon to some California farmers—who, as Mexican and Canadian imports declined, grew and sold so much marijuana that it became one of the state’s most valuable crops.

When one of the four airplanes hijacked on September 11 crashed into the Pentagon, all of the seriously injured victims, most of whom suffered burns, were taken to Washington Hospital Center, the largest hospital in the city. There were only a handful of patients—corpses were more plentiful—but even so, the burn unit was nearly overwhelmed. Like most hospitals, WHC routinely operated at about 95 percent of capacity, so even a small surge of patients stretched the system. Worse yet, the hospital’s phone lines went down, as did local cell service, so anyone needing to make a call had to jump in a car and drive a few miles away.

All things considered, WHC performed well. But for Craig Feied (pronounced FEE-ed), an emergency-medicine specialist there, the incident confirmed his greatest fears. If the hospital nearly went haywire with just a few extra burn patients, what would happen during a major disaster, when the ER was most needed?

Even before September 11, Feied had spent thousands of hours thinking such grim thoughts. He was the chief architect of a federally funded pilot program called ER One, which was meant to drag the emergency room into the modern era.

Until the 1960s, hospitals simply weren’t designed to treat emergencies. “If you brought someone to a hospital at night,” Feied says, “the doors would be locked. You’d ring the bell, a nurse would come down to see what you wanted. She might let you in, then she’d call the doctor at home, and he might or might not come in.” Ambulances were often run by the local mortuary. It is hard to think of a better example of misaligned incentives: a funeral director who is put in charge of helping a patient not die!

Today, emergency medicine ranks as the seventh-largest physician specialty (out of thirty-eight), with a fivefold increase in practitioners since 1980. It is a master-of-all-trades endeavor, performed at lightning speed, and the emergency room has become the linchpin of public health.

In a given year, there are roughly 115 million ER visits in the United States. Excluding pregnancies, 56 percent of all people admitted to U.S. hospitals come through the ER, up from 46 percent in 1993. And yet, Feied says, “you could drive a truck through the gaps in our protocols.”

September 11 brought home the point that emergency rooms are painfully limited in their surge capacity. If there had been a thousand victims at WHC, would they even have gotten inside?

Such a prospect makes Feied grimace. Most ERs have an ambulance bay that can fit only a few vehicles at a time. The docks are also built too high—“because the people who designed them were used to building loading docks,” Feied says. Rooftop helipads are similarly problematic because of the time and space constraints of a single elevator. Feied’s idea for getting rid of such bottlenecks is to design an ER more like an airport, with a large convex intake area that could accommodate a multitude of ambulances, buses, or even helicopters.

But these intake issues aren’t what worry Feied the most. A hospital that gets hit with something serious and communicable—SARS or anthrax or Ebola or a new strain of lethal influenza—would soon cripple itself. Like most buildings, hospitals recirculate their air, which means that the sick patient can infect hundreds. “You don’t want to go to the hospital for a broken ankle and get SARS,” Feied says.

The answer is to build hospitals, and especially ERs, with rooms designed for isolation and zero air recirculation. But most hospitals, Feied notes, don’t want to spend money on such unsexy, non-revenue-generating features. “There were some nice emergency departments built in 2001, state-of-the-art, and they’re completely obsolete today. They were built with open bays, divided by curtains, but if you have a SARS patient in Bed 4, there’s not a patient or doctor in the world who will want to go into Bed 5.”

And don’t even get Feied started on all the hospital patients who die from a cause other than what brought them to the hospital: wrong diagnoses (the result of carelessness, hubris, or cognitive bias); medication errors (based, far too often, on sloppy handwriting); technical complications (reading an X-ray backward, for instance); and bacterial infections (the deadliest and most pervasive problem).

“The state of current medical practice is so bad right now that there’s not very much worth protecting about the old ways of doing things,” Feied says. “Nobody in medicine wants to admit this but it’s the truth.”

Feied grew up in Berkeley, California, during the very raucous 1960s, and he fit right in. He skateboarded everywhere; he occasionally jammed on drums with a local band called the Grateful Dead. He had an aptitude for mechanics, taking apart and reassembling whatever looked interesting,
and he was enterprising: by eighteen, he had founded a small technology company. He studied biophysics and mathematics before going into medicine. He became a doctor, he says, because of “the lure of secret knowledge,” a desire to understand the human body as well as he understood machines.

Still, you sense that machines remain his first love. He is a fervent early adopter—he put a fax machine in the ER and started riding a Segway when both were novelties—and he excitedly recalls hearing a lecture by the computer scientist Alan Kay more than thirty-five years ago on object-oriented programming. Kay’s idea—to encapsulate each chunk of code with logic that enabled it to interact with any other piece—was a miracle of streamlining, making programmers’ lives easier and helping turn computers into more robust and flexible tools.

Feied arrived at Washington Hospital Center in 1995, recruited by his longtime colleague Mark Smith to help fix its emergency department. (Smith was also a true believer in technology. He had a master’s degree in computer science from Stanford, where his thesis adviser was none other than Alan Kay.) Although some of WHC’s specialty departments were well regarded, the ER consistently ranked last in the D.C. area. It was crowded, slow, and disorganized; it ran through a new director every year or so, and the hospital’s own medical director called the ER “a pretty undesirable place.”

By this time, Feied and Smith had between them treated more than a hundred thousand patients in various emergency rooms. They found one commodity was always in short supply: information. A patient would come in—conscious or unconscious, cooperative or not, sober or high, with a limitless array of potential problems—and the doctor had to decide quickly how to treat him. But there were usually more questions than answers: Was the patient on medication? What was his medical history? Did a low blood count mean acute internal bleeding or just chronic anemia? And where was the CT scan that was supposedly done two hours ago?

“For years, I treated patients with no more information than the patients could tell me,” Feied says. “Any other information took too long, so you couldn’t factor it in. We often knew what information we needed, and even knew where it was, but it just wasn’t available in time. The critical piece of data might have been two hours away or two weeks away. In a busy emergency department, even two minutes away is too much. You can’t do that when you have forty patients and half of them are trying to die.”

The problem agitated Feied so badly that he turned himself into the world’s first emergency-medicine informaticist. (He made up the phrase, based on the European term for computer science.) He believed that the best way to improve clinical care in the ER was to improve the flow of information.

Even before taking over at WHC, Feied and Smith hired a bunch of medical students to follow doctors and nurses around the ER and pepper them with questions. Much like Sudhir Venkatesh hired trackers to interview Chicago street prostitutes, they wanted to gather reliable, real-time data that were otherwise hard to get. Here are some of the questions the students asked:

Since I last talked to you, what information did you need?

How long did it take to get it?

What was the source: Did you make a phone call? Use a reference book? Talk to a medical librarian?

Did you get a satisfactory answer to your query?

Did you make a medical decision based on that answer?

How did that decision impact patient care?

What was the financial impact of that decision on the hospital?

The diagnosis was clear: the WHC emergency department had a severe case of “datapenia,” or low data counts. (Feied invented this word as well, stealing the suffix from “leucopenia,” or low white-blood-cell counts.) Doctors were spending about 60 percent of their time on “information management,” and only 15 percent on direct patient care. This was a sickening ratio. “Emergency medicine is a specialty defined not by an organ of the body or by an age group but by time,” says Mark Smith. “It’s about what you do in the first sixty minutes.”

Smith and Feied discovered more than three hundred data sources in the hospital that didn’t talk to one another, including a mainframe system, handwritten notes, scanned images, lab results, streaming video from cardiac angiograms, and an infection-control tracking system that lived on one person’s computer on an Excel spreadsheet. “And if she went on vacation, God help you if you’re trying to track a TB outbreak,” says Feied.

To give the ER doctors and nurses what they really needed, a computer system had to be built from the ground up. It had to be encyclopedic (one missing piece of key data would defeat the purpose); it had to be muscular (a single MRI, for instance, ate up a massive amount of data capacity); and it had to be flexible (a system that couldn’t incorporate any data from any department in any hospital in the past, present, or future was useless).

It also had to be really, really fast. Not only because slowness kills in an ER but because, as Feied had learned from the scientific literature, a person using a computer experiences “cognitive drift” if more than one second elapses between clicking the mouse and seeing new data on the
The data culled by Craig Feied’s team from the WHC emergency room turn out to be just the thing to answer some questions about doctor skill. For starters, the data set is huge, recording some 620,000 visits by roughly 240,000 different patients over nearly eight years, and more than 300 doctors who treated them.

The data also show which doctor treated which patients, and we know a good bit about each doctor as well, including age, gender, medical school attended, hospital where residency was served, and years of experience.

When most people think of ERs, they envision a steady stream of gunshot wounds and accident victims. In reality, dramatic incidents like these represent a tiny fraction of ER traffic and, because WHC has a separate Level I trauma center, such cases are especially rare in our ER data. As of this writing, Azyxxi covers roughly 10 million patients at 350 care sites; for those of you keeping score at home, that’s more than 150 terabytes of data.

It would have been enough if Azyxxi merely improved patient outcomes and made doctors more efficient. But such a massive accumulation of data creates other opportunities. It lets doctors seek out markers for diseases in patients who haven’t been diagnosed. It makes billing more efficient. It makes the dream of electronic medical records a straightforward reality. And, because it collects data in real time from all over the country, the system can serve as a Distant Early Warning Line for disease outbreaks or even bioterrorism.

In the end, Feied won—or, really, the data won. Azyxxi went live on a single desktop computer in the WHC emergency room. Feied put a sign on it: “Beta Test: Do Not Use.” (No one ever said he wasn’t clever.) Like so many Adams and Eves, doctors and nurses began to peck at the forbidden fruit and found it nothing short of miraculous. In a few seconds they could locate practically any information they needed. Within a week, the Azyxxi computer had a waiting line. And it wasn’t just ER docs: they came from all over the hospital to drink up the data. At first glance, it seemed like the product of genius. But no, says Feied. It was “a triumph of doggedness.”

Within a few years, the WHC emergency department went from worst to first in the Washington region. Even though Azyxxi quadrupled the amount of information that was actually being seen, doctors were spending 25 percent less time on “information management,” and more than twice as much time directly treating patients. The old ER wait time averaged eight hours; now, 60 percent of patients were in and out in less than two hours. Patient outcomes were better and doctors were happier (and less error-prone). Annual patient volume doubled, from 40,000 to 80,000, with only a 30 percent increase in staffing. Efficiencies abounded, and this was good for the hospital’s bottom line.

As Azyxxi’s benefits became clear, many other hospitals came calling. So did, eventually, Microsoft, which bought it, Craig Feied and all. Microsoft renamed it Amalga and, within the first year, installed the system in fourteen major hospitals, including Johns Hopkins, New York–Presbyterian, and the Mayo Clinic. Although it was developed in an ER, more than 90 percent of its use is currently in other hospital departments.

It contains everything you might want to know about a given patient—anonymized, of course, for our analysis—from the moment she walks, rolls, or is carried through the ER door until the time she leaves the hospital, alive or otherwise. The data include demographic information; the patient’s complaint upon entering the ER; how long it took to see a doctor; how the patient was diagnosed and treated; whether the patient was admitted to the hospital, and the length of stay; whether the patient was later readmitted; the total cost of the treatment; and if or when the patient died. (Even if the patient died two years later outside the hospital, the death would still be included in our analysis as a result of cross-linking the hospital data with the Social Security Death Index.)

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When most people think of ERs, they envision a steady stream of gunshot wounds and accident victims. In reality, dramatic incidents like these represent a tiny fraction of ER traffic and, because WHC has a separate Level I trauma center, such cases are especially rare in our ER data. That said, the main emergency room has an extraordinary array of patient complaints, from the life-threatening to the entirely imaginary.

On average, about 160 patients showed up each day. The busiest day is Monday, and weekend days are the slowest. (This is a good clue that many ailments aren’t so serious that they can’t wait until the weekend’s activities are over.) The peak hour is 11:00 A.M., which is five times busier than the slowest hour, which is 5:00 A.M. Six of every ten patients are female; the average age is forty-seven. The first thing a patient does upon arrival is tell the triage nurse what’s wrong. Some complaints are common: “shortness of breath,” “chest pains,” “dehydration,” “flu-like symptoms.” Others are far less so: “fish bone stuck in throat,” “hit over the head with book,” and a variety of bites, including a good number of dog bites (about 300) and insect or spider bites (200). Interestingly, there are more human bites (65) than rat bites and...
The vast majority of patients who come to the ER leave alive. Only 1 of every 250 patients dies within a week; 1 percent die within a month, and about 5 percent die within a year. But knowing whether a condition is life-threatening or not isn’t always obvious (especially to the patients themselves). Imagine you’re an ER doc with eight patients in the waiting room, one each with one of the following eight common complaints. Four of these conditions have a relatively high death rate while the other four are low. Can you tell which ones are which?

<table>
<thead>
<tr>
<th>COMPLAINTS</th>
<th>PSYCHIATRIC</th>
<th>NEUROTIC OF BREATH</th>
<th>INFECTION</th>
<th>CLOT</th>
</tr>
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<tr>
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<td>CHEST PAINS</td>
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<td>FEVER</td>
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<tr>
<td>DIZZINESS</td>
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Here’s the answer, based on the likelihood of a patient dying within twelve months:

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<thead>
<tr>
<th>HIGH-RISK CONDITIONS</th>
<th>LOW-RISK CONDITIONS</th>
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<tr>
<td>CLOT</td>
<td>CHEST PAINS</td>
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<tr>
<td>FEVER</td>
<td>DIZZINESS</td>
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<tr>
<td>INFECTION</td>
<td>NUMBNESS</td>
</tr>
<tr>
<td>SHORTNESS OF BREATH</td>
<td>PSYCHIATRIC</td>
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So a patient with chest pains is no more likely than the average ER patient to die within a year, whereas shortness of breath more than doubles the death risk. Similarly, roughly 1 in 10 patients who show up with a clot, a fever, or an infection will be dead within a year; but if a patient is dizzy, is numb, or has a psychiatric condition, the risk of dying is only one-third as high.

With all this in mind, let’s get back to the question at hand: given all these data, how do we measure the efficacy of each doctor?

The most obvious course would be to simply look at the raw data for differences in patient outcomes across doctors. Indeed, this method would show radical differences among doctors. If these results were trustworthy, there would be few factors in your life as important as the identity of the doctor who happens to draw your case when you show up at the ER.

But for the same reasons you shouldn’t put much faith in doctor report cards, a comparison like this is highly deceptive. Two doctors in the same ER are likely to treat very different pools of patients. The average patient at noon, for instance, is about ten years older than one who comes in the middle of the night. Even two doctors working the same shift might see very different patients, based on their skills and interests. It is the triage nurse’s job to match patients and doctors as best as possible. One doc may therefore get all the psychiatric cases on a shift, or all the elderly patients. Because an old person with shortness of breath is much more likely to die than a thirty-year-old with the same condition, we have to be careful not to penalize the doctor who happens to be good with old people.

What you’d really like to do is run a randomized, controlled trial so that when patients arrive they are randomly assigned to a doctor, even if that doctor is overwhelmed with other patients or not well equipped to handle a particular ailment.

But we are dealing with one set of real, live human beings who are trying to keep another set of real, live human beings from dying, so this kind of experiment isn’t going to happen, and for good reason.

Since we can’t do a true randomization, and if simply looking at patient outcomes in the raw data will be misleading, what’s the best way to measure doctor skill?

Thanks to the nature of the emergency room, there is another sort of de facto, accidental randomization that can lead us to the truth. The key is that patients generally have no idea which doctors will be working when they arrive at the ER. Therefore, the patients who show up between 2:00 and 3:00 P.M. on one Thursday in October are, on average, likely to be similar to the patients who show up the following Thursday, or the Thursday after that. But the doctors working on those three Thursdays will probably be different. So if the patients who came on the first Thursday have worse outcomes than the patients who came on the second or third Thursday, one likely explanation is that the doctors on that shift weren’t as good. (In this ER, there were usually two or three doctors per shift.)

There could be other explanations, of course, like bad luck or bad weather or an E. coli outbreak. But if you look at a particular doctor’s record across hundreds of shifts and see that the patients on those shifts have worse outcomes than is typical, you have a pretty strong indication that the doctor was doing a good job.
One last note on methodology: while we exploit information about which doctors are working on a shift, we don’t factor in which doctor actually treats a particular patient. Why? Because we know that the triage nurse’s job is to match patients with doctors, which makes the selection far from random. It might seem counterintuitive—wasteful, even—to ignore the specific doctor-patient match in our analysis. But in scenarios where selection is a problem, the only way to get a true answer is, paradoxically, to throw away what at first seems to be valuable information.

So, applying this approach to Craig Feied’s massively informative data set, what can we learn about doctor skill? Or, put another way: if you land in an emergency room with a serious condition, how much does your survival depend on the particular doctor you draw?

The short answer is...not all that much. Most of what looks like doctor skill in the raw data is in fact the luck of the draw, the result of some doctors getting more patients with less-threatening ailments.

This isn’t to say there’s no difference between the best and worst doctors in the ER. (And no, we’re not going to name them.) In a given year, an excellent ER doctor’s patients will have a twelve-month death rate that is nearly 10 percent lower than the average. This may not sound like much, but in a busy ER with tens of thousands of patients, an excellent doctor might save six or seven lives a year relative to the worst doctor.

Interestingly, health outcomes are largely uncorrelated to spending. This means the best doctors don’t spend any more money—for tests, hospital admittance, and so on—than the lesser doctors. This is worth pondering in an era when higher health-care spending is widely thought to produce better health-care outcomes. In the United States, the health-care sector accounts for more than 16 percent of GDP, up from 5 percent in 1960, and is projected to reach 20 percent by 2015.

So what are the characteristics of the best doctors?

For the most part, our findings aren’t very surprising. An excellent doctor is disproportionately likely to have attended a top-ranked medical school and served a residency at a prestigious hospital. More experience is also valuable: an extra ten years on the job yields the same benefit as having served a residency at a top hospital.

And oh yes: you also want your ER doctor to be a woman. It may have been bad for America’s schoolchildren when so many smart women passed up teaching jobs to go to medical school, but it’s good to know that, in our analysis at least, such women are slightly better than their male counterparts at keeping people alive.

One factor that doesn’t seem to matter is whether a doctor is highly rated by his or her colleagues. We asked Feied and the other head physicians at WHC to name the best docs in the ER. The ones they chose turned out to be no better than average at lowering death rates. They were, however, good at spending less money per patient.

So the particular doctor you draw in the ER does matter—but, in the broader scheme of things, not nearly as much as other factors: your ailment, your gender (women are much less likely than men to die within a year of visiting the ER), or your income level (poor patients are much more likely to die than rich ones).

The best news is that most people who are rushed to the ER and think they are going to die are in little danger of dying at all, at least not any time soon.

In fact, they might have been better off if they simply stayed at home. Consider the evidence from a series of widespread doctor strikes in Los Angeles, Israel, and Colombia. It turns out that the death rate dropped significantly in those places, anywhere from 18 percent to 50 percent, when the doctors stopped working!

This effect might be partially explained by patients’ putting off elective surgery during the strike. That’s what Craig Feied first thought when he read the literature. But he had a chance to observe a similar phenomenon firsthand when a lot of Washington doctors left town at the same time for a medical convention. The result: an across-the-board drop in mortality.

“When there are too many physician-patient interactions, the amplitude gets turned up on everything,” he says. “More people with nonfatal problems are taking more medications and having more procedures, many of which are not really helpful and a few of which are harmful, while the people with really fatal illnesses are rarely cured and ultimately die anyway.”

So it may be that going to the hospital slightly increases your odds of surviving if you’ve got a serious problem but increases your odds of dying if you don’t. Such are the vagaries of life.

Meanwhile, there are some ways to extend your life span that have nothing to do with going to the hospital. You could, for instance, win a Nobel Prize. An analysis covering fifty years of the Nobels in chemistry and physics found that the winners lived longer than those who were merely nominated. (So much for the Hollywood wisdom of “It’s an honor just to be nominated.”) Nor was the winners’ longevity a function of the Nobel Prize money. “Status seems to work a kind of health-giving magic,” says Andrew Oswald, one of the study’s authors. “Walking across that platform in Stockholm apparently adds about two years to a scientist’s life span.”

You could also get elected to the Baseball Hall of Fame. A similar analysis shows that men who are voted into the Hall outlive those who are narrowly omitted.

But what about those of us who aren’t exceptional at science or sport? Well, you could purchase an annuity, a contract that pays off a set amount of income each year but only as long as you stay alive. People who buy annuities, it turns out, live longer than people who don’t, and not because the people who buy annuities are healthier to start with. The evidence suggests that an annuity’s steady payout provides a little extra incentive to keep chugging along.

Religion also seems to help. A study of more than 2,800 elderly Christians and Jews found that they were more likely to die in the thirty days after their respective major holidays than in the thirty days before. (One piece of evidence proving a causal link: Jews had no aversion to dying in the thirty days before a Christian holiday, nor did Christians disproportionately outlast the Jewish holidays.) In a similar vein, longtime friends and rivals Thomas Jefferson and John Adams each valiantly struggled to forestall death until they’d reached an important landmark. They expired within fifteen hours of each other on July 4, 1826, the fiftieth anniversary of the ratification of the Declaration of Independence.

Holding off death by even a single day can sometimes be worth millions of dollars. Consider the estate tax, which is imposed on the taxable estate of a person upon his or her death. In the United States, the rate in recent years was 45 percent, with an exemption for the first $2 million. In 2009, however, the exemption jumped to $3.5 million—which meant that the heirs of a rich, dying parent had about 1.5 million reasons to console themselves if said parent died on the first day of 2009 rather than the last day of 2008. With this incentive, it’s not hard to imagine such heirs giving their parent the best medical care money could buy, at least through the end of the year. Indeed, two Australian scholars found that when their nation abolished its inheritance tax in 1979, a disproportionately high number of people died in the week after the abolition as compared with the week before.

For a time, it looked as if the U.S. estate tax would be temporarily abolished for one year, in 2010. (This was the product of a bipartisan
people who killed you neither knew nor cared a whit about your life, your accomplishments, your loved ones. Your death enjoys a lifetime of smoking.

If someone smokes two packs of cigarettes a day for thirty years and dies of emphysema, at least you can say he brought it on himself and got to enjoy a lifetime of smoking.

The bulk of this spending goes to chemotherapy, which is used in a variety of ways and has proven effective on some cancers, including leukemia, lymphoma, Hodgkin’s disease, and testicular cancer, especially if these cancers are detected early.

But in most other cases, chemotherapy is remarkably ineffective. An exhaustive analysis of cancer treatment in the United States and Australia showed that the five-year survival rate for all patients was about 63 percent but that chemotherapy contributed barely 2 percent to this result. There is a long list of cancers for which chemotherapy had zero discernible effect, including multiple myeloma, soft-tissue sarcoma, melanoma of the skin, and cancers of the pancreas, uterus, prostate, bladder, and kidney.

Consider lung cancer, by far the most prevalent fatal cancer, killing more than 150,000 people a year in the United States. A typical chemotherapy regime for non-small-cell lung cancer costs more than $40,000 but helps extend a patient’s life by an average of just two months.

Thomas J. Smith, a highly regarded oncology researcher and clinician at Virginia Commonwealth University, examined a promising new chemotherapy treatment for metastasized breast cancer and found that each additional year of healthy life gained from it costs $360,000—if such a gain could actually be had. Unfortunately, it couldn’t: the new treatment typically extended a patient’s life by less than two months.

Costs like these put a tremendous strain on the entire health-care system. Smith points out that cancer patients make up 20 percent of Medicare cases but consume 40 percent of the Medicare drug budget.

Some oncologists argue that the benefits of chemotherapy aren’t necessarily captured in the mortality data, and that while chemotherapy may not help nine out of ten patients, it may do wonders for the tenth. Still, considering its expense, its frequent lack of efficacy, and its toxicity—nearly 30 percent of the lung-cancer patients on one protocol stopped treatment rather than live with its brutal side effects—why is chemotherapy so widely administered?

The profit motive is certainly a factor. Doctors are, after all, human beings who respond to incentives. Oncologists are among the highest-paid doctors, their salaries increasing faster than any other specialists, and they typically derive more than half of their income from selling and administering chemotherapy drugs. Chemotherapy can also help oncologists inflate their survival-rate data. It may not seem all that valuable to give a late-stage victim of lung cancer an extra two months to live, but perhaps the patient was only expected to live four months anyway. On paper, this will look like an impressive feat: the doctor extended the patient’s remaining life by 50 percent.

Tom Smith doesn’t discount either of these reasons, but he provides two more.

It is tempting, he says, for oncologists to overstate—or perhaps over-believe in—the efficacy of chemotherapy. “If your slogan is ‘We’re winning the war on cancer,’ that gets you press and charitable donations and money from Congress,” he says. “If your slogan is ‘We’re still getting our butts kicked by cancer but not as bad as we used to,’ that’s a different sell. The reality is that for most people with solid tumors—brain, breast, prostate, lung—we aren’t getting our butts kicked as badly, but we haven’t made much progress.”

There’s also the fact that oncologists are, once again, human beings who have to tell other human beings they are dying and that, sadly, there isn’t much to be done about it. “Doctors like me find it incredibly hard to tell people the very bad news,” Smith says, “and how ineffective our medicines sometimes are.”

If this task is so hard for doctors, surely it must also be hard for the politicians and insurance executives who subsidize the widespread use of chemotherapy. Despite the mountain of negative evidence, chemotherapy seems to afford cancer patients their last, best hope to nurse what little quality of life is left to them. If this is so, isn’t it wrong to drive up the cost of chemotherapy with the threat of denying insurance coverage?

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We had the good fortune to meet Ian Horsley at about this time and, jointly, we began to wonder: if his algorithms could sift through an endless stream of retail banking data and successfully detect fraudsters, might the same data be coaxed to identify other bad guys, like would-be terrorists? Might there be a fourth tactic that could help find terrorists?

Ian Horsley, believes there may. He doesn't work in law enforcement, or in government or the military, nor does anything in his background or manner suggest he might be the least bit heroic. He grew up in the heart of England, the son of an electrical engineer, and is now well into middle age. He still lives happily far from the maddening thrum of London. While perfectly affable, he isn't outgoing or jolly by any measure; Horsley is, in his own words, "completely average and utterly forgettable."

Growing up, he thought he might like to be an accountant. But he left school when his girlfriend's father helped him get a job as a bank cashier. He took on new positions at the bank as they arose, none of them particularly interesting or profitable. One job, in computer programming, turned out to be a bit more intriguing because it gave him "a fundamental understanding of the underlying database that the bank operates on," he says.

Horsley proved to be diligent, a keen observer of human behavior, and a man who plainly knew right from wrong. Eventually he was asked to sniff out fraud among bank employees, and in time he graduated to consumer fraud, which was a far wider threat to the bank. U.K. banks lose about $1.5 billion annually to such fraud. In recent years, it had been facilitated by two forces: the rise of online banking and the fierce competition among banks to snag new business.

For a time, money was so cheap and credit so easy that anyone with a pulse, regardless of employment or citizenship or creditworthiness, could walk into a British bank and walk out with a debit card. (In truth, even a pulse wasn't necessary: fraudsters were happy to use the identities of dead and fictional people as well.) Horsley learned the customs of various subgroups. West African immigrants were master check washers, while Eastern Europeans were the best identity thieves. Such fraudsters were relentless and creative: they would track down a bank's call center and linger outside until an employee exited, offering a bribe for customers' information.

Horsley built a team of data analysts and profilers who wrote computer programs that could crawl through the bank's database and detect fraudulent activity. The programmers were good. The fraudsters were also good, and nimble too, devising new scams as soon as old ones were compromised. These rapid mutations sharpened Horsley's ability to think like a fraudster. Even in his sleep, his mind cruised through billions upon billions of bank data points, seeking out patterns that might betray wrongdoing. His algorithms got tighter and tighter.

We had the good fortune to meet Ian Horsley at about this time and, jointly, we began to wonder: if his algorithms could sift through an endless stream of retail banking data and successfully detect fraudsters, might the same data be coaxed to identify other bad guys, like would-be terrorists? This hunch was supported by the data trail from the September 11 attacks. The banking histories of those nineteen terrorists revealed some behaviors that, in the aggregate, distinguished them from the typical bank customer:

- They opened their U.S. accounts with cash or cash equivalents, in the average amount of roughly $4,000, usually at a branch of a large, well-known bank.
- They typically used a P.O. box as an address, and the addresses changed frequently.
- Some of them regularly sent and received wire transfers to and from other countries, but these transactions were always below the limit that triggered the bank's reporting requirements.
- They tended to make one large deposit and then withdraw cash in small amounts over time.
- Their banking didn't reflect normal living expenses like rent, utilities, auto payments, insurance, and so on.
- There was no typical monthly consistency in the timing of their deposits or withdrawals.
- They didn't use savings accounts or safe-deposit boxes.
- The ratio of cash withdrawals to checks written was unusually high.

It is obviously easier to retroactively create a banking profile of a proven terrorist than to build one that would identify a terrorist before he acts. Nor would a profile of these nineteen men—foreign nationals living in the United States who were training to hijack jetliners—necessarily fit the profile of, say, a homegrown suicide bomber in London.

Furthermore, when data have been used in the past to identify wrongdoing—like the cheating schoolteachers and collusive sumo wrestlers we wrote about in Freakonomics—there was a relatively high prevalence of fraud among a targeted population. But in this case, the population
was gigantic (Horsley’s bank alone had many millions of customers) while the number of potential terrorists was very small.

Let’s say, however, you could develop a banking algorithm that was 99 percent accurate. We’ll assume the United Kingdom has 500 terrorists. The algorithm would correctly identify 495 of them, or 99 percent. But there are roughly 50 million adults in the United Kingdom who have nothing to do with terrorism, and the algorithm would also wrongly identify 1 percent of them, or 500,000 people. At the end of the day, this wonderful, 99-percent-accurate algorithm spits out too many false positives—half a million people who would be rightly indignant when they were hauled in by the authorities on suspicion of terrorism.

Nor, of course, could the authorities handle the workload.

This is a common problem in health care. A review of a recent cancer-screening trial showed that 50 percent of the 68,000 participants got at least 1 false-positive result after undergoing 14 tests. So although health-care advocates may urge universal screening for all sorts of maladies, the reality is that the system would be overwhelmed by false positives and the sick would be crowded out. The baseball player Mike Lowell, a recent World Series MVP, underscored a related problem while discussing a plan to test every ballplayer in the league for human growth hormone. "If it’s 99 percent accurate, that’s going to be 7 false positives," Lowell said. "What if one of the false positives is Cal Ripken? Doesn’t it put a black mark on his career?"

Similarly, if you want to hunt terrorists, 99 percent accurate is not even close to good enough.

On July 7, 2005, four Islamic suicide bombers struck in London, one on a crowded bus and three in the Underground. The murder toll was fifty-two. "Personally, I was devastated by it," Horsley recalls. "We were just starting to work on identifying terrorists and I thought maybe, just maybe, if we had started a couple years earlier, would we have stopped it?"

The 7/7 bombers left behind some banking data, but not much. In the coming months, however, a flock of suspicious characters accommodated our terrorist-detection project by getting themselves arrested by the British police. Granted, none of these men were proven terrorists; most of them would never be convicted of anything. But if they resembled a terrorist closely enough to get arrested, perhaps their banking habits could be mined to create a useful algorithm. As luck would have it, more than a hundred of these suspects were customers at Horsley’s bank.

The procedure would require two steps. First, assemble all the available data on these hundred-plus suspects and create an algorithm based on the patterns that set these men apart from the general population. Once the algorithm was successfully fine-tuned, it could be used to dredge through the bank’s database to identify other potential bad guys.

Given that the United Kingdom was battling Islamic fundamentalists and no longer, for instance, Irish militants, the arrested suspects invariably had Muslim names. This would turn out to be one of the strongest demographic markers for the algorithm. A person with neither a first nor a last Muslim name stood only a 1 in 500,000 chance of being a suspected terrorist. The likelihood for a person with a first or a last Muslim name was 1 in 30,000. For a person with first and last Muslim names, however, the likelihood jumped to 1 in 2,000.

The likely terrorists were predominately men, most commonly between the ages of twenty-six and thirty-five. Furthermore, they were disproportionately likely to:

- Own a mobile phone
- Be a student
- Rent, rather than own, a home

These traits, on their own, would hardly be grounds for arrest. (They describe just about every research assistant the two of us have ever had, and we are pretty sure none of them are terrorists.) But, when stacked atop the Muslim-name markers, even these common traits began to add power to the algorithm.

Once the preceding factors were taken into account, several other characteristics proved fundamentally neutral, not identifying terrorists one way or another. They included:

- Employment status
- Marital status
- Living in close proximity to a mosque

So contrary to common perception, a single, unemployed, twenty-six-year-old man who lived next door to a mosque was no more likely to be a terrorist than another twenty-six-year-old who had a wife, a job, and lived five miles from the mosque.

There were also some prominent negative indicators. The data showed that a would-be terrorist was disproportionately unlikely to:

- Have a savings account
- Withdraw money from an ATM on a Friday afternoon
The no-ATM-on-Friday metric would seem to be a proxy for a Muslim who attends that day’s mandatory prayer service. The life-insurance marker is a bit more interesting. Let’s say you’re a twenty-six-year-old man, married with two young children. It probably makes sense to buy some life insurance so your family can survive if you happen to die young. But insurance companies don’t pay out if the policyholder commits suicide. So a twenty-six-year-old family man who suspects he may one day blow himself up probably isn’t going to waste money on life insurance.

This all suggests that if a budding terrorist wants to cover his tracks, he should go down to the bank and change the name on his account to something very un-Muslim (Ian, perhaps). It also wouldn’t hurt to buy some life insurance. Horsley’s own bank offers starter policies for just a few quid per month.

All these metrics, once combined, did a pretty good job of creating an algorithm that could distill the bank’s entire customer base into a relatively small group of potential terrorists.

It was a tight net but not yet tight enough. What finally made it work was one last metric that dramatically sharpened the algorithm. In the interest of national security, we have been asked to not disclose the particulars; we’ll call it Variable X.

What makes Variable X so special? For one, it is a behavioral metric, not a demographic one. The dream of anti-terrorist authorities everywhere is to somehow become a fly on the wall in a roomful of terrorists. In one small, important way, Variable X accomplishes that. Unlike most other metrics in the algorithm, which produce a yes or no answer, Variable X measures the intensity of a particular banking activity. While not unusual in low intensities among the general population, this behavior occurs in high intensities much more frequently among those who have other terrorist markers.

This ultimately gave the algorithm great predictive power. Starting with a database of millions of bank customers, Horsley was able to generate a list of about 30 highly suspicious individuals. According to his rather conservative estimate, at least 5 of those 30 are almost certainly involved in terrorist activities. Five out of 30 isn’t perfect—the algorithm misses many terrorists and still falsely identifies some innocents—but it sure beats 495 out of 500,495.

As of this writing, Horsley has handed off the list of 30 to his superiors, who in turn have handed it off to the proper authorities. Horsley has done his work; now it is time for them to do theirs. Given the nature of the problem, Horsley may never know for certain if he was successful. And you, the reader, are even less likely to see direct evidence of his success because it would be invisible, manifesting itself in terrorist attacks that never happen.

But perhaps you’ll find yourself in a British pub some distant day, one stool away from an unassuming, slightly standoffish stranger. You have a pint with him, and then another and a third. With his tongue loosened a bit, he mentions, almost sheepishly, that he has recently gained an honorific: he is now known as Sir Ian Horsley. He’s not at liberty to discuss the deeds that led to his knighthood, but it has something to do with protecting civil society from those who would do it great harm. You thank him profusely for the great service he has performed, and buy him another pint, and then a few more. When the pub at last closes, the two of you stumble outside. And then, just as he is about to set off on foot down a darkened lane, you think of a very small way to repay his service. You push him back onto the curb, hail a taxi, and stuff him inside. Because, remember, friends don’t let friends walk drunk.
CHAPTER 3

UNBELIEVABLE STORIES ABOUT APATHY AND ALTRUISM

In March 1964, late on a cold and damp Thursday night, something terrible happened in New York City, something suggesting that human beings are the most brutally selfish animals to ever roam the planet.

A twenty-eight-year-old woman named Kitty Genovese drove home from work and parked, as usual, in the lot at the Long Island Rail Road station. She lived in Kew Gardens, Queens, roughly twenty minutes by train from Manhattan. It was a nice neighborhood, with tidy homes on shaded lots, a handful of apartment buildings, and a small commercial district.

Genovese lived above a row of shops that fronted Austin Street. The entrance to her apartment was around the rear. She got out of her car and locked it; almost immediately, a man started chasing her and stabbed her in the back. Genovese screamed. The assault took place on the sidewalk in front of the Austin Street shops and across the street from a ten-story apartment building called the Mowbray.

The assailant, whose name was Winston Moseley, retreated to his car, a white Corvair parked at the curb some sixty yards away. He put the car in reverse and backed it down the block, passing out of view.

Genovese, meanwhile, staggered to her feet and made her way around to the back of her building. But in a short time Moseley returned. He sexually assaulted her and stabbed her again, leaving Genovese to die. Then he got back in his car and drove home. Like Genovese, he was young, twenty-nine years old, and he too lived in Queens. His wife was a registered nurse; they had two children. On the drive home, Moseley noticed another car stopped at a red light, its driver asleep at the wheel. Moseley got out and woke the man. He didn’t hurt or rob him. The next morning, Moseley went to work as usual.

The crime soon became infamous. But not because Moseley was a psychopath—a seemingly normal family man who, although he had no criminal record, turned out to have a history of grotesque sexual violence. And it wasn’t because Genovese was a colorful character herself, a tavern manager who happened to be a lesbian and had a prior gambling arrest. Nor was it because Genovese was white and Moseley was black.

The Kitty Genovese murder became infamous because of an article published on the front page of The New York Times. It began like this:

> For more than half an hour 38 respectable, law-abiding citizens in Queens watched a killer stalk and stab a woman in three separate attacks in Kew Gardens.... Not one person telephoned the police during the assault; one witness called after the woman was dead.

The murder took about thirty-five minutes from start to finish. "If we had been called when he first attacked," said a police inspector, "the woman might not be dead now."

The police had interviewed Genovese’s neighbors the morning after the murder, and the Times’s reporter reinterviewed some of them. When asked why they hadn’t intervened or at least called the police, they offered a variety of excuses:

"We thought it was a lovers’ quarrel."
"We went to the window to see what was happening but the light from our bedroom made it difficult to see the street."
"I was tired. I went back to bed."

The article wasn’t very long—barely fourteen hundred words—but its impact was immediate and explosive. There seemed to be general agreement that the thirty-eight witnesses in Kew Gardens represented a new low in human civilization. Politicians, theologians, and editorial writers lambasted the neighbors for their apathy. Some even called for the neighbors’ addresses to be published so justice could be done.

The incident so deeply shook the nation that over the next twenty years, it inspired more academic research on bystander apathy than the Holocaust.

To mark the thirtieth anniversary, President Bill Clinton visited New York City and spoke about the crime: "It sent a chilling message about what had happened at that time in a society, suggesting that we were each of us not simply in danger but fundamentally alone."

More than thirty-five years later, the horror lived on in The Tipping Point, Malcolm Gladwell’s groundbreaking book about social behavior, as an example of the "bystander effect," whereby the presence of multiple witnesses at a tragedy can actually inhibit intervention.

Today, more than forty years later, the Kitty Genovese saga appears in all ten of the top-selling undergraduate textbooks for social psychology. One text describes the witnesses remaining “at their windows in fascination for the 30 minutes it took her assailant to complete his grisly deed, during which he returned for three separate attacks.”

How on earth could thirty-eight people stand by and watch as their neighbor was brutalized? Yes, economists always talk about how self-interested we are, but doesn’t this demonstration of self-interest practically defy logic? Does our apathy really run so deep?

The Genovese murder, coming just a few months after President John F. Kennedy’s assassination, seemed to signal a sort of social apocalypse. Crime was exploding in cities all across the United States, and no one seemed capable of stopping it.

For decades, the rate of violent and property crimes in the United States had been steady and relatively low. But levels began to rise in the mid-1950s. By 1960, the crime rate was 50 percent higher than it had been in 1950; by 1970, the rate had quadrupled.

Why?

It was hard to say. So many changes were simultaneously rippling through American society in the 1960s—a population explosion, a
Imagine, for instance, you want to know whether putting more people in prison really lowers the crime rate. This question isn’t as obvious as it may seem. Perhaps the resources devoted to catching and jailing criminals could have been used more productively. Perhaps every time a bad guy is put away, another criminal rises up to take his place.

To answer this question with some kind of scientific certainty, what you’d really like to do is conduct an experiment. Pretend you could randomly select a group of states and command each of them to release 10,000 prisoners. At the same time, you could randomly select a different group of states and have them lock up 10,000 people, misdemeanor offenders perhaps, who otherwise wouldn’t have gone to prison. Now sit back, wait a few years, and measure the crime rate in those two sets of states. Voilà! You’ve just run the kind of randomized, controlled experiment that lets you determine the relationship between variables.

Unfortunately, the governors of those random states probably wouldn’t take too kindly to your experiment. Nor would the people you sent to prison in some states or the next-door neighbors of the prisoners you freed in others. So your chances of actually conducting this experiment are zero.

That’s why researchers often rely on what is known as a natural experiment, a set of conditions that mimic the experiment you want to conduct but, for whatever reason, cannot. In this instance, what you want is a radical change in the prison population of various states for reasons that have nothing to do with the amount of crime in those states.

Happily, the American Civil Liberties Union was good enough to create just such an experiment. In recent decades, the ACLU has filed lawsuits against dozens of states to protest overcrowded prisons. Granted, the choice of states is hardly random. The ACLU sues where prisons are most crowded and where it has the best chance of winning. But the crime trends in states sued by the ACLU look very similar to trends in other states.

The ACLU wins virtually all of these cases, after which the state is ordered to reduce overcrowding by letting some prisoners free. In the three years after such court decisions, the prison population in these states falls by 15 percent relative to the rest of the country.

What do those freed prisoners do? A whole lot of crime. In the three years after the ACLU wins a case, violent crime rises by 10 percent and property crime by 5 percent in the affected states.

So it takes some work, but using indirect approaches like natural experiments can help us look back at the dramatic crime increase of the 1960s and find some explanations.

One major factor was the criminal-justice system itself. The ratio of arrests per crime fell dramatically during the 1960s, for both property and violent crime. But not only were the police catching a smaller share of the criminals; the courts were less likely to lock up those who were caught. In 1970, a criminal could expect to spend an astonishing 60 percent less time behind bars than he would have for the same crime committed a decade earlier. Overall, the decrease in punishment during the 1960s seems to be responsible for roughly 30 percent of the rise in crime.

The postwar baby boom was another factor. Between 1960 and 1980, the fraction of the U.S. population between the ages of fifteen and twenty-four rose by nearly 40 percent, an unprecedented surge in the age group most at risk for criminal involvement. But even such a radical demographic shift can only account for about 10 percent of the increase in crime.

So together, the baby boom and the declining rate of imprisonment explain less than half of the crime spike. Although a host of other hypotheses have been advanced—including the great migration of African Americans from the rural South to northern cities and the return of Vietnam vets scarred by war—all of them combined still cannot explain the crime surge. Decades later, most criminologists remain perplexed.

The answer might be right in front of our faces, literally: television. Maybe Beaver Cleaver and his picture-perfect TV family weren’t just a casualty of the changing times (Leave It to Beaver was canceled in 1963, the same year Kennedy was assassinated). Maybe they were actually a cause of the problem.

People have long posited that violent TV shows lead to violent behavior, but that claim is not supported by data. We are making an entirely different argument here. Our claim is that children who grew up watching a lot of TV, even the most innocent family-friendly shows, were more likely to engage in crime when they got older.

Testing this hypothesis isn’t easy. You can’t just compare a random bunch of kids who watched a lot of TV with those who didn’t. The ones who were glued to the TV are sure to differ from the other children in countless ways beyond their viewing habits.

A more believable strategy might be to compare cities that got TV early with those that got it much later.

We wrote earlier that cable TV came to different parts of India at different times, a staggered effect that made it possible to measure TV’s impact on rural Indian women. The initial rollout of TV in the United States was even bumpier. This was mainly due to a four-year interruption, from 1948 to 1952, when the Federal Communications Commission declared a moratorium on new stations so the broadcast spectrum could be reconfigured.

Some places in the United States started receiving signals in the mid-1940s while others had no TV until a decade later. As it turns out, there is a stark difference in crime trends between cities that got TV early and those that got it late. These two sets of cities had similar rates of violent crime before the introduction of TV. But by 1970, violent crime was twice as high in the cities that got TV early relative to those that got it late. For property crime, the early-TV cities started with much lower rates in the 1940s than the late-TV cities, but ended up with much higher rates.

There may of course be other differences between the early-TV cities and the late-TV cities. To get around that, we can compare children born in the same city in, say, 1950 and 1955. So in a city that got TV in 1954, we are comparing one age group that had no TV for the first four years of life with another that had TV the entire time. Because of the staggered introduction of TV, the cutoff between the age groups that grew up with and without TV in their early years varies widely across cities. This leads to specific predictions about which cities will see crime rise earlier than others—as well as the age of the criminals doing the crimes.

So did the introduction of TV have any discernible effect on a given city’s crime rate?

The answer seems to be yes, indeed. For every extra year a young person was exposed to TV in his first 15 years, we see a 4 percent increase in the number of property-crime arrests later in life and a 2 percent increase in violent-crime arrests. According to our analysis, the total impact of TV on crime in the 1960s was an increase of 50 percent in property crimes and 25 percent in violent crimes.

Why did TV have this dramatic effect?

Our data offer no firm answers. The effect is largest for children who had extra TV exposure from birth to age four. Since most four-year-olds weren’t watching violent shows, it’s hard to argue that content was the problem.

It may be that kids who watched a lot of TV never got properly socialized, or never learned to entertain themselves. Perhaps TV made the have-nots want the things the have-had, even if it meant stealing them. Or maybe it had nothing to do with the kids at all; maybe Mom and Dad became derelict when they discovered that watching TV was a lot more entertaining than taking care of the kids.

Or maybe early TV programs somehow encouraged criminal behavior. The Andy Griffith Show a huge hit that debuted in 1960, featured a growing anti-authoritarian sentiment, the expansion of civil rights, a wholesale shift in popular culture—that it wasn’t easy to isolate the factors driving crime.
As a society, we’ve come to accept that some bad apples will commit crimes. But that still doesn’t explain why none of Kitty Genovese’s neighbors—regular people, good people—stepped in to help. We all witness acts of altruism, large and small, just about every day. (We may even commit some ourselves.) So why didn’t a single person exhibit altruism on that night in Queens?

A question like this may seem to fall beyond the realm of economics. Sure, liquidity crunches and oil prices and even collateralized debt obligations—but social behaviors like altruism? Is that really what economists do?

For hundreds of years, the answer was no. But around the time of the Genovese murder, a few renegade economists had begun to care deeply about such things. Chief among them was Gary Becker, whom we met earlier, in this book’s introduction. Not satisfied with just measuring the economic choices people make, Becker tried to incorporate the sentiments they attached to such choices.

Some of Becker’s most compelling research concerned altruism. He argued, for instance, that the same person who might be purely selfish in business could be exceedingly altruistic among people he knew—although, importantly (Becker is an economist, after all), he predicted that altruism even within a family would have a strategic element. Years later, the economists Doug Bernheim, Andrei Shleifer, and Larry Summers empirically demonstrated Becker’s point. Using data from a U.S. government longitudinal study, they showed that an elderly parent in a retirement home is more likely to be visited by his grown children if they are expecting a sizable inheritance.

But wait, you say: maybe the offspring of wealthy families are simply more caring toward their elderly parents?

A reasonable conjecture—in which you’d expect an only child of wealthy parents to be especially dutiful. But the data show no increase in retirement-home visits if a wealthy family has only one grown child; there need to be at least two. This suggests that the visits increase because of competition between siblings for the parent’s estate. What might look like good old-fashioned intrafamilial altruism may be a sort of prepaid inheritance tax.

Some governments, wise to the ways of the world, have gone so far as to legally require grown children to visit or support their aging moms and dads. In Singapore, the law is known as the Maintenance of Parents Act. Still, people appear to be extraordinarily altruistic, and not just within their own families. Americans in particular are famously generous, donating about $300 billion a year to charity, more than 2 percent of the nation’s GDP. Just think back to the last hurricane or earthquake that killed a lot of people, and recall how Good Samaritans rushed forward with their money and time.

But why?

Economists have traditionally assumed that the typical person makes rational decisions in line with his own self-interest. So why should this rational fellow—Homo economicus, he is usually called—give away some of his hard-earned cash to someone he doesn’t know in a place he can’t pronounce in return for nothing more than a warm, fuzzy glow?

Building on Gary Becker’s work, a new generation of economists decided it was time to understand altruism in the world at large. But how?

How can we know whether an action is altruistic or self-serving? If you help rebuild a neighbor’s barn, is it because you’re a moral person or because you know your own barn might burn down someday? When a donor gives millions to his alma mater, is it because he cares about the pursuit of knowledge or because he gets his name plastered on the football stadium?

Sorting out such things in the real world is extremely hard. While it is easy to observe actions—or, in the Kitty Genovese case, inaction—it is much harder to understand the intentions behind an action.

Is it possible to use natural experiments, like the ACLU-prison scenario, to measure altruism? You might consider, for instance, looking at a series of calamities to see how much charitable contribution they produce. But with so many variables, it would be hard to tease out the altruism from everything else. A crippling earthquake in China is not the same as a scorching drought in Africa, which is not the same as a devastating hurricane in New Orleans. Each disaster has its own sort of “appeal”—and, just as important, donations are heavily influenced by media coverage. One recent academic study found that a given disaster received an 18 percent spike in charitable aid for each seven-hundred-word newspaper article and a 13 percent spike for every sixty seconds of TV news coverage. (Anyone hoping to raise money for a Third World disaster had better hope it happens on a slow news day.) And such disasters are by their nature anomalies—especially noisy ones, like shark attacks—that probably don’t have much to say about our baseline altruism.

In time, those renegade economists took a different approach: since altruism is so hard to measure in the real world, why not peel away all the real world’s inherent complexities by bringing the subject into the laboratory?

Laboratory experiments are of course a pillar of the physical sciences and have been since Galileo Galilei rolled a bronze ball down a length of wooden molding to test his theory of acceleration. Galileo believed—correctly, as it turned out—that a small creation like his could lead to a better understanding of the greatest creations known to humankind: the earth’s forces, the order of the skies, the workings of human life itself.

More than three centuries later, the physicist Richard Feynman reasserted the primacy of this belief. “The test of all knowledge is experiment,” he said. “Experiment is the sole judge of scientific ‘truth.’” The electricity you use, the cholesterol drug you swallow, the page or screen you are consuming now—all are the product of a great deal of experimentation.

Economists, however, have never been as reliant on the lab. Most of the problems they traditionally worry about—the effect of tax increases, for instance, or the causes of inflation—are difficult to capture there. But if the lab could unravel the scientific mysteries of the universe, surely it could help figure out something as benign as altruism.

These new experiments typically took the form of a game, run by college professors and played by their students. This path had been paved by the beautiful mind of John Nash and other economists who, in the 1950s, experimented broadly with the Prisoner’s Dilemma, a game-theory problem that came to be seen as a classic test of strategic cooperation. (It was invented to glean insights about the nuclear standoff between the United States and the Soviet Union.)

By the early 1980s, the Prisoner’s Dilemma had inspired a lab game called Ultimatum, which works as follows. Two players, who remain anonymous to each other, have a onetime chance to split a sum of money. Player 1 (let’s call her Annika) is given $20 and is instructed to offer any amount, from $0 to $20, to Player 2 (we’ll call her Zelda). Zelda must decide whether to accept or reject Annika’s offer. If she accepts, they split the money according to Annika’s offer. But if she rejects, they both go home empty-handed. Both players know all these rules coming into the game.

To an economist, the strategy is obvious. Since even a penny is more valuable than nothing, it makes sense for Zelda to accept an offer as low as a penny—and, therefore, it makes sense for Annika to offer just a penny, keeping $19.99 for herself.

But, economists be damned, that’s not how normal people played the game. The Zeldas usually rejected offers below $3. They were friendly sheriff who didn’t carry a gun and his extravagantly inept deputy, named Barney Fife. Could it be that all the would-be criminals who watched this pair on TV concluded that the police simply weren’t worth being afraid of?

As a society, we’ve come to accept that some bad apples will commit crimes. But that still doesn’t explain why none of Kitty Genovese’s neighbors—regular people, good people—stepped in to help. We all witness acts of altruism, large and small, just about every day. (We may even commit some ourselves.) So why didn’t a single person exhibit altruism on that night in Queens?
to procure enough donated kidneys to save tens of thousands of lives every year.

render one kidney to save someone's life and still carry on a normal life himself.

But over time, transplantation became a victim of its own success. The normal supply of cadavers couldn't keep up with the demand for organs. In the United States, the rate of traffic fatalities was declining, which was great news for drivers but bad news for patients awaiting a lifesaving kidney. (At least motorcycle deaths kept up, thanks in part to many state laws allowing motorcyclists—or, as transplant surgeons call them, "donorcyclists"—to ride without helmets.) In Europe, some countries passed laws of "presumed consent" rather than requesting that a person donate his organs in the event of an accident, the state assumed the right to harvest his organs unless he or his family specifically opted out. But even so, there were never enough kidneys to go around.

Fortunately, cadavers aren't the only source of organs. We are born with two kidneys but need only one to live—the second kidney is a happy evolutionary artifact—which means that a living donor can surrender one kidney to save someone's life and still carry on a normal life himself. Talk about altruism!

Stories abounded of one spouse giving a kidney to the other, a brother coming through for his sister, a grown woman for her aging parent, even kidneys donated between long-ago playground friends. But what if you were dying and didn't have a friend or relative willing to give you a kidney?

One country, Iran, was so worried about the kidney shortage that it enacted a program many other nations would consider barbaric. It sounded like the kind of idea some economist might have dreamed up, drunk on his belief in *Homo economicus*; the Iranian government would pay people to give up a kidney, roughly $1,200, with an additional sum paid by the kidney recipient.

In the United States, meanwhile, during a 1983 congressional hearing, an enterprising doctor named Barry Jacobs described his own pay-for-organs plan. His company, International Kidney Exchange, Ltd., would bring Third World citizens to the United States, remove one of their kidneys, give them some money, and send them back home. Jacobs was savaged for even raising the idea. His most vigorous critic was a young Tennessee congressman named Al Gore, who wondered if these kidney harvestees "might be willing to give you a cut-rate price just for the chance to see the Statue of Liberty or the Capitol or something."

Congress promptly passed the National Organ Transplant Act, which made it illegal "for any person to knowingly acquire, receive, or otherwise transfer any human organ for valuable consideration for use in human transplantation."

Sure, a country like Iran might let people buy and sell human organs as if they were live chickens at a market. But surely the United States had neither the stomach nor the need for such a desperate maneuver. After all, some of the nation's most brilliant academic researchers had scientifically established that human beings are altruistic by their very nature. Perhaps this altruism was just an ancient evolutionary leftover, like that second kidney. But who cared why it existed? The United States would lead the way, a light unto the nations, relying proudly on our innate altruism to procure enough donated kidneys to save tens of thousands of lives every year.
The Ultimatum and Dictator games inspired a boom in experimental economics, which in turn inspired a new subfield called behavioral economics. A blend of traditional economics and psychology, it sought to capture the elusive and often puzzling human motivations Gary Becker had been thinking about for decades.

With their experiments, behavioral economists continued to sully the reputation of *Homo economicus*. He was starting to look less self-interested every day—and if you had a problem with that conclusion, well, just look at the latest lab results on altruism, cooperation, and fairness.

One of the most prolific experimental economists among the new generation was a native of Sun Prairie, Wisconsin, named John List. He became an economist by accident and had a far less polished academic pedigree than his peers and elders. He came from a family of truckers. “My grandfather moved here from Germany, and he was a farmer,” List says. “Then he saw that truckers were making more money than he was just to take his grain to the mill, so he decided to sell everything and buy one truck.”

The Lists were a smart, hardworking, athletic family, but academics were not of paramount importance. John’s father started driving trucks when he was twelve, and John too was expected to join the family business. But he rebelled by going to college. This happened only because he earned a partial golf and academic scholarship to the University of Wisconsin–Stevens Point. During school breaks he’d help his father unload calf feed or haul a load of paper goods down to Chicago, three and a half hours away.

During golf practice at Stevens Point, List noticed a group of professors who had time to play golf just about every afternoon. They taught economics. That’s when List decided to become an economics professor too. (It helped that he liked the subject.)

For graduate school he chose the University of Wyoming. It was hardly a top-tier program, but even so he felt overmatched. On the first day, when students went around the classroom and gave a bit of personal background, List felt everyone staring at him when he said he’d graduated from Stevens Point. They had all gone to places like Columbia and the University of Virginia. He decided his only chance was to outwork them. Over the next few years, he wrote more papers and took more qualifying exams than anyone else—and, like many young economists, started to dabble with lab experiments.

When it was time to apply for a teaching job, List sent out 150 applications. The response was, shall we say, muted. He did land a job at the University of Central Florida, in Orlando, where he took on a heavy teaching load and also coached the men’s and women’s waterskiing teams. He was a blue-collar economist if ever there was one. He was still writing paper after paper and running lots of experiments; his water-skiers even qualified for the national championships.

After a few years, List was invited to join Vernon Smith, the godfather of economic lab experiments, at the University of Arizona. The job would pay $63,000, considerably more than his UCF salary. Out of loyalty, List presented the offer to his dean, expecting UCF to at least match the offer.

“For $63,000,” he was told, “we think we can replace you.”

His stay at Arizona was brief, for he was soon recruited by the University of Maryland. While teaching there, he also served on the President’s Council of Economic Advisors; List was the lone economist on a forty-two-person U.S. delegation to India to help negotiate the Kyoto Protocol.

He was by now firmly at the center of experimental economics, a field that had never been hotter. In 2002, the Nobel Prize for economics was shared by Vernon Smith and Daniel Kahneman, a psychologist whose research on decision-making laid the groundwork for behavioral economics. These men and others of their generation had built a canon of research that fundamentally challenged the status quo of classical economics, and List was following firmly in their footsteps, running variants of Dictator and other behavioralist lab games.

But since his days at Stevens Point, he had also been conducting quirky field experiments—studies where the participants didn’t know an experiment was going on—and found that the lab findings didn’t always hold up in the real world. (Economists are known to admire theoretical proofs; thus the old quip: Sure, it works in practice, but does it work in theory?)

Some of his most interesting experiments took place at a baseball-card show in Virginia. List had been attending such shows for years. As an undergrad, he sold sports cards to earn cash, driving as far as Des Moines, Chicago, or Minneapolis, wherever there was a good market.

In Virginia, List cruised the trading floor and randomly recruited customers and dealers, asking them to step into a back room for an economics experiment. It went like this. A customer would state how much he was willing to pay for a single baseball card, choosing from one of five prices that List established. These offers ranged from lowball ($4) to premium ($50). Then the dealer would give the customer a card that was supposed to correspond to the offered price. Every customer and dealer did five such transactions, though with a different partner for each round.

When the customer has to name his price first—like the white men who visit Chicago street prostitutes—the dealer is plainly in a position to cheat, by giving a card that’s worth less than the offer. The dealer is also in a better position to know each card’s true worth. But the buyers had some leverage, too: if they thought the sellers would cheat, they could simply make a lowball offer each round.

So what happened? On average, the customers made fairly high offers and the dealers offered cards of commensurate value. This suggests that the buyers trusted the sellers and the buyers’ trust was rewarded fairly.

This didn’t surprise List. He had simply demonstrated that the results you get in a lab with college students could be replicated outside the lab with sport-card traders, at least when the participants know a researcher is carefully recording their actions.

Then he ran a different experiment, out on the real trading floor. Once again, he recruited random customers. But this time he had them approach dealers at their booths, and the dealers didn’t know they were being watched.

The protocol was simple. A customer would make a dealer one of two offers: “Give me the best Frank Thomas card you can for $20” or “Give me the best Frank Thomas card you can for $65.”

What happened?

Unlike their scrupulous behavior in the back room, the dealers consistently ripped off the customers, giving them lower-quality cards than the offer warranted. This was true for both the $20 offer and the $65 offer. In the data, List found an interesting split: the out-of-town dealers cheated more often than the locals. This made sense. A local dealer was probably more concerned with protecting his reputation. He might even have been worried about retribution—a baseball bat upside the head, perhaps, after a customer went home, got online, and found out he’d been hustled.

The trade-floor cheating made List wonder if perhaps all the “trust” and “fairness” he’d witnessed in the back room weren’t trust and fairness at all. What if they were just a product of the experimenter’s scrutiny? And what if the same was true for altruism?

The lab findings didn’t always hold up in the real world. (Economists are known to admire theoretical proofs; thus the old quip: Sure, it works in practice, but does it work in theory?)

Despite all the lab evidence of altruism collected by his peers and elders, List was skeptical. His own field experiments pointed in a different direction, as did his personal experience. Back when he was nineteen years old, he delivered a load of paper goods to Chicago. His girlfriend, Jennifer, came along for the ride. (They’d later marry and have five kids.) When they got to the warehouse, four men were in the loading bay, sitting on a couch. It was the dead of summer and punishingly hot. One man said they were on break.

List asked how long the break would last.
In 2005, thanks largely to his field experiments, List was offered a tenured professor position at the University of Chicago, perhaps the most storied economics program in the world. This wasn’t supposed to happen. It is a nearly inexorable law of academia that when a professor lands a tenured job, he does so at an institution less prestigious than the one where he began teaching, and also less prestigious than where he received his Ph.D.

John List, meanwhile, was like a salmon who swam downstream to spawn, into the open water. Back in Wisconsin, his family was unimpressed. “They wonder why I’ve failed so miserably,” he says, “why I’m not still in Orlando, where the weather is really great, instead of Chicago, where the crime is really high.”

By now he knew the literature on altruism experiments as well as anyone. And he knew the real world a bit better. “What is puzzling,” he wrote, “is that neither I nor any of my family or friends (or their families or friends) have ever received an anonymous envelope stuffed with cash. How can this be, given that scores of students around the world have outwardly exhibited their preferences for giving in laboratory experiments by sending anonymous cash gifts to anonymous souls?”

So List set out to definitively determine if people are altruistic by nature. His weapon of choice was Dictator, the same tool that created the conventional wisdom. But List had a few modifications up his sleeve. This meant recruiting a whole bunch of student volunteers and running a few different versions of the experiment.

He began with classic Dictator. The first player (whom we’ll call Annika once again) was given some cash and had to decide whether to give none, some, or even all of it to some anonymous Zelda. List found that 70 percent of the Annikas gave some money to Zelda, and the average “donation” was about 25 percent of the total. This result was perfectly in line with the typical Dictator findings, and perfectly consistent with altruism.

In the second version, List gave Annika another option: she could still give Zelda any amount of her money but, if she preferred, she could instead take $1 from Zelda. If the dictators were altruistic, this tweak to the game shouldn’t matter at all; it should only affect the people who otherwise would have given nothing. All List did was expand the dictator’s “choice set” in a way that was irrelevant for all but the stingiest of players.

But only 35 percent of the Annikas in this modified, steal-a-dollar-if-you-want version gave any money to Zelda. That was just half the number who gave in the original Dictator. Nearly 45 percent, meanwhile, didn’t give a penny, while the remaining 20 percent took a dollar from Zelda.

Hey, what happened to all the altruism?

But List didn’t stop there. In the third version, Annika was told that Zelda had been given the same amount of money that she, Annika, was given. And Annika could steal Zelda’s entire payment—or, if she preferred, she could give Zelda any portion of her own money.

What happened? Now only 10 percent of the Annikas gave Zelda any money, while more than 60 percent of the Annikas took from Zelda. More than 40 percent of the Annikas took all of Zelda’s money. Under List’s guidance, a band of altruists had suddenly—and quite easily—been turned into a gang of thieves.

The fourth and final version of List’s experiment was identical to the third—the dictator could steal the other player’s entire pile of money—but with one simple twist. Instead of being handed some money to play the game, as is standard in such lab experiments, Annika and Zelda first had to work for it. (List needed some envelopes stuffed for another experiment, and with limited research funds he was killing two birds with one stone.)

After they worked, it was time to play. Annika still had the option of taking all of Zelda’s money, as more than 60 percent of the Annikas did in the previous version. But now, with both players having earned their money, only 28 percent of the Annikas took from Zelda. Fully two-thirds of the Annikas neither gave nor took a penny.

So what had John List done, and what does it mean?

He upended the conventional wisdom on altruism by introducing new elements to a clever lab experiment to make it look a bit more like the real world. If your only option in the lab is to give away some money, you probably will. But in the real world, that is rarely your only option. The final version of his experiment, with the envelope-stuffing, was perhaps most compelling. It suggests that when a person comes into some money honestly and believes that another person has done the same, she neither gives away what she earned nor takes what doesn’t belong to her.

But what about all the prizewinning behavioral economists who had identified altruism in the wild?

“I think it’s pretty clear that most people are misinterpreting their data,” List says. “To me, these experiments put the knife in it. It’s certainly not altruism we’ve been seeing.”

List had painstakingly worked his way up from truck driver’s son to the center of an elite group of scholars who were rewriting the rules of economic behavior. Now, in order to stay true to his scientific principles, he had to betray them. As word of his findings began to trickle out, he suddenly became, as he puts it, “clearly the most hated guy in the field.”

List can at least be consoled by knowing that he is almost certainly correct. Let’s consider some of the forces that make such lab stories unbelievable.

The first is selection bias. Think back to the tricky nature of doctor report cards. The best cardiologist in town probably attracts the sickest and most desperate patients. So if you’re keeping score solely by death rate, that doctor may get a failing grade even though he is excellent.

Similarly, are the people who volunteer to play Dictator more cooperative than average? Quite likely yes. Scholars long before John List pointed out that behavioral experiments in a college lab are “the science of just those sophomores who volunteer to participate in research and who also keep their appointment with the investigator.” Moreover, such volunteers tend to be “scientific do-gooders” who “typically have...[a] higher need for approval and lower authoritarianism than non-volunteers.”

Or maybe, if you’re not a do-gooder, you simply don’t participate in this kind of experiment. That’s what List observed during his baseball-
altruism was required for someone to have called the police from the safety of his or her home. That's why the same question—how could those
aren't "good" or "bad." People are people, and they respond to incentives. They can nearly always be manipulated—for good
it is—and, importantly, what it's not.
Consider Iran the most forward-thinking nation in the world, but surely some credit should go to the only country that has recognized altruism for what
kidney transplant does not have to go on a waiting list. The demand for transplantable kidneys is being fully met. The average American may not
be performed this year. This gap grows larger every year. More than 50,000 people on the list have died over the past twenty years, with at least

When you look at the world through the eyes of an economist like John List, you realize that many seemingly altruistic acts no longer seem so altruistic.

It may appear altruistic when you donate $100 to your local public-radio station, but in exchange you get a year of guilt-free listening (and, if
you're lucky, a canvas tote bag). U.S. citizens are easily the world's leaders in per-capita charitable contributions, but the U.S. tax code is among
the most generous in allowing deductions for those contributions.

Most giving is, as economists call it, impute altruism or warm-glow altruism. You give not only because you want to help but because it
makes you look good, or feel good, or perhaps feel less bad.

Consider the panhandler. Gary Becker once wrote that most people who give money to panhandlers do so only because "the unpleasant
appearance or persuasive appeal of beggars makes them feel uncomfortable or guilty." That's why people often cross the street to avoid a
panhandler but rarely cross over to visit one.

What the heck, you decide, I'll give away a few of my dollars. But even a cockeyed optimist wouldn't call that altruism.

Because the lab context is unavoidable artificial. As one academic researcher wrote more than a century ago, lab experiments have the power to turn a person into "a stupid automaton" who may exhibit a "cheerful willingness to assist the investigator in every possible way by reporting to him those very things which he is most eager to find." The psychiatrist Martin Orne warned that the lab encouraged what might best be called forced cooperation. "Just about any request which could conceivably be asked of the subject by a reputable investigator," he wrote, "is legitimized by the quasi-magical phrase "This is an experiment.'"

It isn't that the Dictator participants didn't behave in context. They did. But the lab context is unavoidably artificial. As one academic
researcher wrote more than a century ago, lab experiments have the power to turn a person into "a stupid automaton" who may exhibit a "cheerful willingness to assist the investigator in every possible way by reporting to him those very things which he is most eager to find." The psychiatrist Martin Orne warned that the lab encouraged what might best be called forced cooperation. "Just about any request which could conceivably be asked of the subject by a reputable investigator," he wrote, "is legitimized by the quasi-magical phrase "This is an experiment.'"

Ome's point was borne out rather spectacularly by at least two infamous lab experiments. In a 1961–62 study designed to understand why
Nazi officers obeyed their superiors' brutal orders, the Yale psychologist Stanley Milgram got volunteers to follow his instructions and administer a
series of increasingly painful electric shocks—at least they thought the shocks were painful; the whole thing was a setup—to unseen lab partners. In
1971, the Stanford psychologist Philip Zimbardo conducted a prison experiment, with some volunteers playing guards and others playing inmates.
The guards started behaving so sadistically that Zimbardo had to shut down the experiment.

When you consider what Zimbardo and Milgram got their lab volunteers to do, it is no wonder that the esteemed researchers who ran the
Dictator game, with its innocuous goal of transferring a few dollars from one undergrad to another, could, as List puts it, "induce almost any level of
giving they desire."

So are human beings capable of generous, selfless, even heroic behavior? Absolutely. Are they also capable of heartless acts of apathy?
Absolutely.
The foundation for nearly everything ever written or said about Genovese’s murder was that provocative New York Times article, which wasn’t published until two weeks after the crime. It had been conceived at a lunch between two men: A.M. Rosenthal, the paper’s metro editor, and Michael Joseph Murphy, the city’s police commissioner.

Genovese’s killer, Winston Moseley, was already under arrest and had confessed to the crime. The story wasn’t big news, especially in the Times. It was just another murder, way out in Queens, not the kind of thing the paper of record gave much space.

Strangely, though, Moseley also confessed to a second murder even though the police had already arrested a different man for that crime. “What about that double confession out in Queens?” Rosenthal asked Murphy at lunch. “What’s that story all about anyway?”

Instead of answering, Murphy changed the subject. “That Queens story is something else,” he said, and then told Rosenthal that thirty-eight people had watched Kitty Genovese be murdered without calling the police.

“Thirty-eight?” Rosenthal asked.

“Yes, thirty-eight,” Murphy said, “I’ve been in this business a long time, but this beats everything.”

Rosenthal, as he later wrote, “was sure that the Commissioner was exaggerating.” If so, Murphy may have had sufficient incentive. A story about two men arrested for the same murder clearly had the potential to embarrass the police. Furthermore, given the prolonged and brutal nature of the Genovese murder, the police may have been touchy about who caught the blame. Why hadn’t they been able to stop it?

Despite Rosenthal’s skepticism, he sent Martin Gansberg, a longtime copy editor who’d recently become a reporter, to Kew Gardens. Four days later, one of the most indelible first sentences in newspaper history appeared on the Times’s front page:

For more than half an hour 38 respectable, law-abiding citizens in Queens watched a killer stalk and stab a woman in three separate attacks in Kew Gardens.

For a brand-new reporter like Gansberg and an ambitious editor like Rosenthal—he later wrote a book, Thirty-Eight Witnesses, about the case and became the Times’s top editor—it was an unqualified blockbuster. It isn’t often that a pair of lowly newspapermen can tell a tale that will set the public agenda, for decades hence, on a topic as heady as civic apathy. So they certainly had strong incentives to tell the story.

But was it true?

The best person to answer that question may be Joseph De May Jr., a sixty-year-old maritime lawyer who lives in Kew Gardens. He has an open face, thinning black hair, hazel eyes, and a hearty disposition. On a brisk Sunday morning not long ago, he gave us a tour of the neighborhood.

“Now the first attack occurred roughly in here,” he said, pausing on the sidewalk in front of a small shop on Austin Street. “And Kitty parked her car over there, in the train station parking lot,” he said, gesturing to an area perhaps thirty-five yards away.

The neighborhood has changed little since the crime. The buildings, streets, sidewalks, and parking areas remain as they were. The Mowbray, a well-kept brick apartment house, still stands across the street from the scene of the first attack.

De May moved to the neighborhood in 1974, a decade after Genovese was killed. The murder wasn’t something he thought about much. Several years ago, De May, a member of the local historical society, built a website devoted to Kew Gardens history. After a time, he felt he should add a section about the Genovese murder, since it was the only reason Kew Gardens was known to the outside world, if it was known at all.

As he gathered old photographs and news clippings, he began to find discrepancies with the official Genovese history. The more intently he reconstructed the crime, chasing down legal documents and interviewing old-timers, the more convinced he became that the legendary story of the thirty-eight apathetic witnesses was—well, a bit too heavy on legend. Like the lawyer he is, De May dissected the Times article and identified six factual errors in the first paragraph alone.

The legend held that thirty-eight people “remained at their windows in fascination” and “watched a killer stalk and stab a woman in three separate attacks” but “not one person telephoned the police during the assault.”

The real story, according to De May, went more like this:

The first attack occurred at about 3:20 A.M., when most people were asleep. Genovese cried out for help when Moseley stabbed her in the back. This awoke some Mowbray tenants, who rushed to their windows.

The sidewalk was not well lit, so it may have been hard to make sense of what was happening. As Moseley later testified, “[I] was late at night and I was pretty sure that nobody could see that well out of the window.” What someone likely would have seen at that point was a man standing over a woman on the ground.

At least one Mowbray tenant, a man, shouted out the window: “Leave that girl alone!” This prompted Moseley to run back to his car, which was parked less than a block away. “I could see that she had gotten up and wasn’t dead,” Moseley testified. He backed his car down the street, he said, to obscure his license plate.

Genovese struggled to her feet and slowly made her way around to the back of the building, toward her apartment’s entrance. But she didn’t make it all the way, collapsing inside the vestibule of a neighboring apartment.

Roughly ten minutes after the first attack, Moseley returned. It is unclear how he tracked her, but he may have followed a trail of blood. He attacked her again inside the vestibule, then fled for good.

The Times article, as with most crime articles, especially of that era, relied heavily on information given by the police. At first the police said Moseley attacked Genovese three separate times, so that is what the newspaper published. But only two attacks occurred. (The police eventually corrected this but, as in a game of Telephone, the error took on a life of its own.)

So the first attack, which was brief, occurred in the middle of the night on a darkened sidewalk. And the second attack occurred some time later, in an enclosed vestibule, out of view of anyone who might have seen the first attack.

Who, then, were “the thirty-eight witnesses”?

That number, also supplied by the police, was apparently a whopping overstatement. “We only found half a dozen that saw what was going
on, that we could use," one of the prosecutors later recalled. This included one neighbor who, according to De May, may have witnessed part of the second attack, but was apparently so drunk that he was reluctant to phone the police.

But still: even if the murder was not a bloody and prolonged spectacle that took place in full view of dozens of neighbors, why didn’t anyone call the police for help?

Even that part of the legend may be false. When De May’s website went live, one reader who found it was named Mike Hoffman. He was just shy of fifteen years old when Genovese was murdered, and he lived on the Mowbray’s second floor.

As Hoffman recalls, he was awakened by a commotion on the street. He opened his bedroom window but still couldn’t make out what was being said. He thought perhaps it was a lovers’ quarrel and, more angry than concerned, he ‘yelled for them to ’Shut the fuck up!’”

Hoffman says he heard other people shouting, and when he looked out the window, he saw a man run away. To keep the man in view, Hoffman went to the other window in his room, but the figure faded into the darkness. Hoffman returned to the first window and saw a woman on the sidewalk stagger to her feet. “That’s when my dad came in my room and yelled at me for yelling and waking him up.”

Hoffman told his father what happened. “This guy just beat up a lady and ran away!” Hoffman and his father watched as the woman, walking with great difficulty, rounded the corner. Then everything was quiet. “Dad called the police in case she was hurt badly and needed medical attention,” Hoffman says. “In those days, there was no 9–1–1. We had to dial the operator and wait for the eventual connection to the police operator. It took several minutes to get connected to the police and my father told them what we had seen and heard, and that she did walk away but appeared dazed. At that point we couldn’t see or hear anything else and we all went back to sleep.”

It wasn’t until morning that the Hoffmans found out what happened. “We were interviewed by detectives and learned that she had went around the back of the building across the street, and the guy came back to finish her off,” Hoffman says. “I remember my dad saying to them that if they had come when we called them, she’d probably still be alive.”

Hoffman believes the police response was slow because the situation his father described was not a murder in progress but rather a domestic disturbance—which, by the looks of it, had concluded. The attacker had fled and the victim had walked off, if shakily, under her own power. With a low-priority call like that, Hoffman says, “the cops don’t put down the donuts as fast as if it were to come across as a homicide call.”

The police acknowledged that someone did call after the second attack, in the vestibule, and they arrived shortly thereafter. But Hoffman believes their response may have been based on his father’s original call. Or, perhaps, there was more than one call: Joseph De May has heard from other Mowbray tenants who claim to have phoned the police after the first attack.

It is hard to say how reliable Hoffman’s memory of the events may be. (He did write and sign an affidavit of his recollections.) It is also hard to say if De May’s revisionist history is fully accurate. (To his credit, he points out that “an undetermined number of ear witnesses reacted badly” that night, and perhaps could have done more to help; he is also reluctant to cast himself as the infallible source on all things Genovese.)

De May and Hoffman both have an incentive to exonerate their neighborhood from the black eye the Genovese murder gave it. That said, De May strives hard to not be an apologist, and Hoffman seems to be a pretty good witness—a man who, now in his late fifties and living in Florida, spent twenty years as a New York City policeman and retired as a lieutenant.

Now, considering the various incentives at play, which is more unbelievable: the De May–Hoffman version of events or the conventional wisdom that a whole neighborhood of people stood around and watched, refusing to help, as a man murdered a woman?

Before you answer, consider also the circumstances under which Winston Moseley was ultimately arrested. It happened a few days after the Genovese murder. At about three o’clock in the afternoon in Corona, another Queens neighborhood, Moseley was seen carrying a television out of a home belonging to a family named Bannister and loading it into his car.

A neighbor approached and asked what he was doing. Moseley said he was helping the Bannisters move. The neighbor went back in his house and phoned another neighbor to ask if the Bannisters were really moving.

“Absolutely not,” said the second neighbor. He called the police while the first neighbor went back outside and loosened the distributor cap on Moseley’s car.

When Moseley returned to his car and found it wouldn’t start, he fled on foot but was soon chased down by a policeman. Under interrogation, he freely admitted to killing Kitty Genovese a few nights earlier.

Which means that a man who became infamous because he murdered a woman whose neighbors failed to intervene was ultimately captured because of…a neighbor’s intervention.
It is a fact of life that people love to complain, particularly about how terrible the modern world is compared with the past. They are nearly always wrong. On just about any dimension you can think of—warfare, crime, income, education, transportation, worker safety, health—the twenty-first century is far more hospitable to the average human than any earlier time.

Consider childbirth. In industrialized nations, the current rate of maternal death during childbirth is 9 women per 100,000 births. Just one hundred years ago, the rate was more than fifty times higher.

One of the gravest threats of childbearing was a condition known as puerperal fever, which was often fatal to both mother and child. During the 1840s, some of the best hospitals in Europe—the London General Lying-in Hospital, the Paris Maternité, the Dresden Maternity Hospital—were plagued by it. Women would arrive healthy at the hospital to deliver a baby and then, shortly thereafter, contract a raging fever and die.

Perhaps the finest hospital at the time was the Allgemeine Krankenhaus, or General Hospital, in Vienna. Between 1841 and 1846, doctors there delivered more than 20,000 babies; nearly 2,000 of the mothers, or 1 of every 10, died. In 1847, the situation worsened: 1 of every 6 mothers died from puerperal fever.

That was the year Ignatz Semmelweis, a young Hungarian-born doctor, became assistant to the director of Vienna General’s maternity clinic. Semmelweis was a sensitive man, very much attuned to the suffering of others, and he was so distraught by the rampant loss of life that he became obsessed with stopping it.

Unlike many sensitive people, Semmelweis was able to put aside emotion and focus on the facts, known and unknown.

The first smart thing he did was acknowledge that doctors really had no idea what caused puerperal fever. They might say they knew, but the exorbitant death rate argued otherwise. A look back at the suspected causes of the fever reveals an array of wild guesses:

- “[M]isconduct in the early part of pregnancy, such as tight stays and petticoat bindings, which, together with the weight of the uterus, detain the faeces in the intestines, the thin putrid parts of which are taken up into the blood.”
- “[A]n atmosphere, a miasma, or…by milk metastasis, lochial suppression, cosmo-telluric influences, personal predisposition…”
- Foul air in the delivery wards.
- The presence of male doctors, which perhaps “wounded the modesty of parturient mothers, leading to the pathological change.”
- “Catching a chill, errors in diet, rising in the labor room too soon after delivery in order to walk back to bed.”

It is interesting to note that the women were generally held to blame. This may have had something to do with the fact that all doctors at the time were male. Although nineteenth-century medicine may seem primitive today, doctors were considered nearly godlike in their wisdom and authority. And yet puerperal fever presented a troubling contradiction: when women delivered babies at home with a midwife, as was still common, they were at least sixty times less likely to die of puerperal fever than if they delivered in a hospital.

How could it be more dangerous to have a baby in a modern hospital with the best-trained doctors than on a lumpy mattress at home with a village midwife?

To solve this puzzle, Semmelweis became a data detective. Gathering statistics on the death rate at his own hospital, he discovered a bizarre pattern. The hospital had two separate wards, one staffed by male doctors and trainees, the other by female midwives and trainees. There was a huge gap between the two wards’ death rates:
Why on earth was the death rate in the doctors’ ward more than twice as high? Semmelweis wondered if the women patients admitted to the doctors’ ward were sicker, weaker, or in some other way compromised.

No, that couldn’t be it. Patients were assigned to the wards in alternating twenty-four-hour cycles, depending on the day of the week they arrived. Given the nature of pregnancy, an expectant mother came to the hospital when it was time to have the baby, not on a day that was convenient. This assignment methodology wasn’t quite as rigorous as a randomized, controlled trial, but for Semmelweis’s purpose it did suggest that the divergent death rates weren’t the result of a difference in patient populations.

So perhaps one of the wild guesses listed above was correct: did the very presence of men in such a delicate feminine enterprise somehow kill the mothers?

Semmelweis concluded that this too was improbable. After examining the death rate for newborns in the two wards, he again found that the doctors’ ward was far more lethal than the midwives’: 7.6 percent versus 3.7 percent. Nor was there any difference in the death rate of male babies versus females. As Semmelweis noted, it was unlikely that newborns would “be offended by having been delivered in the presence of men.” So it was unreasonable to suspect that male presence was responsible for the mothers’ deaths.

There was also a theory that patients admitted to the doctors’ ward, having heard of its high death rate, were “so frightened that they contract the disease.” Semmelweis didn’t buy this explanation either: “We can assume that many soldiers engaged in murderous battle must also fear death. However, these soldiers do not contract childbed fever.”

No, some other factor unique to the doctors’ ward had to figure in the fever. Semmelweis had by now established a few facts:

- Even the poorest women who delivered their babies on the street and then came to the hospital did not get the fever.
- Women who were dilated for more than twenty-four hours “almost invariably became ill.”
- Doctors did not contract the disease from the women or newborns, so it was almost certainly not contagious.

Still, he remained puzzled. “Everything was in question; everything seemed inexplicable; everything was doubtful,” he wrote. “Only the large number of deaths was an unquestionable reality.”

The answer finally came to him in the wake of a tragedy. An older professor whom Semmelweis admired died quite suddenly after a mishap. He had been leading a student through an autopsy when the student’s knife slipped and cut the professor’s finger. The maladies he suffered before dying—bilateral pleurisy, pericarditis, peritonitis, and meningitis—were, Semmelweis observed, “identical to that from which so many hundred maternity patients had also died.”

The professor’s case held little mystery. He died from “cadaverous particles that were introduced into his vascular system,” Semmelweis noted. Were the dying women also getting such particles in their bloodstream?

Of course!

In recent years, Vienna General and other first-rate teaching hospitals had become increasingly devoted to understanding anatomy. The ultimate teaching tool was the autopsy. What better way for a medical student to limn the contours of illness than to hold in his hands the failed organs, to sift for clues in the blood and urine and bile? At Vienna General, every single deceased patient—including the women who died of puerperal fever—was taken directly to the autopsy room.

But doctors and students often went to the maternity ward straight from the autopsy table with, at best, a cursory cleansing of their hands. Although it would be another decade or two before the medical community accepted germ theory—which established that many diseases are caused by living microorganisms and not animal spirits or stale air or too-tight corsets—Semmelweis understood what was going on. It was the doctors who were responsible for puerperal fever, transferring “cadaverous particles” from the dead bodies to the women giving birth.

This explained why the death rate in the doctors’ ward was so much higher than in the midwives’ ward. It also explained why women in the doctors’ ward died more often than women who gave birth at home or even in the streets, and why women in a longer state of dilation were more susceptible to the fever: the longer a woman lay in that state, the more often her uterus was poked and prodded by a gaggle of doctors and medical students, their hands still dripping with the remnants of their latest autopsy.
The whale was especially beloved by the finer sex, surrendering its body parts for corsets, collars, parasols, perfume, hairbrushes, and red fabric dye. The manufacture of paint and varnish; textiles and leather; candles and soap; clothing and of course food (the tongue was a particular delicacy).

Or consider the whale. Hunted since antiquity, by the nineteenth century it had become an economic engine that helped turn the United States into a powerhouse. Every square inch of it could be turned into something, so the whale afforded one-stop shopping for a fast-growing nation: material for the manufacture of paint and varnish; textiles and leather; candles and soap; clothing and of course food (the tongue was a particular delicacy). The whale was especially beloved by the finer sex, surrendering its body parts for corsets, collars, parasols, perfume, hairbrushes, and red fabric dye.
Out of a worldwide fleet of 900 whaling ships, 735 of them were American, hunting in all four oceans. Between 1835 and 1872, these ships reaped nearly 300,000 whales, an average of more than 7,700 a year. In a good year, the total take from oil and baleen (the whale's bonelike "teeth") exceeded $10 million, today's equivalent of roughly $200 million. Whaling was dangerous and difficult work, but it was the fifth-largest industry in the United States, employing 70,000 people.

And then what appeared to be an inexhaustible resource was—quite suddenly and, in retrospect, quite obviously—heading toward exhaustion. Too many ships were hunting for too few whales. A ship that once took a year at sea to fill its hold with whale oil now needed four years. Oil prices spiked accordingly, rocking the economy back home. Today, such an industry might be considered "too big to fail," but the whaling industry was failing indeed, with grim repercussions for all America.

That's when a retired railway man named Edwin L. Drake, using a steam engine to power a drill through seventy feet of shale and bedrock, struck oil in Titusville, Pennsylvania. The future bubbled to the surface. Why risk life and limb chasing underwater leviathans around the world, having to catch and carve them up, when so much energy was just waiting, in the nation's basement, to be pumped upstairs?

Oil was not only a cheap and simple fix but, like the whale, extraordinarily versatile. It could be used as lamp oil, a lubricant, and as a fuel for automobiles and home heating; it could be made into plastic and even nylon stockings. The new oil industry also provided lots of jobs for unemployed whalers and, as a bonus, functioned as the original Endangered Species Act, saving the whale from near-certain extinction.

By the early twentieth century, most infectious diseases—smallpox, tuberculosis, diphtheria, and the like—were on their way out. But polio refused to surrender.

It would be hard to invent a more frightening illness. "It was a children's disease; there was no prevention; there was no cure; every child everywhere was at risk," says David M. Oshinsky, author of the Pulitzer Prize–winning Polio: An American Story. "And what this really meant was that parents were absolutely frantic."

Polio was also a great mystery, spiking in summertime, its cause unknown. (In a classic case of mistaking correlation and causality, some researchers suspected that ice cream—consumed in far greater quantities in the summer—caused polio.) It was first thought to target immigrant slum children, especially boys, but it struck girls too, as well as kids in the leafiest suburbs. Even Franklin Delano Roosevelt, who was far removed from immigrant slums and, at thirty-nine, from childhood as well, contracted the disease.

Every outbreak prompted a new round of quarantines and panic. Parents kept their kids away from friends, from pools and parks and libraries. In 1916, the worst polio epidemic to date struck New York City. Out of 8,900 reported cases, 2,400 people died, most of them children under five. The disease roared on. Ninety-five-two was the worst year yet, with 57,000 reported cases nationwide, 3,000 of them fatal and 21,000 resulting in permanent paralysis.

Surviving a bad case of polio was only marginally better than dying. Some victims lost the use of their legs and lived in constant pain. Those with respiratory paralysis practically lived inside an "iron lung," a huge tank that did the work of their failed chest muscles. As the population of living polio victims grew, the cost of their medical care was staggering. "At a time when less than ten percent of the nation's families had any form of health insurance," Oshinsky writes, "the expense of boarding a polio patient (about $900 a year) actually exceeded the average annual wage ($875)."

America was by now the most powerful country on earth, the victor in two world wars, possessor of a blindingly bright future. But there was legitimate concern that this single disease would consume such a large share of future health-care dollars that it would cripple the nation.

And then a vaccine was developed—a series of vaccines, really—and polio was effectively stamped out.

To call the vaccine a "simple" fix might seem to discount the tireless efforts of everyone who helped stop polio: the medical researchers (Jonas Salk and Albert Sabin chief among them); the fund-raising volunteers (the March of Dimes, Oshinsky writes, was "the largest charitable army the country had ever known"); even the non-human martyrs (thousands of monkeys were imported to be given experimental vaccines).

On the other hand, there is no simpler medical fix than a vaccine. Consider two of the major ways we try to thwart disease. The first is to invent a procedure or technology that helps fix a problem once it's arisen (open-heart surgery, for instance); these tend to be very costly. The second is to invent a medicine to prevent the problem before it happens; in the long run, these tend to be extraordinarily cheap. Health-care researchers have estimated that if a polio vaccine hadn't been invented, the United States would currently be caring for at least 250,000 long-term patients at an annual cost of at least $30 billion. And that doesn't even include "the intangible costs of suffering and death and of averted fear."

Polio is a stark example, but there are countless cheap and simple medical fixes. New ulcer drugs reduced the rate of surgery by roughly 60 percent; a later round of even cheaper drugs saved ulcer patients some $800 million a year. In the first twenty-five years after lithium was introduced ($875)."
This was no coincidence. He studied economics at Berkeley and went on to the Harvard Business School, where he stayed on as a young professor of accounting. McNamara volunteered when World War II broke out, and his analytical skills landed him in the Statistical Control Office of the Army Air Forces.

His team used data as a weapon to fight the war. For example, the abort rate among American bombers leaving England for daytime sorties over Germany was found to be unnaturally high, about 20 percent. The pilots gave a variety of explanations for failing to reach the target: a malfunctioning electrical system, a spotty radio, or illness. But a closer analysis of the data led McNamara to conclude that these reasons were “baloney.” The real explanation, he said, was fear. “A helluva lot of them were going to be killed, they knew that, and they found reasons to not go over the target.”

McNamara reported this to the commanding officer, the notoriously headstrong Curtis LeMay, who responded by flying the lead plane on bombing missions and vowing to court-martial any pilot who turned back. The abort rate, McNamara says, “dropped overnight.”

After the war, the Ford Motor Company asked McNamara and others from his unit to bring their statistical wizardry to the auto industry. McNamara wanted to return to Harvard, but he and his wife had both racked up huge medical bills—from polio, of all things. So he took the job at Ford. He quickly rose through the ranks even though he wasn’t a “car guy” in any traditional sense. “Instead,” as one historian later wrote, “he was absorbed by such novel concepts as safety, fuel economy, and basic utility.”

McNamara was particularly concerned with the deaths and injuries from automobile accidents. He asked the car guys what caused the problem. There were few statistics available, he was told.

Some aeronautical researchers at Cornell were trying to prevent airplane deaths, so McNamara commissioned them to look into auto crashes. They experimented by wrapping human skulls in different materials and dropping them down the stairwells in Cornell’s dormitories. It turned out that human beings were no match for the hard materials used in car interiors. “In a crash, the driver was often impaled on the steering wheel,” McNamara says. “The passenger was often injured because he’d hit the windshield or the header bar or the instrument panel.” McNamara ordered new Ford models to have a safer steering wheel and a padded instrument panel.

But the best fix, he realized, was also the simplest one. Rather than worrying about what a passenger’s head would hit when he was flung about during an accident, wouldn’t it be better to keep him from being flung at all? McNamara knew that airplanes had seat belts; why not cars?

“I calculated the number of deaths we’d prevent each year, which was very high,” he says. “And this came at essentially no cost, with no great penalty for wearing them.”

McNamara had all of Ford's company cars outfitted with seat belts. “I flew down to visit an assembly plant in Texas,” he recalls. "The manager met me at the plane. I buckled my seat belt, and he said, ‘What’s the matter, you afraid of my driving?’"

That manager, it turned out, reflected a widespread sentiment about seat belts. McNamara’s bosses saw them as “inconvenient, costly, and just a bunch of damn nonsense,” he says. Even so, they followed his lead and put seat belts in the new Ford models.

McNamara was of course right: the seat belt would eventually save many lives. But the key word here is “eventually.”

The brilliant rationalist had encountered a central, frustrating tenet of human nature: behavior change is hard. The cleverest engineer or economist or politician or parent may come up with a cheap, simple solution to a problem, but if it requires people to change their behavior, it may not work. Every day, billions of people around the world engage in behaviors they know are bad for them—smoking cigarettes, gambling excessively, riding a motorcycle without a helmet.

Why? Because they want to! They derive pleasure from it, or a thrill, or just a break from the daily humdrum. And getting them to change their behavior, even with a fiercely rational argument, isn’t easy.

And so it was with the seat belt. Congress began setting federal safety standards in the mid-1960s, but even fifteen years later, seat belt use was laughably low: just 11 percent. Over time, the numbers crept upward, thanks to a variety of nudges: the threat of a traffic ticket; expansive public-awareness campaigns; annoying beeps and flashing dashboard lights if the belt wasn’t buckled; and, eventually, a societal acceptance that wearing a seat belt wasn’t an insult to anyone’s driving ability. Seat-belt use rose to 21 percent by the mid-1980s, 49 percent by 1990, 61 percent by the mid-1990s, and today it is over 80 percent.

That’s a big reason the per-mile auto fatality rate has fallen so much in the United States. Seat belts reduce the risk of death by as much as 70 percent; since 1975 they have saved roughly 250,000 lives. Traffic fatalities still claim more than 40,000 lives a year, but relatively speaking, driving isn’t all that dangerous anymore. What makes the death toll so high is that so many Americans spend an enormous amount of time in their cars, racking up some 3 trillion miles per year. That translates into one death for every 75 million miles driven—or, put another way, if you drove 24 hours a day at 30 miles per hour, you could expect to die in a car accident only after driving for 285 straight years. Compared with the death rates in many countries in Africa, Asia, and the Middle East, where seat-belt use is far less prevalent, driving in the United States isn’t much more dangerous than sitting on your couch.

And seat belts, at about $25 a pop, are one of the most cost-effective lifesaving devices ever invented. In a given year, it costs roughly $500 million to put them in every U.S. vehicle, which yields a rough estimate of $30,000 for every life saved. How does this compare with a far more complex safety feature like air bags? At an annual U.S. price of more than $4 billion, air bags cost about $1.8 million per life saved.

Robert McNamara, who recently passed away at the age of ninety-three, told us shortly before his death that he still wanted to get to 100 percent compliance on seat belts. “A lot of women often don’t use the shoulder belt because they’re uncomfortable, they’re not designed to take account of the breasts,” he said. “I think with very little thought, belts could be designed that are more comfortable and therefore increase the percentage of use.”

He may or may not be right about women and seat belts. But without doubt there is one group of people for whom seat belts are poorly designed: children.

Sometimes it pays to be low status. When a family of four goes for a drive, the kids usually get shunted to the backseat while the mom or dad rides shotgun. The kids are luckier than they know: in the event of a crash, the backseat is far safer than the front. This is even truer for adults, who are larger and therefore more likely to smash into something hard when they sit up front. Unfortunately, while it’s okay to consign the low-status kids to the shotgun. The kids are luckier than they know: in the event of a crash, the backseat is far safer than the front. This is even truer for adults, who are larger and therefore more likely to smash into something hard when they sit up front.

While it’s okay to consign the low-status kids to the backseat, they should still be strapped in. The child safety seat, commonly known as a car seat, was introduced in the 1960s, it was first embraced by only the most vigilant parents. Thanks to the advocacy of doctors, traffic-safety experts, and
frightening bang. In real time, you couldn’t see much (except that, to our relief, the seat-belted dummy remained in one piece). But watching
and besides, if we put one of his expensive dummies in a lap-and-shoulder belt, the impact would probably rip it to pieces.

duty heard the particulars of our test, he refused to participate. It was an idiotic experiment, he said:

told us we couldn’t name the lab, however, out of concern he might lose work from the car-seat manufacturers that were the core of his business.

rarely, if ever, run parallel tests on child-sized crash-test dummies. So we decided to do it ourselves.

But who cares if car seats aren’t so simple or cheap? Not every solution can be as elegant as we might like. Isn’t it worth a police officer
nothing. That makes sense. A car crash is a violent affair, and a lot of terrible things can happen to a mass of flesh and bone when it is

It turns out that a child in a car seat is 54 percent less likely to die than a child riding completely unrestrained—that is, with no car seat, no
But how much better is the complicated and costly new solution (the car seat) than the cheap and simple old solution (the seat belt), even

Seat belts plainly won’t do for children under two years old. They are simply too small, and a car seat is the best practical way to secure

A quick look at the raw FARS data from nearly thirty years of crashes reveals a surprising result. For children two and older, the rate of
deadly crashes involving at least one fatality is almost identical for those riding in car seats and those wearing seat belts:

<table>
<thead>
<tr>
<th>MODE OF RESTRAINT</th>
<th>INCIDENTS</th>
<th>DEATHS</th>
<th>CHILD’S DEATH RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHILD SAFETY SEAT</td>
<td>6,835</td>
<td>1,241</td>
<td>18.2%</td>
</tr>
<tr>
<td>ADULT SEAT BELT</td>
<td>9,664</td>
<td>1,750</td>
<td>18.1%</td>
</tr>
</tbody>
</table>

It may be that these raw data are misleading. Perhaps kids who ride in car seats are in more violent crashes. Or maybe their parents drive
more at night, or on more dangerous roads, or in less-safe vehicles?

But even the most rigorous econometric analysis of the FARS data yields the same results. In recent crashes and old ones, in vehicles large
in single-car crashes and pileups, there is no evidence that car seats are better than seat belts in saving the lives of children two and

certain kinds of crashes—rear-enders, for instance—car seats actually perform slightly worse.

So maybe the problem is, as NHTSA admits, that too many car seats are installed improperly. (You might argue that a forty-year-old safety
device that only 20 percent of its users can install correctly may not be a great safety device to begin with; compared with car seats, the condoms
worn by Indian men seem practically infallible.) Could it be that the car seat is a miracle device but that we just haven’t learned to use it properly?

To answer this, we sought out crash-test data for a side-by-side comparison of seat belts and car seats. You wouldn’t think this would be
hard to find. After all, every car seat brought to the market must undergo crash testing to gain federal approval. But it appears that researchers have
rarely, if ever, run parallel tests on child-sized crash-test dummies. So we decided to do it ourselves.

The idea was simple: we would commission two crash tests, one with a three-year-old-sized dummy in a car seat versus a three-year-old
dummy in a lap-and-shoulder belt, the other with a six-year-old-sized dummy in a booster seat versus a six-year-old dummy in a lap-and-shoulder belt.

We had a hard time finding a crash-test lab that would do our tests, even though we were willing to pay the $3,000 fee. (Hey, science
doesn’t come cheap.) After being turned down by what felt like every facility in America, we finally found one willing to take our money. Its director
told us we couldn’t name the lab, however, out of concern he might lose work from the car-seat manufacturers that were the core of his business.

But, he said, he was “a fan of science,” and he too wanted to know how things would turn out.

After flying in to this undisclosed location, we bought some new car seats at a Toys “R” Us and drove to the lab. But once the engineer on
duty heard the particulars of our test, he refused to participate. It was an idiotic experiment, he said: of course the car seats would perform better—and
and besides, if we put one of his expensive dummies in a lap-and-shoulder belt, the impact would probably rip it to pieces.

It seemed odd to worry over the health of a crash-test dummy—aren’t they made to be crashed?—but once we agreed to reimburse the lab
if the seat-belted dummy was damaged, the engineer got to work, grumbling under his breath.

The lab conditions guaranteed that the car seats would perform optimally. They were strapped to old-fashioned bench-style rear seats,
give a flush fit, by an experienced crash-test engineer who was presumably far better at securing a car seat than the average parent.

The chore was gruesome, from start to finish. Each dummy, dressed in shorts, T-shirt, and sneakers, had a skein of wires snaking out of
its body to measure head and chest damage.

First came the pair of three-year-olds, one in a car seat and the other in a lap-and-shoulder belt. The pneumatic sled was fired with
frightening bang. In real time, you couldn’t see much (except that, to our relief, the seat-belted dummy remained in one piece). But watching the
couple of degrees. But it's enough to discourage hur

The temperature change isn't drastic, just a

The irony is that many of these homeowners were lured to
tropical cyclones). In the United States, the carnage has been lighter—roughly 20,000 deaths—but the financial losses have been steep, averaging

Some problems, meanwhile, seem beyond the reach of any solution, simple or otherwise. Think of the devastation Mother Nature regularly dishes

On all crashes. One was a nationally representative database and two were from individual states, New Jersey and Wisconsin. Together, they cover

The FARS data set won't work because it covers only fatal accidents. We did, however, locate three other data sets that contain information

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From the mid-1960s until the mid-1990s, hurricane activity was depressed by the Atlantic Multidecadal Oscillation, a long-recurring climate

Why so much damage of late? More people have been moving to hurricane-prone areas (it's nice to live near the ocean, after all), and a lot

Alas, governments aren't exactly famous for cheap or simple solutions; they tend to prefer the costly-and-cumbersome route. Note that none

Or, looking at it another way, maybe that’s the greatest
cost of car seats. They give parents a misplaced sense of security, a belief they’ve
done everything possible to protect their children. This complacency keeps us from striving for a better solution, one that may well be simpler and

doing anything to ensure the safety of all children who travel in cars. Do you really think the best solution is to begin with a device optimized for adults and use it to strap down some second, child-sized contraption? Would you really stipulate that

Some problems, meanwhile, seem beyond the reach of any solution, simple or otherwise. Think of the devastation Mother Nature regularly dishes

But for more minor injuries, car seats did a better job, reducing the likelihood of injury by roughly 25 percent compared with seat belts.

So don’t go throwing out your car seats just yet. (That would be illegal in all fifty states.) Children are such valuable cargo that even the

What does an analysis of these data reveal?

For preventing serious injury, lap-and-shoulder belts once again performed as well as child safety seats for children aged two through six.

The FARS data set won't work because it covers only fatal accidents. We did, however, locate three other data sets that contain information

In some regards, hurricanes wouldn't seem to be such a hard problem to solve. Unlike other problems—cancer, for instance—their cause is
well established, their location is predictable, and even their timing is known. Atlantic hurricanes generally strike between August 15 and November 15. They travel westward through "Hurricane Alley," a horizontal stretch of ocean running from the west coast of Africa through the Caribbean and into the southeastern United States. And they are essentially heat engines, massive storms created when the topmost layer of ocean water edges above a certain temperature (80 degrees Fahrenheit, or 26.7 degrees Celsius). That's why they start forming only toward summer's end, after the sun has had a few months to warm up the ocean.

And yet for all their predictability, hurricanes represent a battle that humans seem to have lost. By the time a hurricane forms, there’s really no way to fight it. All you can do is run away.

But outside of Seattle lives an intellectually venturesome fellow named Nathan who believes, along with some friends, that they’ve got a good hurricane solution. Nathan has a physics background, which is key, because that means he understands the thermal properties that define a hurricane. A hurricane isn’t just a dynamo; it’s a dynamo that comes without an “off” switch. Once it’s begun amassing energy it cannot be shut down, and it’s far too powerful to be blown back out to sea with a big fan.

That’s why Nathan and his friends—most of whom are, like him, science geeks of some sort—want to dissipate the thermal energy before it has a chance to accumulate. In other words: prevent the water in Hurricane Alley from getting warm enough to form a destructive hurricane in the first place. Armies sometimes engage in a “scorched earth” policy, destroying anything that might be of value to the enemy. Nathan and his friends want to practice a “chilled ocean” policy to keep the enemy from destroying anything of value.

But, one might be tempted to ask, doesn’t this constitute playing with Mother Nature? "Of course it’s playing with Mother Nature!" Nathan cackles. "You say that like it’s a bad thing!"

Indeed, if we hadn’t played with Mother Nature by using ammonium nitrate to raise our crop yields, many readers of this book probably wouldn’t exist today. (Or they would at least be too busy to read, spending all day scouring for roots and berries.) Stopping polio was also a form of playing with Mother Nature. As are the levees we use to control hurricane flooding—even if, as in Hurricane Katrina, they sometimes fail.

The anti-hurricane solution Nathan proposes is so simple that a Boy Scout might have dreamt it up (a very clever one, at least). It can be built with materials bought at a Home Depot, or maybe even fetched from the dump.

"The trick is to modify the surface temperature of the water," Nathan says. "Now the interesting thing is that the surface layer of warm water is very thin, often less than 100 feet. And right beneath it is a bulk of very cold water. If you’re skin-diving in many of these areas, you can feel the huge difference."

The warm surface layer is lighter than the cold water beneath, and therefore stays on the surface. "So what we need to do is fix that," he says.

It is a tantalizing puzzle—all that cold water, trillions upon trillions of gallons, lying just beneath the warm surface and yet impotent to defuse the potential disaster.

But Nathan has a solution. It is basically “an inner tube with a skirt,” he says with a laugh. That is, a large floating ring, anywhere from thirty to three hundred feet across, with a long flexible cylinder affixed to the inside. The ring might be made from old truck tires, filled with foamed concrete and lashed together with steel cable. The cylinder, extending perhaps six hundred feet deep into the ocean, could be fashioned from polyethylene, aka the plastic used in shopping bags.

“That’s it!” Nathan crows.

How does it work? Imagine one of these skirted inner tubes—a giant, funky, man-made jellyfish—floating in the ocean. As a warm wave splashes over the top, the water level inside the ring rises until it is higher than the surrounding ocean. “When you have water elevated above the surface in a tube like that,” Nathan explains, “it’s called ‘hydraulic head.’”

Hydraulic head is a force, created by the energy put into the waves by wind. This force would push the warm surface water down into the long plastic cylinder, ultimately flushing it out at the bottom, far beneath the surface. As long as the waves keep coming—and they always do—the hydraulic head’s force would keep pushing surface water into the cooler depths, which inevitably lowers the ocean’s surface temperature. The process is low-impact, non-polluting, and slow: a molecule of warm surface water would take about three hours to be flushed out the bottom of the plastic cylinder.

Now imagine deploying these floats en masse in the patches of ocean where hurricanes grow. Nathan envisions “a picket fence” of them between Cuba and the Yucatán and another skein off the southeastern seaboard of the United States. They’d also be valuable in the South China Sea and in the Coral Sea off the coast of Australia. How many would be needed? Depending on their size, a few thousand floats might be able to stop hurricanes in the Caribbean and the Gulf of Mexico.

A simple throwaway version of this contraption could be built for roughly $100 apiece, although the larger costs would come in towing and anchoring the floats. There’s also the possibility of more durable and sophisticated versions, remote-controlled units that could be relocated to where they are most needed. A “smart” version could even adjust the rate at which it cools the surface water by varying the volume of warm water it takes in.

The most expensive float Nathan envisions would cost $100,000. Even at that price, allocating 10,000 of them around the world would cost just $1 billion—or one-tenth the amount of hurricane property damage incurred in a single year in the United States alone. As Ignatz Semmelweis learned about hand-washing and as millions of heart patients learned about cheap pills like aspirin and statins, an ounce of prevention can be worth a few tons of cure.

Nathan isn’t yet sure the float will work. For months it has been undergoing intense computer modeling; soon it will be tried out in real water. But all indications are that he and his friends have invented a hurricane killer.

Even if it were capable of eliminating tropical storms entirely, that wouldn’t be wise, since storms are part of the natural climate cycle and deliver much-needed rainfall to land. The real value comes from cooling down a Category 5 storm into a less destructive one. “You might be able to manipulate the monsoon rain cycle in tropical areas,” Nathan enthuses, “and smooth out the boom-or-bust nature of rainfall in the Sahel in Africa, aiming to prevent starvation.”

The float might also improve the ocean’s ecology. As surface water heats up each summer, it becomes depleted of oxygen and nutrients, creating a dead zone. Flushing the warm water downward would bring rich, oxygenated cold water to the surface, which ought to substantially enhance sea life. (The same effect can be seen today around offshore oil platforms.) The float might also help sink some of the excess carbon dioxide that has been absorbed by the ocean’s surface in recent decades.

There remains, of course, the question of how, and by whom, these floats would be deployed. The Department of Homeland Security recently solicited hurricane-mitigation ideas from various scientists, including Nathan and his friends. Although such agencies rarely opt for cheap and simple solutions—it simply isn’t in their DNA—perhaps an exception will be made in this case, for the potential upside is large and the harm in trying seems minimal.

As dangerous as hurricanes are, there looms within the realm of nature a far larger problem, one that threatens to end civilization as we
know it: global warming. If only Nathan and his friends, such smart and creative thinkers who aren’t afraid of simple solutions, could do something about that...
WHAT DO AL GORE AND MOUNT PINATUBO HAVE IN COMMON?

The headlines have been harrowing, to say the least.

“Some experts believe that mankind is on the threshold of a new pattern of adverse global climate for which it is ill-prepared,” one New York Times article declared. It quoted climate researchers who argued that “this climatic change poses a threat to the people of the world.”

A Newsweek article, citing a National Academy of Sciences report, warned that climate change “would force economic and social adjustments on a worldwide scale.” Worse yet, “climatologists are pessimistic that political leaders will take any positive action to compensate for the climatic change or even to allay its effects.”

Who in his or her right mind wouldn’t be scared of global warming?

But that’s not what these scientists were talking about. These articles, published in the mid-1970s, were predicting the effects of global cooling.

Alarm bells had rung because the average ground temperature in the Northern Hemisphere had fallen by .5 degrees Fahrenheit (.28 degrees Celsius) from 1945 to 1968. Furthermore, there had been a large increase in snow cover and, between 1964 and 1972, a decrease of 1.3 percent in the amount of sunshine hitting the United States. Newsweek reported that the temperature decline, while relatively small in absolute terms, “has taken the planet about a sixth of the way toward the Ice Age average.”

The big fear was a collapse of the agricultural system. In Britain, cooling had already shortened the growing season by two weeks. “[T]he resulting famines could be catastrophic,” warned the Newsweek article. Some scientists proposed radical warming solutions such as “melting the arctic ice cap by covering it with black soot.”

These days, of course, the threat is the opposite. The earth is no longer thought to be too cool but rather too warm. And black soot, rather than saving us, is seen as a chief villain. We have cast endless streams of carbon emissions skyward, the residue of all the fossil fuels we burn to heat and cool and feed and transport and entertain ourselves.

By so doing, we have apparently turned our tender planet into a greenhouse, fashioning in the sky a chemical scrim that traps too much of the sun’s warmth and prevents it from escaping back into space. The “global cooling” phase notwithstanding, the average global ground temperature over the past hundred years has risen 1.3 degrees Fahrenheit (.7 degrees Celsius), and this warming has accelerated of late.

There is essentially a consensus among climate scientists that the earth’s temperature has been rising and, increasingly, agreement that human activity has played an important role. But the ways humans affect the climate aren’t always as obvious as they seem.

It is generally believed that cars and trucks and airplanes contribute an ungodly share of greenhouse gases. This has recently led many right-minded people to buy a Prius or other hybrid car. But every time a Prius owner drives to the grocery store, she may be canceling out its emission-reducing benefit, at least if she shops in the meat section.

How so? Because cows—as well as sheep and other cud-chewing animals called ruminants—are wicked polluters. Their exhalation and flatulence and belching and manure emit methane, which by one common measure is about twenty-five times more potent as a greenhouse gas than the carbon dioxide released by cars (and, by the way, humans). The world’s ruminants are responsible for about 50 percent more greenhouse gas than the entire transportation sector.

Even the “locavore” movement, which encourages people to eat locally grown food, doesn’t help in this regard. A recent study by two Carnegie Mellon researchers, Christopher Weber and H. Scott Matthews, found that buying locally produced food actually increases greenhouse-gas emissions. Why?

More than 80 percent of the emissions associated with food are in the production phase, and big farms are far more efficient than small farms. Transportation represents only 11 percent of food emissions, with delivery from producer to retailer representing only 4 percent. The best way to help, Weber and Matthews suggest, is to subtly change your diet. “Shifting less than one day per week’s worth of calories from red meat and dairy products to chicken, fish, eggs, or a vegetable-based diet achieves more greenhouse-gas reduction than buying all locally sourced food,” they write.

You could also switch from eating beef to eating kangaroo—because kangaroo farts, as fate would have it, don’t contain methane. But just imagine the marketing campaign that would be needed to get Americans to take up ‘roo-burgers. And think how hard the cattle ranchers would lobby Washington to ban kangaroo meat. Fortunately, a team of Australian scientists is attacking this problem from the opposite direction, trying to replicate the digestive bacteria in kangaroos’ stomachs so it can be transplanted to cows.

For a variety of reasons, global warming is a uniquely thorny problem.

First, climate scientists can’t run experiments. In this regard, they are more like economists than physicists or biologists, their goal being to tease out relationships from existing data without the ability to, say, invoke a ten-year ban on cars (or cows).

Second, the science is extraordinarily complex. The impact of any single human activity—let’s pretend we tripled the number of airplane flights, for instance—depends on many different factors: the gases emitted, yes, but also how the planes affect things like convection and cloud formation.

To predict global surface temperatures, one must take into account these and many other factors, including evaporation, rainfall, and, yes, animal emissions. But even the most sophisticated climate models don’t do a very good job of representing such variables, and that obviously makes predicting the climatic future very difficult. By comparison, the risk models used by modern financial institutions seem quite reliable—but, as
The imprecision inherent in climate science means we don’t know with any certainty whether our current path will lead temperatures to rise two degrees or ten degrees. Nor do we really know if even a steep rise means an inconvenience or the end of civilization as we know it.

It is this specter of catastrophe, no matter how remote, that has propelled global warming to the forefront of public policy. If we were certain that warming would impose large and defined costs, the economics of the problem would come down to a simple cost-benefit analysis. Do the future benefits from cutting emissions outweigh the costs of doing so? Or are we better off waiting to cut emissions later—or even, perhaps, polluting at will and just learning to live in a hotter world?

The economist Martin Weitzman analyzed the best available climate models and concluded the future holds a 5 percent chance of a terrible-case scenario—a rise of more than 10 degrees Celsius.

There is of course great uncertainty even in this estimate of uncertainty. So how should we place a value on this relatively small chance of worldwide catastrophe?

The economist Nicholas Stern, who prepared an encyclopedic report on global warming for the British government, suggested we spend 1.5 percent of global gross domestic product each year—that would be a $1.2 trillion bill as of today—to attack the problem.

But as most economists know, people are generally unwilling to spend a lot of money to avert a future problem, especially when its likelihood is so uncertain. One good reason for waiting is that we might have options in the future to avert the problem that cost far less than today’s options.

Although economists are trained to be cold-blooded enough to sit around and calmly discuss the trade-offs involved in global catastrophe, the rest of us are a bit more excitable. And most people respond to uncertainty with more emotion—fear, blame, paralysis—than might be advisable. Uncertainty also has a nasty way of making us conjure up the very worst possibilities. (Think about the last time you heard a bump in the night outside your bedroom door.) With global warming, the worst possibilities are downright biblical: rising seas, hellish temperatures, plaque upon plague, a planet in chaos.

It is understandable, therefore, that the movement to stop global warming has taken on the feel of a religion. The core belief is that humankind inherited a pristine Eden, has sinned greatly by polluting it, and must now suffer lest we all perish in a fiery apocalypse. James Lovelock, who might be considered a high priest of this religion, writes in a confessional language that would feel at home in any liturgy: “[W]e misused energy and overpopulated the Earth…[I]t is much too late for sustainable development; what we need is a sustainable retreat.”

A “sustainable retreat” sounds a bit like wearing a sackcloth. To citizens of the developed world in particular, this would mean consuming less, using less, driving less—and, though it’s uncouth to say it aloud, learning to live with a gradual depopulation of the earth.

If the modern conservation movement has a patron saint, it is surely Al Gore, the former vice president and recent Nobel laureate. His documentary film *An Inconvenient Truth* hammered home for millions the dangers of overconsumption. He has since founded the Alliance for Climate Protection, which describes itself as “an unprecedented mass persuasion exercise.” Its centerpiece is a $300 million public-service campaign called “We,” which urges Americans to change their profligate ways.

Any religion, meanwhile, has its heretics, and global warming is no exception. Boris Johnson, a classically educated journalist who managed to become mayor of London, has read Lovelock—he calls him a “sacerdotal figure”—and concluded the following: “Like all the best religions, fear of climate change satisfies our need for guilt, and self-disgust, and that eternal human sense that technological progress must be punished by the gods. And the fear of climate change is like a religion in this vital sense, that it is veiled in mystery, and you can never tell whether your acts of propitiation or atonement have been in any way successful.”

So while the true believers bemoan the desecration of our earthly Eden, the heretics point out that this Eden, long before humans arrived, once became so naturally thick with methane smog that it was rendered nearly lifeless. When Al Gore urges the citizenry to sacrifice their plastic shopping bags, their air-conditioning, their extraneous travel, the agnostics grumble that human activity accounts for just 2 percent of global carbon-dioxide emissions, with the remainder generated by natural processes like plant decay.

Once you strip away the religious fervor and scientific complexity, an incredibly simple dilemma lies at the heart of global warming. Economists fondly call it an *externality*.

What’s an externality? It’s what happens when someone takes an action but someone else, without agreeing, pays some or all of the costs of that action. An externality is an economic version of taxation without representation.

If you happen to live downwind from a fertilizer factory, the ammonium stench is an externality. When your neighbors throw a big party (and don’t have the courtesy to invite you), their ruckus is an externality. Secondhand cigarette smoke is an externality, as is the stray gunshot one drug dealer meant for another that instead hit a child on the playground.

The greenhouse gases thought to be responsible for global warming are primarily externalities. When you have a bonfire in your backyard, you’re not just toasting marshmallows. You’re also emitting gases that, in a tiny way, help to heat the whole planet. Every time you get behind the wheel of a car, or eat a hamburger, or fly in an airplane, you are generating some by-products you’re not paying for.

Imagine a fellow named Jack who lives in a lovely house—he built it himself—and comes home from work on the first warm day of summer. All he wants is to relax and cool off. So he cranks the air conditioner all the way up. Maybe he thinks for a moment about the extra dollar or two he’ll pay on his next electricity bill, but the cost isn’t enough to deter him.

What he *doesn’t* think about is the black smoke from the power plant that burns the coal that heats the water that turns to steam that fills the turbine that spins the generator that makes the power that cools the house that Jack built.

Nor will he think about the environmental costs associated with mining and trucking away that coal, or the associated dangers. In the United States alone, more than 100,000 coal miners died on the job over the past century, with another estimated 200,000 dying later from black lung disease. Now *those* are externalities. Thankfully, coalmining deaths have plummeted in the United States, to a current average of about 36 per year. But if Jack happened to live in China, the local death externality would be much steeper: at least 3,000 Chinese coal miners die on the job each year.

It’s hard to blame Jack for not thinking about externalities. Modern technology is so proficient that it often masks the costs associated with our consumption. There’s nothing visibly dirty about the electricity that feeds Jack’s air conditioner. It just magically appears, as if out of a fairy tale. If there were only a few Jacks in the world, or even a few million, no one would care. But as the global population huddles toward 7 billion, all those externalities add up. So who should be paying for them?

In principle, this shouldn’t be such a hard problem. If we knew how much it cost humankind every time someone used a tank of gas, we could simply levy a tax of that magnitude on the driver. The tax wouldn’t necessarily convince him to cancel his trip, nor should it. The point of the tax is to make sure the driver faces the full costs of his actions (or, in economist-speak, to *internalize the externality*).
The revenues raised from these taxes could then be spread out across the folks who suffer the effects of a changing climate—people living in Bangladeshi lowlands, for instance, who will be flooded if the oceans rise precipitously. If we chose exactly the right tax, the revenues could properly compensate the victims of climate change.

But when it comes to actually solving climate-change externalities through taxes, all we can say is good luck. Besides the obvious obstacles—like determining the right size of the tax and getting someone to collect it—there’s the fact that greenhouse gases do not adhere to national boundaries. The earth’s atmosphere is in constant, complex motion, which means that your emissions become mine and mine yours. Thus, global warming.

If, say, Australia decided overnight to eliminate its carbon emissions, that fine nation wouldn’t enjoy the benefits of its costly and painful behavior unless everyone else joined in. Nor does one nation have the right to tell another what to do. The United States has in recent years sporadically attempted to lower its emissions. But when it leaned on China or India to do the same, those countries can hardly be blamed for saying, Hey, you got to free-your ride to industrial superpowerdom, so why shouldn’t we?

When people aren’t compelled to pay the full cost of their actions, they have little incentive to change their behavior. Back when the world’s big cities were choked with horse manure, people didn’t switch to the car because it was good for society; they switched because it was in their economic interest to do so. Today, people are being asked to change their behavior not out of self-interest but rather out of selflessness. This might make global warming seem like a hopeless problem unless—and this is what Al Gore is banking on—people are willing to put aside their self-interest and do the right thing even if it’s personally costly. Gore is appealing to our altruistic selves, our externality-hating better angels.

Keep in mind that externalities aren’t always as obvious as they seem.

To keep their cars from being stolen off the street, a lot of people lock the steering wheel with an anti-theft device like the Club. The Club is big and highly visible (it even comes in neon pink). By using a Club, you are explicitly telling a potential thief that your car will be hard to steal. The implicit signal, meanwhile, is that your neighbor’s car—the one without a Club—is a much better target. So your Club produces a negative externality for your non-Club-using neighbor in the form of a higher risk that his car will be stolen. The Club is a perfect exercise in self-interest.

A device called LoJack, meanwhile, is in many ways the opposite of the Club. It is a small radio transmitter, not much larger than a deck of cards, hidden somewhere in or beneath the car where a thief can’t see it. But if the car is stolen, the police can remotely activate the transmitter and follow its signal straight to the car.

Unlike the Club, LoJack doesn’t stop a thief from stealing your car. So why bother installing it?

For one, it helps you recover the car, and fast. When it comes to auto theft, fast is important. Once your car has been missing more than a few days, you generally don’t want it back, because it likely will have been stripped. Even if you don’t want your car to be found, your insurance company does. So a second reason to install LoJack is that insurers will discount your premium. But perhaps the best reason is that LoJack actually makes it fun to have your car stolen.

There’s a certain thrill to tracking a LoJack-equipped car, as if the hounds have just been released. The police spring into action, follow the radio signal, and nab the car thief before he knows what’s happening. If you’re lucky, he may even have filled up the gas tank for you.

Most stolen cars end up in chop shops, clandestine mini-factories that remove the car’s most valuable parts and scrap the remains. The police have a hard time rooting out these operations—until, that is, LoJack comes around. Now the police simply follow the radio signal and, often, find the chop shop.

The people who run chop shops aren’t stupid, of course. Once they realize what’s happening, they change their procedure. The thief, rather than driving the car straight to the shop, will leave it in a parking lot for a few days. If the car is gone when he returns, he knows it had LoJack. If not, he assumes it’s safe to deliver it to the chop shop.

But the police aren’t stupid either. When they find a stolen car in a parking lot, they may choose not to reclaim it right away. Instead, they watch the vehicle until the theft returns and let him lead them to the chop shop.

Just how difficult has LoJack made life for auto thieves?

For every additional percentage point of cars that have LoJack in a given city, overall thefts fall by as much as 20 percent. Since a thief can’t tell which cars have LoJack, he’s less willing to take a chance on any car. LoJack is relatively expensive, about $700, which means it isn’t all that popular, installed in fewer than 2 percent of new cars. Even so, those cars create a rare and wonderful thing—a positive externality—for all the drivers who are too cheap to buy LoJack, because it protects their cars too.

That’s right: not all externalities are negative. Good public schools create positive externalities because we all benefit from a society of well-educated people. (They also drive up property values.) Fruit farmers and beekeepers create positive externalities for each other: the trees provide free pollen for the bees and the bees pollinate the fruit trees, also at no charge. That’s why beekeepers and fruit farmers often set up shop next to each other.

One of the unlikeliest positive externalities on record came cloaked in a natural disaster.

In 1991, an eroded, wooded mountain on the Philippine island of Luzon began to rumble and spew sulfuric ash. It turned out that beloved old Mount Pinatubo was a dormant volcano. The nearby farmers and townspeople were reluctant to evacuate, but the geologists, seismologists, and volcanologists who rushed in ultimately persuaded most of them to leave.

Good thing, too: on June 15, Pinatubo erupted for nine furious hours. The explosions were so massive that the top of the mountain caved in on itself, forming what is now a caldera, a huge bowl-shaped crater, its new peak 850 feet lower than the original mountaintop. Worse yet, the region was simultaneously being lashed by a typhoon. According to one account, the sky poured down “heavy rain and ash with pumice lumps the size of golf balls.” Around 250 people died, mainly from collapsed roofs, and more died in the following days from mudslides. Still, thanks to the scientists’ warnings, the death toll was relatively small.

Mount Pinatubo was active for two years. As the haze was settling out, the earth cooled off by an average of nearly 1 degree Fahrenheit, or .5 degrees Celsius. It was the cooling that got scientists’ attention. A paper in *Science* concluded that a Pinatubo-size eruption every few years would “offset much of the anthropogenic warming expected over the next century.”
In a nondescript section of Bellevue, Washington, a suburb of Seattle, lies a particularly nondescript series of buildings. There’s a heating-and-air-conditioning company, a boat maker, a shop that fabricates marble tiles, and another building that used to be a Harley-Davidson repair shop. This last one is a windowless, charmless structure of about twenty thousand square feet whose occupant is identified only by a sheet of paper taped to the glass door. It reads “Intellectual Ventures.”

Inside is one of the most unusual laboratories in the world. There are lathes and mold makers and 3D printers and many powerful computers, of course, but there is also an insectary where mosquitoes are bred so they can be placed in an empty fish tank and, from more than a hundred feet away, assassinated by a laser. This experiment is designed to thwart malaria. The disease is spread only by certain species of female mosquito, so the laser’s tracking system identifies the females by wing-beat frequency—they flap more slowly than males because they are heavier—and zaps them.

Intellectual Ventures is an invention company. The lab, in addition to all the gear, is stocked with an elite assemblage of brainpower, scientists and puzzle-solvers of every variety. They dream up processes and products and then file patent applications, more than five hundred a year. The company also acquires patents from outside inventors, ranging from Fortune 500 companies to solo geniuses toiling in basements. IV operates much like a private-equity firm, raising investment capital and paying returns when its patents are licensed. The company currently controls more than twenty thousand patents, more than all but a few dozen companies in the world. This has led to some grumbling that IV is a “patent troll,” accumulating patents so it can extort money from other companies, via lawsuit if necessary. But there is little hard evidence for such claims. A more realistic assessment is that IV has created the first mass market for intellectual property.

Its ringleader is a gregarious man named Nathan, the same Nathan we met earlier, the one who hopes to enfeeble hurricanes by seeding the ocean with skirted truck tires. Yes, that apparatus is an IV invention. Internally it is known as the Salter Sink because it sinks warm surface water and was originally developed by Stephen Salter, a renowned British engineer who has been working for decades to harness the power of ocean waves.

By now it should be apparent that Nathan isn’t just some weekend inventor. He is Nathan Myhrvold, the former chief technology officer at Microsoft. He co-founded IV in 2000 with Edward Jung, a biophysicist who was Microsoft’s chief software architect. Myhrvold played a variety of roles at Microsoft: futurist, strategist, founder of its research lab, and whisperer-in-chief to Bill Gates. “I don’t know anyone I would say is smarter than Nathan,” Gates once observed.

Myhrvold, who is fifty years old, has been smart for a long time. Growing up in Seattle, he graduated from high school at fourteen and by the time he was twenty-three had earned, primarily at UCLA and Princeton, a bachelor’s degree (mathematics), two master’s degrees (geophysics/space physics and mathematical economics), and a Ph.D. (mathematical physics). He then went to Cambridge University to do quantum cosmology research with Stephen Hawking.

Myhrvold recalls watching the British science-fiction TV show Dr. Who when he was young: “The Doctor introduces himself to someone, who says, ‘Doctor? Are you some kind of scientist?’ And he says, ‘Sir, I am every kind of scientist.’ And I was, like, Yes! Yes! That is what I want to be: every kind of scientist!”

He is so polymathic as to make an everyday polymath tremble with shame. In addition to his scientific interests, he is an accomplished nature photographer, chef, mountain climber, and a collector of rare books, rocket engines, antique scientific instruments, and, especially, dinosaur bones: he is co-leader of a project that has dug up more T. rex skeletons than anyone else in the world. He is also—and this is hardly unrelated to his hobbies—very wealthy. In 1999, when he left Microsoft, he appeared on the Forbes list of the four hundred richest Americans.

At the same time—and this is how Myhrvold has managed to stay wealthy—he is famously cheap. As he walks through the IV lab pointing out his favorite tools and gadgets, his greatest pride is reserved for the items he bought on eBay or at bankruptcy sales. Though Myhrvold understands complexity as well as anyone, he is a firm believer that solutions should be cheap and simple whenever possible.

He and his compatriots are currently working on, among other projects: a better internal combustion engine; a way to reduce an airplane’s “skin drag” and thus increase its fuel efficiency; and a new kind of nuclear power plant that would radically improve the future of worldwide electricity production. Although many of their ideas are just that—ideas—some have already started saving lives. The company has invented a process whereby a neurosurgeon who is attempting to repair an aneurysm can send IV the patient’s brain-scan data, which are fed into a 3D printer that produces a life-size plastic model of the aneurysm. The model is shipped overnight to the surgeon, who can make a detailed plan to attack the aneurysm before cutting through the patient’s skull.

It takes a healthy dose of collective arrogance for a small group of scientists and engineers to think they could simultaneously tackle many of the world’s toughest problems. Fortunately, these folks have the requisite amount. They have already sent satellites to the moon, helped defend the United States against missile attack and, via computing advances, changed the way the world works. (Bill Gates is not only an investor in IV but an occasional inventor as well. The mosquito-zapping laser was a response to his philanthropic quest to eradicate malaria.) They have also conducted definitive scientific research in many fields, including climate science.

So it was only a matter of time before they began thinking about global warming. On the day we visited IV, Myhrvold convened roughly a dozen of his colleagues to talk about the problem and possible solutions. They sat around a long oval conference table, Myhrvold near one end.

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They are a roomful of wizards, and yet without doubt Myhrvold is their Harry Potter. For the next ten or so hours, fueled by an astonishing amount of diet soda, they prodded and amplified, interjected and challenged.

Everyone in the room agrees that the earth has been getting warmer and they generally suspect that human activity has something to do with it. But they also agree that the standard global-warming rhetoric in the media and political circles is oversimplified and exaggerated. Too many accounts, Myhrvold says, suffer from “people who get on their high horse and say that that our species will be exterminated.”

Does he believe this?

“Probably not.”

When An Inconvenient Truth is mentioned, the table erupts in a sea of groans. The film’s purpose, Myhrvold believes, was “to scare the crap out of people.” Although Al Gore “isn’t technically lying,” he says, some of the nightmare scenarios Gore describes—the state of Florida
yields a 70 percent increase in plant growth, an obvious boon to agricultural productivity.

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The soil as it gets carbon dioxide from the air, on a molecule-lost-per-molecule-gained basis. Most plants, especially during the active growing season, are water-stressed. They bleed very seriously to get their food.

The atmosphere is governed by the law of diminishing returns: each gigaton added to the air has less radiative impact than the previous one. Furthermore, atmospheric carbon dioxide is not the major greenhouse gas. The major greenhouse gas is water vapor.

So an increase in carbon dioxide means that plants require less water to grow. And what happens to productivity?

"Plants pay exceedingly dearly for carbon dioxide," Lowell Wood jumps in. "A plant has to raise about a hundred times as much water from the soil as it gets carbon dioxide from the air, on a molecule-lost-per-molecule-gained basis. Most plants, especially during the active part of the growing season, are water-stressed. They bleed very seriously to get their food."

So an increase in carbon dioxide means that plants require less water to grow. And what happens to productivity?

Caldeira's study showed that doubling the amount of carbon dioxide while holding steady all other inputs—water, nutrients, and so forth—yields a 70 percent increase in plant growth, an obvious boon to agricultural productivity.

"That's why most commercial hydroponic greenhouses have supplemental carbon dioxide," Myhrold says. "And they typically run at 1,400 parts per million."
“Twenty thousand years ago,” Caldeira says, “carbon-dioxide levels were lower, sea level was lower—and trees were in a near state of asphyxiation for lack of carbon dioxide. There’s nothing special about today’s carbon-dioxide level, or today’s sea level, or today’s temperature. What damages us are rapid rates of change. Overall, more carbon dioxide is probably a good thing for the biosphere—it’s just that it’s increasing too fast.”

The gentlemen of IV abound with further examples of global warming memes that are all wrong. Rising sea levels, for instance, “aren’t being driven primarily by glaciers melting,” Wood says, no matter how useful that image may be for environmental activists. The truth is far less sexy. “It is driven mostly by water-warming—literally, the thermal expansion of ocean water as it warms up.”

Sea levels are rising, Wood says—and have been for roughly twelve thousand years, since the end of the last ice age. The oceans are about 425 feet higher today, but the bulk of that rise occurred in the first thousand years. In the past century, the seas have risen less than eight inches.

As to the future: rather than the catastrophic thirty-foot rise some people have predicted over the next century—good-bye, Florida!—Wood notes that the most authoritative literature on the subject suggests a rise of about one and a half feet by 2100. That’s much less than the twice-daily tidal variation in most coastal locations. “So it’s a little bit difficult,” he says, “to understand what the purported crisis is about.”

Caldeira, with something of a pained look on his face, mentions a most surprising environmental scourge: trees. Yes, trees. As much as Caldeira personally lives the green life—his Stanford office is cooled by a misting water chamber rather than air-conditioning—his research has found that planting trees in certain locations actually exacerbates warming because comparatively dark leaves absorb more incoming sunlight than, say, grassy plains, sandy deserts, or snow-covered expanses.

Then there’s this little-discussed fact about global warming: while the drumbeat of doom has grown louder over the past several years, the average global temperature during that time has in fact decreased.

In the darkened conference room, Myhrvold cues up an overhead slide that summarizes IV’s views of the current slate of proposed global-warming solutions. The slide says:

- Too little
- Too late
- Too optimistic

Too little means that typical conservation efforts simply won’t make much of a difference. “If you believe there’s a problem worth solving,” Myhrvold says, “then these solutions won’t be enough to solve it. Wind power and most other alternative energy things are cute, but they don’t scale to a sufficient degree. At this point, wind farms are a government subsidy scheme, fundamentally.” What about the beloved Prius and other low-emission vehicles? “They’re great,” he says, “except that transportation is just not that big of a sector.”

Also, coal is so cheap that trying to generate electricity without it would be economic suicide, especially for developing countries. Myhrvold argues that cap-and-trade agreements, whereby coal emissions are limited by quota and cost, can’t help much, in part because it is already... Too late. The half-life of atmospheric carbon dioxide is roughly one hundred years, and some of it remains in the atmosphere for thousands of years. So even if humankind immediately stopped burning all fossil fuel, the existing carbon dioxide would remain in the atmosphere for several generations. Pretend the United States (and perhaps Europe) miraculously converted overnight and became zero-carbon societies. Then pretend they persuaded China (and perhaps India) to demolish every coal-burning power plant and diesel truck. As far as atmospheric carbon dioxide is concerned, it might not matter all that much. And by the way, that zero-carbon society you were dreamily thinking about is way... Too optimistic. “A lot of the things that people say would be a good thing probably aren’t,” Myhrvold says. As an example he points to solar power. “The problem with solar cells is that they’re black, because they are designed to absorb light from the sun. But only about 12 percent gets turned into electricity, and the rest is reradiated as heat—which contributes to global warming.”

Although a widespread conversion to solar power might seem appealing, the reality is tricky. The energy consumed by building the thousands of new solar plants necessary to replace coal-burning and other power plants would create a huge long-term “warming debt,” as Myhrvold calls it. “Eventually, we’d have a great carbon-free energy infrastructure but only after making emissions and global warming worse every year until we’re done building out the solar plants, which could take thirty to fifty years.”

This hardly means the energy problem should be dismissed. That’s why IV—along with inventors all over the world—are working toward the holy grail: cheaper and cleaner forms of energy.

But from an atmospheric perspective, energy represents what might be called the input dilemma. How about the output dilemma? What if the greenhouse gases we’ve already emitted do produce an ecological disaster?

Myhrvold is not blind to the possibility. He has probably thought about such scenarios in greater scientific detail than any climate doomsayer: a collapse of massive ice sheets in Greenland or Antarctica; a release of huge amounts of methane caused by the melting of arctic permafrost; and, as he describes it, “a breakdown of the thermohaline circulation system in the North Atlantic, which would put an end to the Gulf Stream.”

So what happens if the doomsayers turn out to be right? What if the earth is becoming dangerously warmer, whether because of our fossil-fuel profligacy or some natural climate cycle? We don’t really want to sit back and stew in our own juices, do we?

In 1980, when Myhrvold was a grad student at Princeton, Mount St. Helens erupted back home in Washington State. Even though he was nearly three thousand miles away, Myhrvold saw a thin layer of ash accumulating on his windowsill. “It’s hard not to think about volcanic dust when it’s raining down on your dorm room,” he says, “although to be honest, my room was messy in many other ways.”

Even as a kid, Myhrvold was fascinated by geophysical phenomena—volcanoes, sunspots, and the like—and their history of affecting the atmosphere.
The connection between volcanoes and climate is hardly a new idea. Another polymath, Benjamin Franklin, wrote what seems to be the first scientific paper on the topic. In “Meteorological Imagination and Conjectures,” published in 1784, Franklin posited that recent volcanic eruptions in Iceland had caused a particularly harsh winter and a cool summer with “constant fog over all Europe, and [a] great part of North America.” In 1815, the gargantuan eruption of Mount Tambora in Indonesia produced “The Year Without a Summer,” a worldwide disaster that killed crops, prompted widespread starvation and food riots, and brought snow to New England as late as June.

Volcanoes erupt all the time, all over the world, but truly “big-ass” ones are rare. If they weren’t—we, well, we probably wouldn’t be around to worry about global warming. The anthropologist Stanley Ambrose has argued that a supervolcanic explosion at Lake Toba on Sumatra, roughly seventy thousand years ago, blocked the sun so badly that it triggered an ice age that nearly wiped out Homo sapiens.

It wasn’t just the cooling potential of stratospheric sulfur dioxide that surprised Caldeira. It was how little was needed to do the job: about thirty-four gallons per minute, not much more than the amount of water that comes out of a heavy-duty garden hose.

Nathan Myhrvold was working at Microsoft then, but he still followed the scientific literature on geophysical phenomena. He took note of the Pinatubo climate effects and, one year later, a 900-page report from the National Academy of Sciences called Policy Implications of Greenhouse Warming. It included a chapter on geoengineering, which the NAS defined as “large-scale engineering of our environment in order to combat or counteract the effects of changes in atmospheric chemistry.”

But a big volcano shoots sulfur dioxide far higher, into the stratosphere. That’s the layer that begins at about seven miles above the earth’s surface, or six miles at the poles. Above that threshold altitude, there is a drastic change in a variety of atmospheric phenomena. The sulfur dioxide, rather than quickly returning to the earth’s surface, absorbs stratospheric water vapor and forms an aerosol cloud that circulates rapidly, blanketing most of the globe. In the stratosphere, sulfur dioxide can linger for a year or more, and will thereby affect the global climate.

That’s what happened in 1991 when Mount Pinatubo erupted in the Philippines. Pinatubo made Mount St. Helens look like a hiccup; it put more sulfur dioxide into the stratosphere than any volcano since Krakatoa, more than a century earlier. In the period between those two eruptions, the state of science had progressed considerably. A worldwide cadre of scientists was on watch at Pinatubo, equipped with modern technology to capture every measurable piece of data. The atmospheric aftereffects of Pinatubo were undeniable: a decrease in ozone, more diffuse sunlight, and, yes, a sustained drop in global temperature.

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What distinguishes a big-ass volcano isn’t just how much stuff it ejaculates, but where the ejaculate goes. The typical volcano sends sulfur dioxide into the troposphere, the atmospheric layer closest to the earth’s surface. This is similar to what a coal-burning power plant does with its sulfur emissions. In both cases, the gas stays in the sky only a week or so before falling back to the ground as acid rain, generally within a few hundred miles of its origin.

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Other people: if human activity is warming up the planet, could human ingenuity cool it down?

People have been trying to manipulate the weather forever. Just about every religion ever invented has a rain-making prayer. But secularists have stepped it up in recent decades. In the late 1940s, three General Electric scientists in Schenectady, New York, successfully seeded clouds with silver iodide. The trio included a chemist named Bernard VonNEGUT; the project’s public-relations man was his younger brother Kurt, who went on to become a world-class novelist—and in his writing, he used a good bit of the far-out science he picked up in Schenectady.

The 1992 NAS report gave a credibility boost to geoengineering, which until then had largely been seen as the province of crackpots and rogue governments. Still, some of the NAS proposals would have seemed outlandish even in a Vonnegut novel. A “multiple balloon screen,” for instance, was meant to deflect sunlight by launching billions of aluminized balloons into the sky. A “space mirror” scheme called for fifty-five thousand reflective sails to orbit high above the earth.

The NAS report also raised the possibility of intentionally spreading sulfur dioxide in the stratosphere. The idea was attributed to a Belarusian climate scientist named Mikhail Budynko. After Pinatubo, there was no doubt that stratospheric sulfur dioxide cooled the earth. But wouldn’t it be nice to have a way to rely on volcanoes to do the job?

Unfortunately, the proposals for getting sulfur dioxide into the stratosphere were complex, costly, and impractical. Loading up artillery shells, for instance, and firing them into the sky. Or launching a fleet of fighter jets with high-sulfur fuel and letting their exhaust paint the stratosphere. “It was more science fiction than science,” says Myhrvold. “None of the plans made any economic or practical sense.”

The other problem was that many scientists, particularly nature-friendly ones like Ken Caldeira, found the very idea abhorrent. Dump chemicals in the atmosphere to reverse the damage caused by…dumping chemicals in the atmosphere? It was a crazy, hair-of-the-dog scheme that seemed to violate every tenet of environmentalism. Those who saw global warming as a religious issue could hardly imagine a more grievous sacrilege.

But the best reason to reject the idea, Caldeira thought, was that it simply wouldn’t work.

That was his conclusion after hearing Lowell Wood give a lecture on stratospheric sulfur dioxide at a 1998 climate conference in Aspen. But being a scientist who prefers data to dogma—even if the environmental dogma in this case lay close to his heart—Caldeira ran a climate model to test Wood’s claims. "The intent," he says, "was to put an end to all the geoengineering talk."

He failed. As much as Caldeira disliked the concept, his model backed up Wood’s claims that geoengineering could stabilize the climate even in the face of a large spike in atmospheric carbon dioxide, and he wrote a paper saying so. Caldeira, the most reluctant geoengineer imaginable, became a convert—willing, at least, to explore the idea.

Which is how it comes to pass that, more than ten years later, Caldeira, Wood, and Myhrvold—the onetime peacenik, the onetime weapons architect, and the onetime Viking fanboy—are huddled together in a former Harley-Davidson repair shop showing off their scheme to stop global warming.

It wasn’t just the cooling potential of stratospheric sulfur dioxide that surprised Caldeira. It was how little was needed to do the job: about thirty-four gallons per minute, not much more than the amount of water that comes out of a heavy-duty garden hose.

Warming is largely a polar phenomenon, which means that high-latitude areas are four times more sensitive to climate change than the equator. By IV’s estimations, 100,000 tons of sulfur dioxide per year would effectively reverse warming in the high Arctic and reduce it in much of the Northern Hemisphere.

That may sound like a lot but, relatively speaking, it is a smidge. At least 200 million tons of sulfur dioxide already go into the atmosphere each year, roughly 25 percent from volcanoes, 25 percent from human sources like motor vehicles and coal-fired power plants, and the rest from other natural sources like sea spray.

So all that would be needed to produce a globe-changing effect is one-twentieth of 1 percent of current sulfur emissions, simply relocated to a higher point in the sky. How can this be? Myhrvold’s answer: “Leverage!”
that an injection of sulfur in the stratosphere “is the bona fides run even deeper than Caldeira’s. Crutzen won a Nobel Prize in 1995 for his research on atmospheric ozone depletion. And yet in 2006, studied and remain unchallenged.

This is not to dismiss the potential objections to Budyko’s Blanket, which are legion. First of all, would it work?

The answer is that Gore and Pinatubo both suggest a way to cool the planet, albeit with methods whose cost-effectiveness are a universe apart.

Stern proposes spending each year to attack the problem, IV’s idea is, well, practically free. It would cost $50 million less to stop global warming and running in about three years, with a startup cost of $150 million and annual operating costs of $100 million.

the stratosphere. Even so, that would still represent less than 1 percent of current worldwide sulfur emissions. IV estimates this plan could be up than what Al Gore’s foundation is paying just to increase public awareness about global warming.

The liquefied sulfur dioxide would be sent skyward by a series of pumps, affixed to the hose at every 100 yards. These too would be relatively light, about forty-five pounds each—“smaller than the pumps in my swimming pool,” Myhrvold says. There are several advantages to using many small pumps rather than one monster pump at the base station: a big ground pump would create more pressure, which, in turn, would require a far heavier hose; even if a few of the small pumps failed, the mission itself wouldn’t; and using small, standardized units would keep costs down.

At the end of the hose, a cluster of nozzles would spritz the stratosphere with a fine mist of colorless liquid sulfur dioxide. Thanks to stratospheric winds that typically reach one hundred miles per hour, the spritz would wrap around the earth in roughly ten days’ time. That’s how long it would take to create Budyko’s Blanket. Because stratospheric air naturally spirals toward the poles, and because the arctic regions are more vulnerable to global warming, it makes sense to spray the sulfur aerosol at high latitude—with perhaps one hose in the Southern Hemisphere and another in the Northern.

Myhrvold, in his recent travels, happened upon one potentially perfect site. Along with Bill Gates and Warren Buffett, he was taking a whirlwind educational tour of various energy producers—a nuclear plant, a wind farm, and so on. One of their destinations was the Athabasca Oil Sands in northern Alberta, Canada.

Billions of barrels of petroleum can be found there, but it is heavy, mucky crude. Rather than lying in a liquid pool beneath the earth’s crust, it is mixed in, like molasses, with the surface dirt. In Athabasca you don’t drill for oil; you mine it, scooping up gigantic shovels of earth and then separating the oil from its waste components.

One of the most plentiful waste components is sulfur, which commands such a low price that oil companies simply stockpile it. “There were big yellow mountains of it, like a hundred meters high by a thousand meters wide!” says Myhrvold. “And they stair-step them, like a Mexican pyramid. So you could put one little pumping facility up there, and with one corner of one of those sulfur mountains, you could solve the whole global warming problem for the Northern Hemisphere.”

It is interesting to think what might have happened if Myhrvold was around one hundred years ago, when New York and other cities were choking on horse manure. One wonders if, while everyone else looked at the mountains of dung and saw calamity, he might have seen opportunity. On balance, Budyko’s Blanket is a fiendishly simple plan. Considering the complexity of climate in general and how much we don’t know, it probably makes sense to start small. With the fire-hose approach, you could begin with a trickle of sulfur and monitor the results. The amount could be easily dialed up or down—or, if need be, turned off. There is nothing permanent or irreversible about the process.

And it would be startlingly cheap. IV estimates the “Save the Arctic” plan could be set up in just two years at a cost of roughly $20 million, with an annual operating cost of about $10 million. If cooling the poles alone proved insufficient, IV has drawn up a “Save the Planet” version, with five worldwide base stations instead of two, and three hoses at each site. This would put about three to five times the amount of sulfur dioxide into the stratosphere. Even so, that would still represent less than 1 percent of current worldwide sulfur emissions. IV estimates this plan could be up and running in about three years, with a startup cost of $150 million and annual operating costs of $100 million.

So Budyko’s Blanket could effectively reverse global warming at a total cost of $250 million. Compared with the $1.2 trillion that Nicholas Stern proposes spending each year to attack the problem, IV’s idea is, well, practically free. It would cost $50 million less to stop global warming than what Al Gore’s foundation is paying just to increase public awareness about global warming.

And there lies the key to the question we asked at the beginning of this chapter: What do Al Gore and Mount Pinatubo have in common?

The answer is that Gore and Pinatubo both suggest a way to cool the planet, albeit with methods whose cost-effectiveness are a universe apart.
Another fundamental objection to geoengineering is that it intentionally alters the earth’s natural state. To that, Myhrvold has a simple answer: “We’ve already geoengineered the earth.”

In just a few centuries, we will have burned up most of the fossil fuel that took 300 million years of biological accumulation to make. Compared with that, injecting a bit of sulfur into the sky seems pretty mild. As Lowell Wood points out, sulfur isn’t even the optimal chemical for a stratospheric shield. Other, less noxious-sounding materials—aluminized plastic micro beads, for instance—could make an even more efficient sunscreen. But sulfur is the most palatable choice “simply because we’ve got the volcano proof of feasibility,” Wood says, “and along with that, a proof of harmlessness.”

Wood and Myhrvold do worry that Budyko’s Blanket might create an “excuse to pollute.” That is, rather than buying time for us to create new energy solutions, it would lure people into complacency. But blaming geoengineering for this, Myhrvold says, is like blaming a heart surgeon for saving the life of someone who fails to exercise and eats too many french fries.

Perhaps the single best objection to the garden hose idea is that it is too simple and too cheap. As of this writing, there is no regulatory framework to prohibit anyone—a government, a private institution, even an individual—from putting sulfur dioxide in the atmosphere. (If there were, many of the world’s nearby eight thousand coal-burning electricity units would be in a lot of trouble.) Still, Myhrvold admits that “it would freak people out” if someone unilaterally built the thing. But of course this depends on the individual. If it were Al Gore, he might snag a second Nobel Peace Prize. If it were Hugo Chávez, he’d probably get a prompt visit from some U.S. fighter jets.

One can also imagine the wars that might break out over who controls the dials on Budyko’s Blanket. A government that depends on high oil prices might like to crank up the sulfur to keep things extra cool; others, meanwhile, might be happier with longer growing seasons.

Lowell Wood recounts a lecture he once gave, during which he mentioned that a stratospheric shield could also filter out damaging ultraviolet rays. An audience member suggested that fewer ultraviolet rays would lead to more people getting rickets.

“My response,” Wood says, “was that your pharmacist can take care of that with vitamin D, and it’ll be better for your overall health as well.”

All the rocket scientists, climate scientists, physicists, and engineers around the IV conference table chuckle at Wood’s riposte. Then someone asks if IV, with Budyko’s Blanket up its sleeve, should be working toward a rickets-prevention patent. Now they laugh louder. But it’s not entirely a joke. Unlike most of the patents IV owns, Budyko’s Blanket has no clear route to profits. “If you were an investor of mine,” Myhrvold says, “you might ask: ‘Remind me again why you’re working on this?’” Indeed, many of IV’s most time-consuming projects, including a variety of AIDS and malaria solutions, are substantially pro bono work.

“On balance, the role of clouds is to produce a cooling,” says Latham. “If clouds didn’t exist in the atmosphere, the earth would be a lot hotter than it is.”

Precisely!

As it turns out, the amount of stratospheric sulfur necessary to cool the planet is equal to the amount that just a handful of coal-burning power plants already belch out. This second plan calls for simply extending the smokestacks at a few strategically located plants. So instead of spewing their sulfur-laden smoke several hundred feet into the air, these smokestacks would release it some eighteen miles high, into the stratosphere, where it would have the same net cooling effect as the garden-hose scheme.

This plan is appealing because it simply repurposes existing pollution without adding any more. Although an eighteen-mile-high smokestack might sound like a hard thing to build, IV has figured out how—essentially by attaching a long, skinny hot-air balloon to an existing power-plant smokestack, creating a channel that lets the hot sulfur gases rise by their own buoyancy into the stratosphere. This project is dubbed, naturally, “chimney to the sky.”

And if even that plan is too repugnant, IV has something entirely different, a plan that is practically heavenly: a sky full of fluffy white clouds. This is the brainchild of John Latham, a British climate scientist who recently joined the IV stable of inventors. Latham is a gentle, soft-spoken man in his late sixties who is also a rather serious poet. So caught his ear when, long ago, he stood on a mountaintop in North Wales with his eight-year-old son Mike, gazing down at a sunset, and the boy, pointing out how shiny the clouds were, called them “soggy mirrors.”

“On balance, the role of clouds is to produce a cooling,” says Latham. “If clouds didn’t exist in the atmosphere, the earth would be a lot hotter..."
During a five-month study in the intensive-care unit of an Australian children's hospital, doctors were asked to track their own hand-washing equipment or furniture. Cedars-Sinai, like a lot of other hospitals, had wall-mounted Purell dispensers for handy disinfection, but these too were never refilled. "I'd spend nearly half my time just standing over a sink," one doctor said. "It was tedious and time-consuming."

A raft of recent studies have shown that hospital personnel wash or disinfect their hands in fewer than half the instances they should. And doctors are the worst offenders, more lax than either nurses or aides.

This failure seems puzzling. In the modern world, we tend to believe that dangerous behaviors are best solved by education. That is the thinking behind nearly every public-awareness campaign ever undertaken, from global warming to AIDS prevention to drunk driving. And doctors are the most educated people in the hospital. The best medicine for stopping infections? Getting doctors to wash their hands more frequently.

For one, they acknowledged, doctors are incredibly busy, and time spent washing hands is time not spent treating patients. Craig Feied, our emergency-room revolutionary from Washington, estimates that he often interacted with more than one hundred patients per shift. "If I ran to wash my hands every time I touched a patient, following the protocol, I'd spend nearly half my time just standing over a sink."

Sinks, furthermore, aren't always as accessible as they should be, in patient rooms especially, they are sometimes barricaded by equipment or furniture. Cedars-Sinai, like a lot of other hospitals, had wall-mounted Purell dispensers for handy disinfection, but these too were often ignored.

Doctors' hand-washing failures also seem to have psychological components. The first might be (generously) called a perception deficit. Their self-reported rate? Seventy-three percent. Not perfect, but not so terrible either.

So do contemporary doctors follow Semmelweis's orders? A raft of recent studies have shown that hospital personnel wash or disinfect their hands in fewer than half the instances they should. And doctors are the worst offenders, more lax than either nurses or aides.

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In the wake of this report, hospitals all over the country hustled to fix the problem. Even a world-class hospital like Cedars-Sinai Medical Center in Los Angeles found it needed improvement, with a hand-hygiene rate of just 65 percent. Its senior administrators formed a committee to identify the reasons for this failure.

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Unbeknownst to these doctors, however, their nurses were spying on them, and recorded the docs’ actual hand-hygiene rate: a paltry 9 percent.

Paul Silka, an emergency-room doctor at Cedars-Sinai who also served as the hospital’s chief of staff, points to a second psychological factor: arrogance. “The ego can kick in after you’ve been in practice a while,” he explains. “You say: ‘Hey, I couldn’t be carrying the bad bugs. It’s the other hospital personnel.’”

Silka and the other administrators at Cedars-Sinai set out to change their colleagues’ behavior. They tried all sorts of incentives: gentle cajoling via posters and e-mail messages; greeting doctors every morning with a bottle of Purell; establishing a Hand Hygiene Safety Posse that roamed the wards, giving a $10 Starbucks card to doctors who were seen properly washing their hands. You might think the highest earners in a hospital would be immune to a $10 incentive. “But none of them turned down the card,” Silka says.

After several weeks, the hand-hygiene rate at Cedars-Sinai had increased but not nearly enough. This news was delivered by Rekha Murthy, the hospital’s epidemiologist, during a lunch meeting of the Chief of Staff Advisory Committee. There were roughly twenty members, most of them top doctors in the hospital. They were openly discouraged by the report. When lunch was over, Murthy handed each of them an agar plate—a sterile petri dish loaded with a spongy layer of agar. “I would love to culture your hand,” she told them.

They pressed their palms into the plates, which Murthy sent to the lab. The resulting images, Silka recalls, “were disgusting and striking, with gobs of colonies of bacteria.”

Here were the most important people in the hospital, telling everyone else how to change their behavior, and yet even their own hands weren’t clean! (And, most disturbingly, this took place at a lunch meeting.)

It may have been tempting to sweep this information under the rug. Instead, the administration decided to harness the disgusting power of the bacteria-laden handprints by installing one of them as the screen saver on computers throughout the hospital. For doctors—lifesavers by training, and by oath—this grisly warning proved more powerful than any other incentive. Hand-hygiene compliance at Cedars-Sinai promptly shot up to nearly 100 percent.

As word got around, other hospitals began copying the screen-saver solution. And why not? It was cheap, simple, and effective.

A happy ending, right?

Yes, but…think about it for a moment. Why did it take so much effort to persuade doctors to do what they have known to do since the age of Semmelweis? Why was it so hard to change their behavior when the price of compliance (a simple hand-wash) is so low and the potential cost of failure (the loss of a human life) so high?

Once again, as with pollution, the answer has to do with externalities.

When a doctor fails to wash his hands, his own life isn’t the one that is primarily endangered. It is the next patient he treats, the one with the open wound or the compromised immune system. The dangerous bacteria that patient receives are a negative externality of the doctor’s actions—just as pollution is a negative externality of anyone who drives a car, jacks up the air conditioner, or sends coal exhaust up a smokestack. The polluter has insufficient incentive to not pollute, and the doctor has insufficient incentive to wash his hands.

This is what makes the science of behavior change so difficult.

So instead of collectively wringing our filthy hands about behavior that is so hard to change, what if we can come up with engineering or design or incentive solutions that supersede the need for such change?

That’s what Intellectual Ventures has in mind for global warming, and that is what public-health officials have finally embraced to cut down on hospital-acquired infections. Among the best solutions: using disposable blood-pressure cuffs on incoming patients; infusing hospital equipment with silver ion particles to create an antimicrobial shield; and forbidding doctors to wear neckties because, as the U.K. Department of Health has noted, they “are rarely laundered,” “perform no beneficial function in patient care,” and “have been shown to be colonized by pathogens.”

That’s why Craig Feied has worn bow ties for years. He has also helped develop a virtual-reality interface that allows a gowned and gloved-up surgeon to scroll through X-rays on a computer without actually touching it—because computer keyboards and mice tend to collect pathogens at least as effectively as a doctor’s necktie. And the next time you find yourself in a hospital room, don’t pick up the TV remote control until you’ve disinfected the daylights out of it.

Perhaps it’s not so surprising that it’s hard to change people’s behavior when someone else stands to reap most of the benefit. But surely we are capable of behavior change when our own welfare is at stake, yes?

Sadly, no. If we were, every diet would always work (and there would be no need for diets in the first place). If we were, most smokers would be ex-smokers. If we were, no one who ever took a sex-ed class would be party to an unwanted pregnancy. But knowing and doing are two different things, especially when pleasure is involved.

Consider the high rate of HIV and AIDS in Africa. For years, public-health officials from around the world have been fighting this problem. They have preached all sorts of behavior change—using condoms, limiting the number of sexual partners, and so on. Recently, however, a French researcher named Bertran Auvert ran a medical trial in South Africa and came upon findings so encouraging that the trial was halted so the new preventive measure could be applied at once.

What was this magical treatment?

Circumcision. For reasons Auvert and other scientists do not fully understand, circumcision was found to reduce the risk of HIV transmission by as much as 60 percent in heterosexual men. Subsequent studies in Kenya and Uganda corroborated Auvert’s results.

All over Africa, foreskins began to fall. “People are used to policies that target behaviors,” said one South African health official, “but circumcision is a surgical intervention—it’s cold, hard steel.”

The decision to undergo an adult circumcision is obviously a deeply personal one. We would hardly presume to counsel anyone in either direction. But for those who do choose circumcision, a simple word of advice: before the doctor gets anywhere near you, please make sure he washes his hands.
The branch of economics concerned with issues like inflation, recessions, and financial shocks is known as macroeconomics. When the economy is going well, macroeconomists are lauded as heroes; when it turns sour, as it did recently, they catch a lot of the blame. In either case, the headlines go to the macroeconomists.

We hope that after reading this book, you’ll realize there is a whole different breed of economist out there—microeconomists—lurking in the shadows. They seek to understand the choices that individuals make, not just in terms of what they buy but also how often they wash their hands and whether they become terrorists.

Some of these microeconomists do not even limit their research to the human race.

Keith Chen, the son of Chinese immigrants, is a hyper-verbal, sharp-dressing thirty-three-year-old with spiky hair. After an itinerant upbringing in the rural Midwest, Chen attended Stanford, where after a brief infatuation with Marxism, he made an about-face and took up economics. Now he is an associate professor of economics at Yale.

His research agenda was inspired by something written long ago by Adam Smith, the founder of classical economics: “Nobody ever saw a dog make a fair and deliberate exchange of one bone for another with another dog. Nobody ever saw one animal by its gestures and natural cries signify to another, this is mine, that yours; I am willing to give this for that.”

In other words, Smith was certain that humankind alone had a knack for monetary exchange.

But was he right?

In economics, as in life, you’ll never find the answer to a question unless you’re willing to ask it, as silly as it may seem. Chen’s question was simply this: What would happen if I could teach a bunch of monkeys to use money?

Chen’s monkey of choice was the capuchin, a cute, brown New World monkey about the size of a one-year-old child, or at least a scrappy one-year-old who has a very long tail. “The capuchin has a small brain,” Chen says, “and it’s pretty much focused on food and sex.” (This, we would argue, doesn’t make the capuchin so different from many people we know, but that’s another story.) “You should really think of a capuchin as a bottomless stomach of want. You can feed them marshmallows all day, they’ll throw up, and then come back for more.”

To an economist, this makes the capuchin an excellent research subject.

Chen, along with Venkat Lakshminarayanan, went to work with seven capuchins at a lab set up by the psychologist Laurie Santos at Yale–New Haven Hospital. In the tradition of monkey labs everywhere, the capuchins were given names—in this case, derived from characters in James Bond films. There were four females and three males. The alpha male was named Felix, after the CIA agent Felix Leiter. He was Chen’s favorite.

The monkeys lived together in a large, open cage. Down at one end was a much smaller cage, the testing chamber, where one monkey at a time could enter to take part in experiments. For currency, Chen settled on a one-inch silver disc with a hole in the middle—“kind of like Chinese money,” he says.

The first step was to teach the monkeys that the coins had value. This took some effort. If you give a capuchin a coin, he will sniff it and, after determining he can’t eat it (or have sex with it), he’ll toss it aside. If you repeat this several times, he may start tossing the coins at you, and hard.

So Chen and his colleagues gave the monkey a coin and then showed a treat. Whenever the monkey gave the coin back to the researcher, it got the treat. It took many months, but the monkeys eventually learned that the coins could buy the treats.

It turned out that individual monkeys had strong preferences for different treats. A capuchin would be presented with twelve coins on a tray—his budget constraint—and then be offered, say, Jell-O cubes by one researcher and apple slices by another. The monkey would hand his coins to whichever researcher held the food he preferred, and the researcher would fork over the goodies.

Chen now introduced price shocks and income shocks to the monkeys’ economy. Let’s say Felix’s favorite food was Jell-O, and he was accustomed to getting three cubes of it for one coin. How would he respond if one coin suddenly bought just two cubes?

To Chen’s surprise, Felix and the others responded rationally. When the price of a given food rose, the monkeys bought less of it, and when the price fell, they bought more. The most basic law of economics—that the demand curve slopes downward—held for monkeys as well as humans.

Now that he had witnessed their rational behavior, Chen wanted to test the capuchins for irrational behavior. He set up two gambling games. In the first, a capuchin was shown one grape and, depending on a coin flip, either got only that grape or won a bonus grape as well. In the second game, the capuchin started out seeing two grapes, but if the coin flip went against him, the researchers took away one grape and the monkey got only one.

In both cases, the monkey got the same number of grapes on average. But the first gamble was framed as a potential gain while the second was framed as a potential loss.

How did the capuchins react?

Given that the monkeys aren’t very smart in the first place, you might assume that any gambling strategy was well beyond their capabilities. In that case, you’d expect them to prefer it when a researcher initially offered them two grapes instead of one. But precisely the opposite happened! Once the monkeys figured out that the two-grape researcher sometimes withheld the second grape and that the one-grape researcher sometimes added a bonus grape, the monkeys strongly preferred the one-grape researcher. A rational monkey wouldn’t have cared, but these irrational monkeys suffered from what psychologists call “loss aversion.” They behaved as if the pain from losing a grape was greater than the pleasure from gaining one.

Up to now, the monkeys appeared to be as rational as humans in their use of money. But surely this last experiment showed the vast gulf that lay between monkey and man.

Or did it?

The fact is that similar experiments with human beings—day traders, for instance—had found that people make the same kind of irrational
decisions at a nearly identical rate. The data generated by the capuchin monkeys, Chen says, “make them statistically indistinguishable from most stock-market investors.”

So the parallels between human beings and these tiny-brained, food-and-sex monkeys remained intact. And then, as if Chen needed any further evidence of these parallels, the strangest thing happened in the lab.

Felix scurried into the testing chamber, just as he’d done countless times before, but on this day, for reasons Chen could never understand, Felix did not gather up the twelve coins on the tray and use them to buy food. Instead, he flung the entire tray’s worth of coins back into the communal cage and, fleeing the testing chamber, dashed in after them—a bank heist followed by a jailbreak.

There was chaos in the big cage, with twelve coins on the floor and seven monkeys going after them. When Chen and the other researchers went inside to get the coins, the monkeys wouldn’t give them up. After all, they had learned that the coins had value. So the humans resorted to bribing the capuchins with treats. This taught the monkeys another valuable lesson: crime pays.

Then, out of the corner of his eye, Chen saw something remarkable. One monkey, rather than handing his coin over to the humans for a grape or a slice of apple, instead approached a second monkey and gave it to her. Chen had done earlier research in which monkeys were found to be altruistic. Had he just witnessed an unprompted act of monkey altruism?

After a few seconds of grooming—*bam!*—the two capuchins were having sex. What Chen had seen wasn’t altruism at all, but rather the first instance of monkey prostitution in the recorded history of science.

And then, just to prove how thoroughly the monkeys had assimilated the concept of money, as soon as the sex was over—*it* lasted about eight seconds; they’re monkeys, after all—the capuchin who’d received the coin promptly brought it over to Chen to purchase some grapes.

This episode sent Chen’s mind spinning. Until now, the researchers had run narrowly defined money experiments with one monkey at a time. What if Chen could introduce money directly into the monkeys’ lives? The research possibilities were endless.

Alas, Chen’s dream of capuchin capitalism never came to pass. The authorities who oversaw the monkey lab feared that introducing money to the capuchins would irreparably damage their social structure.

They were probably right. If the capuchins were so quick to turn to prostitution as soon as they got hold of some money, just imagine how quickly the world would be overrun with monkey murderers and monkey terrorists, with monkey polluters who contribute to global warming and monkey doctors who fail to wash their hands. Future generations of monkeys, of course, would come along and solve these problems. But there would always be something to fix—like the monkeys’ pigheaded insistence that all their children ride in car seats...
Jointly, we’d first like to thank all the people who let us tell their stories in this book. For every person named in the text, there were usually five or ten more who contributed in various ways. Thanks to all of you. We are also greatly indebted to the many scholars and researchers whose work is cited in the book.

Suzanne Gluck of William Morris Endeavor is an agent like no other, and we are lucky to have her. She has many extraordinary colleagues, including Tracy Fisher, Raffaella De Angelis, Cathryn Summerhayes, Erin Malone, Sarah Ceglarski, Caroline Donofrio, and Eric Zohn, all of whom have been a big help, as have others at WME, past and present.

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To the women of Number 17: what fun! And there is more to come.

The Harry Walker Agency has given us more opportunities to meet more incredible people than we ever thought possible, and they are a joy to work with. Thanks to Don Walker, Beth Gargano, Cynthia Rice, Kim Nisbet, Mirjana Novkovic, and everyone else there.

Linda Jines continues to prove that she has no peer when it comes to naming things.

And thanks especially to all the readers who take the time to send along their clever, fascinating, devious, and maddening ideas for us to pursue.

PERSONAL ACKNOWLEDGMENTS

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S.D.L.

People like Sudhir Venkatesh, Allie, Craig Feied, Ian Horsley, Joe De May Jr., John List, Nathan Myhrvold, and Lowell Wood make me grateful every day that I became a writer. They are full of insights and surprises that are a joy to learn. Steve Levitt is not only a great collaborator but a wonderful economics teacher as well. For outstanding research assistance, thanks to Rhena Tantisunthorn, Rachel Fershleiser, Nicole Tourtelot, Danielle Holtz, and especially Ryan Hagen, who did great work on this book and will write great books of his own one day. To Ellen, my extraordinary wife, and to the fantastic creatures known as Solomon and Anya: you are all pretty damn swell.

S.J.D.
INTRODUCTION: PUTTING THE FREAK IN ECONOMICS

THE PERILS OF WALKING DRUNK: The brilliant economist Kevin Murphy called our attention to the relative risk of walking drunk. For background on the dangers of drunk driving, see Steven D. Levitt and Jack Porter, “How Dangerous Are Drinking Drivers?” Journal of Political Economy 109, no. 6 (2001). / 2 One of the benefits of a cumbersome federal bureaucracy is that it hires tens of thousands of employees to staff hundreds of agencies that collect and organize endless reams of statistical data. The National Highway Traffic Safety Administration (NHTSA) is one such agency, and it supplies definitive and valuable data on traffic safety. Regarding the proportion of miles driven drunk, see “Impaired Driving in the United States,” NHTSA, 2006. / 2 For drunk pedestrian deaths, see “Pedestrian Roadway Fatalities,” NHTSA, DOT HS 809 456, April 2003. / 2 For drunk driving deaths, see “Traffic Safety Facts 2006,” NHTSA, DOT HS 810 801, March 2008. / 2 “They lie down to rest on country roads”: see William E. Schmidt, “A Rural Phenomenon: Lying-in-the-Road Deaths,” The New York Times, June 30, 1986. / 3 The number of Americans of driving age: here and elsewhere in this book, population statistics and characteristics are generally drawn from U.S. Census Bureau data. / 3 “Friends Don’t Let Friends...”: by total happenstance, we recently met one of the creators of the original slogan “Friends Don’t Let Friends Drive Drunk.” Her name is Susan Wersha Zerin. In the early 1980s, she worked at the Leber Katz Partners ad agency in New York and was the account manager on a pro-bono anti-drunk-driving campaign for the U.S. Department of Transportation. “Elizabeth Dole, the secretary of transportation, was our key contact,” she recalls. The phrase “Friends Don’t Let Friends Drive Drunk” was written as the campaign’s internal strategic statement, but it proved so memorable in-house that it was adopted as the campaign’s tagline.


WHAT IS “FREAKONOMICS,” ANYWAY? Gary Becker, the original freakonomist, has written many books, papers, and articles that should be...

**CHAPTER 1: HOW IS A STREET PROSTITUTE LIKE A DEPARTMENT-STORE SANTA?**

Meet Lasheena: She is one of the many street prostitutes who participated in Sudhir Venkatesh’s fieldwork, summarized in much further detail later in the chapter and contained in Steven D. Levitt and Sudhir Alladi Venkatesh, “An Empirical Analysis of Street-Level Prostitution,” working paper.


**THE STREET PROSTITUTES OF CHICAGO:** This section is largely drawn from Steven D. Levitt and Sudhir Alladi Venkatesh, “An Empirical Analysis of Street-Level Prostitution,” working paper.

**LYING TO THE OPORTUNIDADES CLERK:** See César Martinelli and Susan Parker, “Deception and Misreporting in a Social Program,” *Journal of European Economics Association* 7, no. 4 (2009). This paper was brought to our attention by the journalist Tina Rosenberg.


WHY AREN'T THERE MORE WOMEN LIKE ALLIE? As detailed in this book’s explanatory note, we met Allie thanks to a mutual acquaintance. Allie is not her real name, but all other facts about her are true. Over the past few years, we have both spent a considerable amount of time with her (all fully clothed), as this section was based on extensive interviews, a review of her ledgers, and the occasional guest lectures she delivered at the University of Chicago for Levitt’s class “The Economics of Crime.” Several students said this was the single-best lecture they had in all their years at the university, which is both a firm testament to Allie’s insights and a brutal indictment of Levitt and the other professors. See also Stephen J. Dubner, "A Call Girl’s View of the Spitzer Affair," *Freakonomics blog*, *The New York Times Magazine*, March 12, 2008.

CHAPTER 2: WHY SHOULD SUICIDE BOMBERS BUY LIFE INSURANCE?


THE BIRTHDATE BULGE AND THE RELATIVE-AGE EFFECT: See Stephen J. Dubner and Steven D. Levitt, “A Star Is Made,” *The New York Times Magazine*, May 7, 2006; K. Anders Ericsson, Neil Charness, Paul J. Feltovich, and Robert R. Hoffman, *The Cambridge Handbook of Expertise and Expert Performance* (Cambridge University Press, 2006); K. Anders Ericsson, Ralf Th. Krampe, and Clemens Tesch-Romer, “The Role of Deliberate Practice in the Acquisition of Expert Performance,” *Psychological Review* 100, no. 3 (1993); Werner Helsen, Jan Van Winckel, and A. Mark Williams, “The Relative Age Effect in Youth Soccer Across Europe,” *Journal of Sports Sciences* 23, no. 6 (June 2005); and Greg Spira, “The Boys of Late Summer,” *Slate*, April 16, 2008. As explained in a footnote to this section, we originally planned to write a chapter in *SuperFreakonomics* on how talent is acquired—that is, when a person is very good at a given thing, what is it that makes him or her so good? But our plans changed when several books were recently published on this theme. A lot of people gave generously of their time and thoughts in our reporting on this abandoned chapter, and we remain indebted to them. Ericsson was extremely helpful, as were Werner Helsen, Paula Barnsley, Gus Thompson, and many others. We are especially grateful to Takeru Kobayashi, the competitive-eating champion from Japan, for his time, insights, and willingness during a New York visit to try out a Papaya King hot dog as well as a Hebrew National, even though he’s not particularly fond of hot dogs except when he’s eating eight or ten of them per minute. It was the ultimate busman’s holiday, and Kobayashi could not have been more gracious.


THE MAN WHO FIXES HOSPITALS: This section is based primarily on author interviews with Craig Feied as well as other members of his team, including Mark Smith. We also benefited substantially from Rosabeth Moss Kanter and Michelle Heskett, “Washington Hospital Center,” a four-part series in *Harvard Business School*, July 21, 2002, N9–303–010 through N9–303–022. / 67 Emergency medicine as a specialty: see Derek R.
CHAPTER 3: UNBELIEVABLE STORIES ABOUT APATHY AND ALTRUISM

KITTY GENOVESE AND THE “38 WITNESSES”: This section, as well as the section at the end of the chapter about Kitty Genovese, benefited from the research by David R. Kidd and the弘扬者 of the Kitty Genovese Research Project, as well as the book “The Kitty Genovese Case: A Case Study invictim Psychology” by Michael Blum and Gary A. Melton. However, the authors of the book have been criticized for their interpretation of the Genovese event. The authors of the book have been criticized for their interpretation of the Genovese event. The authors of the book have been criticized for their interpretation of the Genovese event. The authors of the book have been criticized for their interpretation of the Genovese event. The authors of the book have been criticized for their interpretation of the Genovese event. The authors of the book have been criticized for their interpretation of the Genovese event. The authors of the book have been criticized for their interpretation of the Genovese event.


AMERICANS ARE FAMOUSLY ALTRUISTIC: These figures are drawn from an Indiana University Center on Philanthropy study. From 1996 to 2006, overall American giving increased from $139 billion to $295 billion (inflation-adjusted), which represents an increase from 1.7% of GDP to 2.6% of GDP. See also David Leonhardt, “What Makes People Give,” The New York Times, March 9, 2008. / 107 For more on disaster donations and TV coverage, see Philip H. Brown and Jessica H. Minty, “Media Coverage and Charitable Giving After the 2004 Tsunami,” Southern Economic Journal 75, no. 1 (2008).


JOHN LIST, GAME-CHANGER: This section is drawn primarily from author interviews with John A. List as well as a number of his many, many papers, several written in collaboration with Steven D. Levitt. These papers include: List, “Does Market Experience
CHAPTER 4: THE FIX IS IN—AND IT’S CHEAP AND SIMPLE

It seemed to perfectly sum up what happened that night. But Fred Shapiro, Genovese. “The only thing necessary for the triumph of evil is for good men to do nothing.”


KITY GENOVESE REVISITED: See the notes at the top of this chapter section for a list of the sources we relied upon for the reappraisal of the case. This second section drew substantially on interviews with Joseph De May Jr. and Mike Hoffman, as well as A.M. Rosenthal’s book Thirty-Eight Witnesses. … One of us (Dubner) had the opportunity to work with Rosenthal as the latter’s days at the Times expired. Even toward the end of his life (he died in 2008), Rosenthal remained a forceful journalist and an exceedingly sharp-opinioned man who didn’t suffer fools or, as some have argued, dissenting opinions. In 2004, Rosenthal participated in a symposium at Fordham University in New York to mark the fortieth anniversary of the Genovese murder. He offered a singular explanation for his obsession with the case: “Why did the Genovese incident move me so deeply? I tell you this. I had five sisters, and I was the youngest. What loving and magnificent sisters I had. But one of my sisters was murdered. Young Bess was returning home two nights before New Year’s through a path in Van Cortlandt Park, when a sexual pervert jumped out of the bushes and exposed himself to her. In shock, she escaped, and ran home one mile, sweaty in the chill weather. Within two days, Bess fell ill and died. I still miss our darling Bess, and feel Bess was murdered by this criminal who took her life away, no less than the monster who killed Kitty Genovese.” … The Genovese murder caused many pundits to dust off a famous remark uttered by Edmund Burke two centuries earlier: “The only thing necessary for the triumph of evil is for good men to do nothing.” It seemed to perfectly sum up what happened that night. But Fred Shapiro, editor of The Yale Book of Quotations, could never find anything like this line in Burke’s writings. Which means that this famous quotation—along with, seemingly, half the quotes attributed to Mark Twain and Oscar Wilde—appears to be apocryphal as the story of the thirty-eight witnesses.


“AN INTELLECTUALLY VENTUREsome fellow named Nathan”: This section is drawn from author interviews with Nathan and his colleagues, whom the reader will meet in fuller detail in Chapter 5. Neal Stephenson—yes, the same one who writes phantasmagorical novels—was particularly helpful in walking us through some of the details and showing computer simulations. The hurricane killer described is also known as Jeffrey A. Bowers et al., “Water Alteration Structure Applications and Methods,” U.S. Patent Application 20090173366, July 9, 2009. Among the “et al.” authors is one William H. Gates III. The abstract from the patent application reads like this: “A method is generally described which includes environmental alteration. The method includes determining a placement of at least one vessel capable of moving water to lower depths in the water via wave induced downwelling. The method also includes placing at least one vessel in the determined placement. Further, the method includes generating movement of the water adjacent the surface of the water in response to the placing.”

CHAPTER 5: WHAT DO AL GORE AND MOUNT PINATUBO HAVE IN COMMON?


JAMES LOVELOCK: All Lovelock quotes in this chapter can be found in The Revenge of Gaia: Earth’s Climate Crisis and the Fate of Humanity (Basic Books, 2006). Lovelock is a scientist perhaps best known as the originator of the Gaia hypothesis, which argues that the earth is essentially a living organism much like (but in many ways superior to) a human being. He has written several books on the subject, including the foundational Gaia: The Practical Science of Planetary Medicine (Gaia Books, 1991).


GLOBAL WARMING AS A "UNIQUELY THorny PROBLEM": For the "terrible-case scenario," see Martin L. Weitzman, "On Modeling and Interpreting the Economics of Catastrophic Climate Change," The Review of Economics and Statistics 91, no. 1 (February 2009). / 169 A Stern warning: see Nicholas Herbert Stern, The Economics of Climate Change: The Stern Review (Cambridge University Press, 2007). / 169 There is much to be read about the influence of uncertainty, especially as it compares with its cousin risk. The Israeli psychologists Amos Tversky and Daniel Kahneman, whose work is generally credited with giving ultimate birth to behavioral economics, conducted pioneering research on how people make decisions under pressure and found that uncertainty leads to "severe and systematic errors" in judgment. (See "Judgment Under Uncertainty: Heuristics and Biases," from Judgment Under Uncertainty: Heuristics and Biases, ed. Daniel Kahneman, Paul Slovic, and Amos Tversky [Cambridge University Press, 1982].) We wrote about the difference between risk and uncertainty in a New York Times Magazine column ("The Jane Fonda Effect," September 16, 2007) about the fear over nuclear power: "[The economist Frank Knight] made a distinction between two key factors in decision making: risk and uncertainty. The cardinal difference, Knight declared, is that risk—however great—can be measured, whereas uncertainty cannot be. How do people weigh risk versus uncertainty? Consider a famous experiment that illustrates what is known as the Ellsberg Paradox. There are two urns. The first urn, you are told, contains 50 red balls and 50 black balls. The second one also contains 100 red and black balls, but the number of each color is unknown. If your task is to pick a red ball out of either urn, which urn do you choose? Most people pick the first urn, which suggests that they prefer a measurable risk to an immeasurable uncertainty. (This condition is known to economists as ambiguity aversion.) Could it be that nuclear energy, risks and all, is now seen as preferable to the uncertainties of global warming?" / 170 Al Gore’s "We" campaign: see www.climateprotect.org and Andrew C. Revkin, "Gore Group Plans Ad Blitz on Global Warming," The New York Times, April 1, 2008. / 170 The heretic Boris Johnson: see Boris Johnson, We’ve Lost Our Fear of Hellfire, but Put Climate Change in Its Place, The Telegraph, February 2, 2006. / 170 "Rendered nearly lifeless": see Peter Ward, The Medea Hypothesis: Is Life on Earth Ultimately Self-Destructive? (Princeton University Press, 2009); and Drake Bennett, "Dark Green: A Scientist Argues That the Natural World Isn’t Benevolent and Sustaining: It’s Bent on Self-Destruction," The Boston Globe, January 11, 2009. / 170–171 Human activity and carbon emissions: see Kenneth Chang, "Satellite Will Track Carbon Dioxide," The New York Times, February 22, 2009; read more about NASA’s view of carbon dioxide at http://oco.jpl.nasa.gov/science/

THE NEGATIVE EXTERNALITIES OF COAL MINING: For American coal worker deaths, see the U.S. Department of Labor, Mine Safety and Health Administration, "Coal Fatalities for 1900 Through 2008" and Jeff Goodell, Big Coal: The Dirty Secret Behind America’s Energy Future (Houghton Mifflin, 2007). Deaths from black lung were gleaned from National Institute for Occupational Safety and Health reports. Chinese coal worker deaths were reported by the Chinese government to be 4,746 in 2006, 3,786 in 2007, and 3,215 in 2008; these numbers are likely underestimates. See “China Sees Coal Mine Deaths Fall, but Outlook Grim,” Reuters, January 11, 2007; and “Correction: 3,215 Coal Mining Worker Deaths in 2008,” China.org.cn, February 9, 2009.


INTELLIGENT VENTURES AND GEOENGINEERING: This section is primarily drawn from a visit we made to the Intellectual Ventures lab in Bellevue, Washington, in early 2008, and from subsequent interviews and correspondence with Nathan Myhrvold, Ken Caldeira, Lowell Wood, John Latham, Bill Gates, Rod Hyde, Neal Stephenson, Pablo Holman, and others. During our visit to IV, several other people contributed to the conversation, including Shelby Barnes, Wray Gibbs, John Gilleeon, Jordin Kare, Casey Teegene, and Chuck Witmer.... Conor and Cameron Myhrvold, Nathan’s college-age sons, also participated. They have already stepped into the invention racket themselves with a "wearable portable protection system for a body," or a human air bag. From the patent application: "In an embodiment, system 100 may be worn by athletes in lieu of traditional body-padding, helmets, and/or guards. In another embodiment, system 100 may be worn by people riding bicycles, skate-boarding, skating, skiing, snow-boarding, sledging and/or while engaged in various other sports or activities."... For some interesting further reading on their father, see: Ken Auletta, "The Microsoft Provocateur," The New Yorker, May 12, 1997; "Patent Quality and Improvement," Myhrvold’s testimony before the Subcommittee on the Courts, the Internet and Intellectual Property, Committee on the Judiciary, House of Representatives, Congress of the United States, April 28, 2005; Jonathan Reynolds, "Kitchen Voyeur," The New York Times Magazine,
DIRTY HANDS AND DEADLY DOCTORS: For *Semmelweis's sad ending*, see Sherwin B. Nuland, *The Doctor's Plague: Germs, Childbed
Fever, and the Strange Story of Ignatz Semmelweis (Atlas Books, 2003). / 204  “A raft of recent studies”: see Didier Pittet, “Improving Adherence to Hand Hygiene Practice: A Multidisciplinary Approach,” Emerging Infectious Diseases, March–April 2001. / 204–205 “To Err Is Human”: Linda T. Kohn, Janet Corrigan, and Molla S. Donaldson, To Err Is Human: Building a Safer Health System (National Academies Press, 2000). It should be noted that hospitals had already been trying for years to increase doctors’ hand-washing rates. In the 1980s, the National Institutes of Health launched a campaign to promote hand-washing in pediatric wards. The promotional giveaway was a stuffed teddy bear called T. Bear. Kids and doctors alike loved T. Bear—but they weren’t the only ones. When a few dozen T. Bears were pulled from the wards to be examined after just one week, every one of them was found to have acquired at least one of a host of new friends: Staphylococcus aureus, E. coli, Pseudomonas, Klebsiella, and several others. / 205–206 Cedars-Sinai Medical Center: see Stephen J. Dubner and Steven D. Levitt, “Selling Soap,” The New York Times Magazine, September 24, 2006. It was Dr. Leon Bender, a urologist at Cedars-Sinai, who led us to this story. / 205 The Australian study: see J. Tibbals, “Teaching Hospital Medical Staff to Handwash,” Medical Journal of Australia 164 (1996). / 207 “Among the best solutions”: for disposable blood-pressure cuffs, see Kevin Sack, “Swabs in Hand, Hospital Cuts Deadly Infections,” The New York Times, July 27, 2007; for the silver-ion antimicrobial shield, see Craig Feied, “Novel Antimicrobial Surface Coatings and the Potential for Reduced Fomite Transmission of SARS and Other Pathogens,” unpublished manuscript, 2004; for neckties, see “British Hospitals Ban Long Sleeves and Neckties to Fight Infection,” Associated Press, September 17, 2007.


EPILOGUE: MONKEYS ARE PEOPLE TOO
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Aab, Albert, 59
Abbott, Karen, 24
abortion, 4–5
accidental randomization, 79
Adams, John, 83
adverse selection, 53
Afghanistan, 65, 87
Africa, HIV and AIDS in, 208–9
Agricultural Revolution, 141–42
agriculture, and climate change, 166
air travel, and terrorism, 65–66
air bags, for automobiles, 150
Al-Ahd (The Oath) newsletter, 62
al Qaeda, 63
Allgemeine Krankenhaus (General Hospital), Vienna, 134–38, 203–4
Alliance for Climate Protection, 170
Allie (prostitute), xvi-xvii, 49–56
Almond, Douglas, 57, 58–59
altruism
  and anonymity, 109, 118
  and charitable giving, 106–7
  and climate externalities, 173
  and economics, 105,106–23
  effect of media coverage on, 107
  experiments about, 106–23
  and Genovese murder, 97–100, 104–5,106,110,125–31
  impure, 124–25
  and incentives, 125, 131
  List’s experiments about, 113–20, 121, 123, 125
  and manipulation, 125
  and monkey-monetary exchange experiment, 215
  and people as innately altruistic, 110–11, 113
  and taxes, 124
  warm-glow, 124–25
Amalga program, 73–74
Ambrose, Stanley, 189
American Civil Liberties Union (ACLU), 101
Americans with Disabilities Act (ADA), 139
ammonium nitrate, 142, 160
An Inconvenient Truth (documentary), 170, 181
The Andy Griffith Show(TV), 104
aneurysms, repair of, 179–80
animals, emissions of, 166, 167–68
annuities, 82
antimicrobial shield, 207
apathy, and Genovese murder, 99–100, 125–31
Apni Beti, Apna Dhan (“My Daughter, My Pride”) project, 5–6
Arbogast, Jessie, 14, 15
Archimedes, 193
Army Air Forces, U.S., 147
Athabasca Oil Sands (Alberta, Canada), 195
athletes
  birthdays of, 59–60
  women as, 22
automobiles
  air bags for, 150
and cheap and simple fixes, 146–58
children in, 150–58
crash-test data for, 153–55
as replacement for horse, 10–11
seat belts for, 148, 149–58
stolen, 173–75
autopsies, 137–38, 140, 203
Auvert, Bertran, 208
Azyxxi program, 73

baby boom, and crime, 102
banks, and terrorism, 90–96
Barres, Ben (aka Barbara Barres), 47–48
baseball, drug testing in, 92
baseball cards, experiment about, 115–17, 121
Baseball Hall of Fame, and life span, 82
Bastiat, Frédéric, 31
Bateson, Melissa, 122
Becker, Gary, 12–13, 105, 106, 113, 124
behavior
  Becker’s views about, 12
  collective, 203
  data for describing, 13–14
  difficulty of changing, 148–49, 173, 203–9
  of doctors, 203–8
  influence of films on, 15
  irrational, 214
  predicting, 17
  rational, 122–23, 213–14
  for self-welfare, 208–9
  typical, 13–14, 15–16
behavioral economics, 12–13, 113–23. See also specific researcher or experiment
Bernheim, Douglas, 105
Berrebi, Claude, 62–63
Bertrand, Marianne, 45–46
BigDoggie.net, 51
birth effects, 57–62
Bishop, John, 44
blood-pressure cuffs, disposable, 207
boats, wind-powered fiberglass, 202
Bolivar, Simón, 63
border security, 66
Budyko, Mikhail, 191
Budyko’s Blanket, 193–99, 200
Buffett, Warren, 195
“butterfly girls,” 24–25, 34
bystander effect, 99

Caldeira, Ken, 183–84, 185, 186, 191–92, 196, 200
Canada, Athabasca Oil Sands in, 195
cancer, 84–87, 92
cap-and-trade agreement, 187
capitalism, as “creative destruction,” 11
cardiovascular disease, 86
careers/professions
  and feminist revolution, 43–44
  and prostitution, 54–55
Carnegie Institution, 183
“casual sex,” 30–31
Cedars-Sinai Medical Center, 205–6
Chamberlen, Peter, 141
change
  behavioral, 148–49, 173, 203–9
  charitable giving, 106–7, 124
Chavez, Hugo, 198
cheap and simple fixes
and Agricultural Revolution, 141–42
and automobiles, 146–58
and childbirth, 133–38
and drugs, 145–46
and hurricanes, 158–63,178
and law of unintended consequences, 138–41
and oil, 142–43
and polio, 143–45
and population, 141–42
and puerperal fever, 133–38
and technological innovation, 11
and whaling, 142–43
See also Myhrvold, Nathan
cheating, 116–17, 121
chemotherapy, 84–86
Chen, Keith, 211–16
Chevrolet, 158
Chicago, Illinois, prostitution in, 23–25, 26–38, 40–42, 50–55, 70–71
chief executive officers (CEOs), women as, 44–45
childbirth
and cheap and simple fixes, 133–38,177
forceps in, 140–41
children
and MBA wage study, 45–46
seat belts for, 150–58
"chimney to the sky," 200–201
circumcision, 208–9
civil rights, 100
Civil Rights Act (1964), 43
climate change
and Budyko’s Blanket, 193–99, 200
control of, 198
cost-benefit analysis about, 168–69
and hurricanes, 158–63
incentives concerning, 203
lack of experiments about, 168
manipulation of, 190–91
prediction models about, 181–86
scary scenarios about, 169, 202–3
and volcanoes, 188–90
See also global warming/cooling
Clinton, Bill, 99
clouds, puffy white, 201–2
Club (anti-theft device), 173–74
coal, 187, 189, 200–201
competition, for prostitutes, 30–31
condoms
in India, 5, 6
and prostitution, 36, 53
Congress, U.S.
organ donation legislation of, 112
seat belt legislation of, 149
context, of experiments, 122–23
cooperation, forced, 123
Cornell University, auto crash research at, 147–48
crash-test research, 147–48,153–55
crime
impact of television on, 102–4
increase in, 100–104
criminal justice system, 101–2
Crutzen, Paul, 196–97, 200

data
for describing human behavior, 13–14,16
misinterpretation of, 120
on-the-spot collection of, 28–29
World War II use of, 147
See also specific experiment

De May, Joseph Jr., 127–28, 129, 130–31

death
as externality, 172
holding off, 82–87
life insurance for, 200
military, 87
traffic, 65–66, 87
See also terrorism
debt, forgiveness of, 140
decision making, 1
Defense Department, U.S., 15, 66
Department of Health, U.K., 207
Dictator (game), 109–10, 111, 113, 115, 117, 118–20, 121, 122, 123
discrimination
against women, 20–22, 45
and disabled workers, 139
gender, 45
price, 35
doctors
arrogance of, 205
measuring skills of, 74–82
neckties of, 207
oncology, 85–86
perception deficit of, 205
and puerperal fever, 134–38
report cards for, 74–75, 78, 121
strikes by, 81
as washing hands, 203–8, 209
women as, 80–81
Dolin, Eric Jay, 142
Dr. Leonard’s (health care catalog), 35
Dr. Who (TV show), 179
Drake, Edwin L., 143
drugs
and cheap and simple fixes, 145–46
and chemotherapy, 84–86
and holding off death, 84–86
and prostitution, 29, 36
testing for, 92
drunkenness, 1–3, 12, 14, 66, 96
dung, horse, 9–10, 12

“the economic approach,” 12, 16

economics
Allie’s study of, 56
and altruism, 105, 106–23
behavioral, 113–23
experimental, 106–23
macro-, 16–17, 211
as male field, 48
micro-, 211
predictions concerning, 16–17

electric shock treatments, 123

elephants, 15
emergency medicine, 66–69, 70–82
Endangered Species Act, 139, 143
envelope-stuffing experiment, 119–20
environment. See also climate; global warming/cooling; horses
Equal Pay Act (1963), 43
ER One program, 67
Ericsson, K. Anders, 60–61
Eriksson, Leif, 189
Eros.com, 51
escorts, 49–55
estate taxes, 83–84
European Union, child auto safety in, 157
Everleigh, Ada, 24–25, 26
false positives, 91–92
family reunions, and prostitution, 42
famine, 141–42, 177
Fatality Analysis Reporting System (FARS), 152–53, 156
fear, of pilots in World War II, 147
Federal Communications Commission (FCC), 103
Feied, Craig, 66–73, 75, 80, 81, 205, 207–8
feminist revolution, 43–44
Feynman, Richard, 107
fibbing, on surveys, 7
films, influence on behavior of, 15
financial crisis, 16
float, hurricane, 160–63, 178, 193
for-sale-by-owner market (FSBO), 39
forceps, in childbirth, 140–41
Ford, Henry II, 158
Ford Motor Company, 147, 158
Franklin, Benjamin, 189
freakonomics, definition of, 13
Friedman, Milton, 141

Galileo Galilei, 107

games
about altruism, 108–11, 113, 115, 117, 118–20
See also specific game
Gandhi, Mohandas, 63
Gansberg, Martin, 126–27
“garden hose to the sky.” See Budyko’s Blanket
Gates, Bill, 178, 180, 195
Gawande, Atul, 141
gender issues
and discrimination, 20–22
and life expectancy, 20
and profession, 47–48
and SAT-style math test, 46
and sex-change operations, 47–48
and wages, 21–22, 44, 45–47
See also women

General Electric, 190–91
Genovese, Kitty, murder of, 97–100, 104–5, 106, 110, 125–31
genoengineering, 191–92, 197, 199, 200, 202, 203. See also Budyko’s Blanket
germ theory, 138, 204
Germany, trash-tax avoiders in, 139
“gifted,” 61
Gladwell, Malcolm, 99
global warming/cooling
activism concerning, 169–71, 199
and Budyko’s Blanket, 193–99, 200
and cloud project, 201–2
and externalities, 172–73
and greenhouse gases, 166–68, 171, 182–83, 184–85, 188
IV’s work on, 180–99
and media, 11, 165
Myhrvold views about, 202–3
See also climate
Goldin, Claudia, 21, 45–46
Gore, Al, 112, 170–71, 173, 181, 184, 196, 198, 200, 203
Great Depression, 16–17
greenhouse gases, 166–68, 171, 182–83, 184–85, 188. See also carbon emissions
Guevara, Che, 63
handprints, bacteria-laden, 206
Harvard University, gender wage gap of graduates of, 21
Hawking, Stephen, 179
health care
spending for, 80, 84–85
See also doctors; emergency medicine; hospitals; medicine
heart disease, 84
Hispanics, and prostitution, 35
HIV and AIDS, 36, 208–9
Ho Chi Minh, 63
Hoffman, Mike, 129–30, 131
Homeland Security, U.S. Department of, 163
Homo altruisticus, 110–11
Homo economicus, 106, 110, 112, 113
horses, 8–10, 12
Horsley, Ian, 88–90, 91, 92, 94, 95–96
hospitals
errors in, 68–69, 72, 204
report cards for, 75
See also specific hospital
Hurricane Katrina, 158
hurricanes, 158–63, 178, 193
Iceland, volcano eruptions, 189
Ichino, Andrea, 21–22
impure altruism, 124–25
incentives
and altruism, 125, 131
and annuities, 82
to change behavior, 203
and chemotherapy, 85
and climate change, 173, 203
and doctors’ behavior, 206
and drunk driving, 2
and predicting behavior, 17
and prostitution, 19–20, 25, 41
and unintended consequences, 139
wages as, 46–47
and women in India, 4
India
condoms in, 5, 6
List in, 115
television in, 6–8, 12, 14, 16
TV in, 103
women in, 3–8, 14
Indian Council of Medical Research, 5
Industrial Revolution, 142
information, medical, 70–74
input dilemma, 188
Institute of Medicine, 204
Intellectual Ventures (IV), 177–203
pro bono work of, 198–99
See also specific person or project
MBA wage study, 45–46
McCloskey, Deirdre (aka Donald McCloskey), 48
McNamara, Robert S., 146–48, 150, 155, 158
media
and altruism, 107
and global warming, 11, 165
shark stories in, 14, 15
medical information, 70–74
Medicare, 85
medicine
emergency, 66–69, 70–82
errors in, 68–69, 72, 204
false positives in, 92
See also doctors; drugs; hospitals; specific disease
methane, 170, 188
Mexico, Oportunidades program in, 27–28
microeconomics, 211
Microsoft Corporation, 73–74, 178, 179, 190
Milgram, Stanley, 123
military, deaths in, 87
monkeys, monetary exchange among, 212–16
Moretti, Enrico, 21–22
Morris, Eric, 9, 10
Moseley, Winston, 98, 125–26, 128, 130, 131
mosquitoes experiment, 177, 180, 181
Mount Pinatubo (Philippines), 175–77, 190, 191, 196
Mount St. Helens (Washington), 188, 190
Mount Tambora (Indonesia), 189
Murphy, Michael Joseph, 125–26
Murthy, Rekha, 206
Myhrvold, Nathan
and Budyko’s Blanket, 197, 198, 199
and cheap and simple fixes, 179–80
and geophysical phenomena, 188–89
and global warming/cooling, 180–88, 190, 191, 192, 193, 194, 195, 197, 198, 199
and hurricanes, 159–62, 163, 178
personal and professional background of, 178–79
and scary climate scenarios, 202–3
Nash, John, 108
Nathan. See Myhrvold, Nathan
National Academy of Sciences (NAS), climate change report of, 165, 190, 191
National Association of Realtors, 56
National Automobile Dealers Association, 146
National Foundation for Infant Paralysis, 157
National Highway Traffic Safety Administration (NHTSA), 151, 152, 153
National Organ Transplant Act, 112
National Standardized Child Passenger Safety Training Program, 151
natural disasters, 175–77
natural experiments, 101
Nazis, obeying, 123
negative externalities, 8, 11, 171–173 203
neurobiology, as male field, 47–48
new ideas, as repugnant, 199–200
New York City
polio epidemic in, 144
terrorism in, 66
See also Genovese, Kitty, murder of
The New York Times
climate change story in, 165
Genovese murder story in, 98, 99, 125–27, 128
Newsweek magazine, climate change story in, 165, 166
Nobel Prize, 12, 59, 82, 115, 117, 184, 196, 198
object-oriented programming, 69, 72
“ocean acidification,” 183–84
Olmsted, Frederick Law, 42
on-the-spot data collection, 28–29, 70–71
oncologists, 85–86
Oportunidades (Mexican welfare program), 27–28
oral sex, 33–34
organ transplants, 111–13, 124–25, 199–200
Orne, Martin, 123
Oshinsky, David M., 144,145
Oster, Emily, 6–7
Oswald, Andrew, 82
output dilemma, 188
overconsumption, dangers of, 170
ozone, 190,196,197
Palestinian suicide bombers, 62–63
panhandlers, 124
paper goods delivery, List’s experience with, 117
parents
experiment about visiting, 105–6
and interviews about seat belts, 155–56
Parker, Susan W., 27–28
Pasteur, Louis, 204
perfect substitutes, 37
pilots, World War II, 147
“pimpact,” 37, 40
pimps, 37–38, 40–41, 56
police
and increase in crime, 104
and pimps, 40–41
and prostitution, 32, 41, 55
and stolen cars, 174, 175
and terrorism, 66
See also Genovese, Kitty
Policy Implications of Greenhouse Warming (NAS report), 190
polio, 143–45, 147, 157
politics, and prostitution, 25
popular culture, and crime, 100
population, and cheap and simple fixes, 141–42
positive externalities, 175, 176
practice, deliberate, 61
predictions, economic, 16–17
pregnancy, of prostitutes, 34
premarital sex, 31
President’s Council of Economic Advisors, 115
price
raising, 42
See also wages
price insensitive, 54
principal-agent problem, 41
prisoners
and guard-prisoner experiment, 123
release of, 100–102
Prisoner’s Dilemma (game), 108
professions. See careers/professions; specific profession
prostitutes/prostitution
and Allie, 49–55
arrest of, 32, 41
as career, 54–55
in Chicago, 23–25, 26–38, 41–42, 50–55, 70–71
clientele of, xvi, 33, 35
competition for, 30–31
and condoms, 36, 53
data about, 27
demand for, 43, 54, 55
and deviant acts, 34
downside for, 29–30
and drugs, 29, 36
and escorts, 49–55
exit strategy for, 55
as geographically concentrated, 32–33
incentives for, 19–20, 25, 41
and Internet, 40, 51
legalization of, 55
male, 36
monkey, 215, 216
need for champion for, 31–32
part-time, 42
as perfect substitutes, 37
and police, 32, 41, 55
pregnancy of, 34
and principal-agent problem, 41
protection for, 31
and race, 32–33, 35–36
Santa-like, 43
and sellers versus users, 25–26
street, 36, 41–43, 52, 54, 71
as trophy wives, 52–53
and type of tricks, 33–35
Venkatesh study of, 26–37, 38, 40–42, 70–71
and violence, 38
women as dominant in, 23–26, 40
See also pimps
puerperal fever, 133–38

race, and prostitution, 32–33, 35–36
Ramadan, 57–58, 59
rational behavior, 122–23, 213–14
real estate
   Allie’s license for, 55–56
   residential, 38–40
Reid, Richard, 65
rejection, and altruism, 108, 109
"relative-age effect," 60
religion, 82–83
repugnant idea, 199–200
reputation, and baseball card experiment, 116
retirement home visits, experiment concerning, 105–6
revolutionaries, 63–64
"Rimpact," 39, 40
Ripken, Jr., Cal, 92
Robespierre, Maximilien, 63
Roosevelt, Franklin Delano, 144, 157
Rosenthal, A. M., 125–27
ruminants, 166, 167–68

Sabin, Albert, 145
safety seats, child, 150–58
Salk, Jonas, 145
Salter Sink. See float, hurricane
Salter, Stephen, 178, 202
Santa Claus, 43
Santos, Laurie, 212
SAT-style math test and gender, 46
"Save the Arctic" plan, 195–96
"Save the Planet" plan, 196
Schilt, Kristen, 48
schools, as externalities, 175
Schumpeter, Joseph, 11
screen-saver solution, 206–7
scrutiny, 121–22
sea level, rising, 185–86
"seat-belt syndrome," 155
seat belts, 148, 149–58
"Seattle Stomp," 139
terrorists
biographical background of, 62–63
goals of, 63–64
identification of possible, 90–95
and life insurance, 94
methods used by, 88
and profiles of, 90–95
revolutionaries as different from, 63–64

See also September 11, 2001

Thirty-Eight Witnesses (Rosenthal), 126
Thomas, Frank, 116
Time magazine, shark story in, 14
Title IX, 22
"To Err Is Human" (Institute of Medicine report), 204
"too big to fail," 143
traffic deaths, 65–66, 87
trash-pickup fees, 139
trees, and climate, 186
trimmers, price of, 35
trophy wives, 52–53
Trotsky, Leon, 63
trust
and altruism, 116,117
and baseball card experiment, 116,117
typical behavior, 13–14,15–16

Uganda, babies in, 57–58
Ultimatum (game), 108–9, 110, 113
unintended consequences, law of, 6–8, 12, 138–41
United Kingdom
banks in, 89–95
climate change in, 166
University of Chicago
List appointment at, 118
MBA study of graduates of, 45–46
urban planning conference, and horse problem, 10
users versus sellers, 25–26

Variable X, 95
Vaux, Calvert, 42
Venkatesh, Sudhir, 26, 28, 29, 30, 32–37, 38, 40–42, 70–71
Vice Commission, Chicago, 23–24, 26
Vienna General Hospital (Austria), 137–38, 203–4
Vietnam War, 146
violence and prostitutes, 38
visas, 66
volcanic eruptions, 176–77, 188–90, 192
volunteers, in experiments, 121
Vonnegut, Bernard, 191
Vonnegut, Kurt, 191

wages
and gender issues, 21–22, 44, 45–47
as incentives, 46–47
and sex-change operations, 47–48
teachers and, 44
walking, drunk, 2–3, 12, 14, 96
"war on drugs," 25
warm-glow altruism, 124
washing hands, 203–8, 209
Washington, D.C., shootings in, 64, 66
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To learn about the underlying research on any given section of the book, please read the endnotes (Back Matter: Notes).
A few years ago, we wrote a New York Times Magazine column, “A Star Is Made,” about the birthdate bulge and Ericsson’s research on talent. We planned to expand upon it for a chapter in SuperFreakonomics. Alas, we ended up discarding the chapter, half-written, for in the time between the column and finishing this book, the field became suddenly crowded with other books that highlighted Ericsson’s research, including Outliers (by Malcolm Gladwell), Talent Is Overrated (by Geoff Colvin), and The Talent Code (by Dan Coyle).
This was in the early days of the Internet, before the advent of the Web.
These and other death rates are *risk-adjusted* death rates, controlling for age, other symptoms, etc.
This name is, for reasons that will soon become apparent, a pseudonym. All other facts about him are real.
Lowell Wood challenged Myhrvold’s quote of Archimedes: “Actually, he asked for a sufficiently long lever.” To which Myhrvold huffed: “He needed a fulcrum too!”