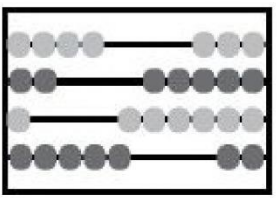
Counting

How We Use Numbers to Decide What Matters



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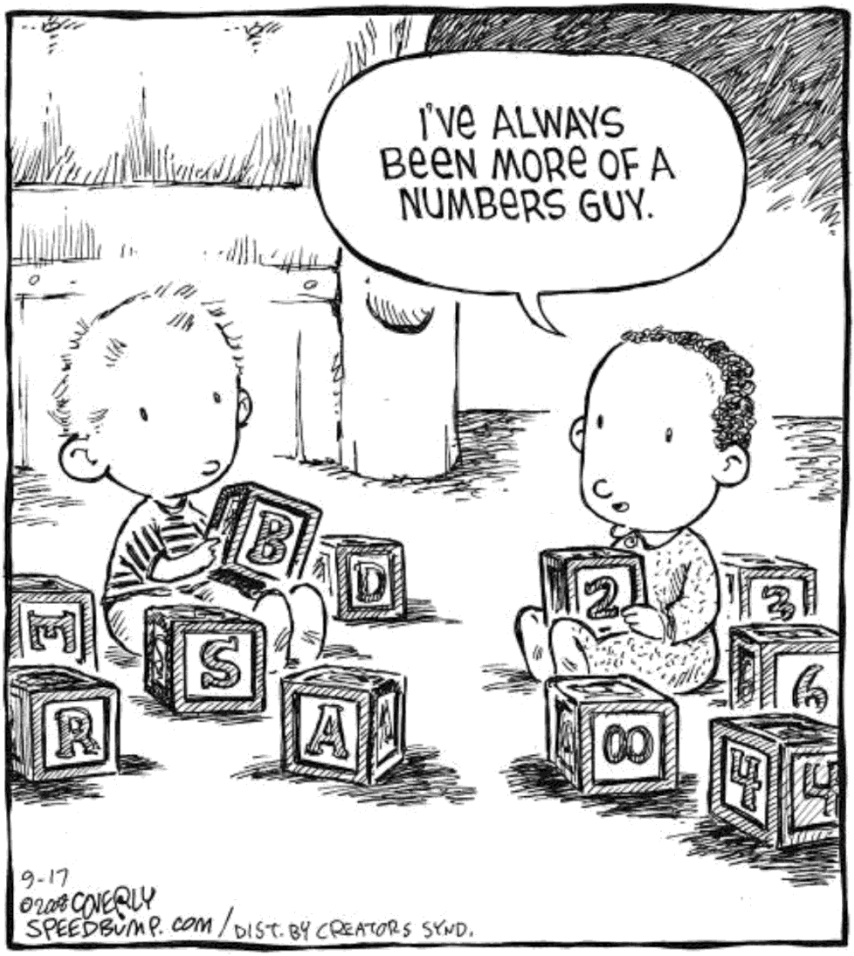
Prologue: Of Two Minds

During my sophomore year of college, I had an identity crisis.

I loved math and science courses because they reassured me there is some order in the world. Besides, math and science problems had right answers and I was good at finding them. But when daytime coursework passed into late-night dorm sessions, literature, philosophy, and politics posed more urgent and discussable questions: What is the meaning of life, and how can people live together to make the best of it? These questions had no right answers and my grades told me I wasn't very good at dealing with ambiguity. But at age 18, those were the questions I desperately needed to pursue.

I was trapped between "the two cultures," Sir Charles Snow's phrase for the chasm he observed between scientists and literary types. The two camps simply couldn't talk to each other. They spoke different languages, they thought differently, and they certainly had different ways of pursuing truth. My father had given me Snow's book in high school. At the time, it didn't speak to me. Now I saw that Dad had sensed my struggle long before I did.



Browsing one day in a campus bookstore, I found a ray of hope in an essay called "The Creative Mind" by Jacob Bronowski. Bronowski challenged the two-cultures divide by showing that creativity is the same process for scientists, poets, and painters. They all grope for new understanding by finding "hidden likenesses" that others haven't noticed. Scientists, he wrote, don't make discoveries by "taking enough readings and then squaring and cubing everything in sight." Copernicus couldn't have gotten the idea that the earth revolves around the sun with only a camera and a measuring stick. "His first step was a leap of imagination—to lift himself from the earth, and put himself wildly, speculatively into the sun." From that vantage point, he saw that "the orbits of the planets would look simpler if they were looked at from the sun and not the earth." For Bronowski, Copernicus's creative moment, the poet's metaphor, and the painter's imagery are all of a kind.

I felt liberated by Bronowski's insight. I didn't know how I was going to reconcile the two cultures for myself, but I knew it would require some leaps of imagination. I bolted from my science path and through a circuitous route became a political scientist, despite an ominous note from a professor on one of my papers: "B—This is a credible effort, but you'll never be a political scientist." Political science is an oxymoron if ever there was one. The very name spans the two cultures. I should have known I would remain caught between the two cultures for the rest of my days.

I landed my first teaching job in another oxymoron, a new program called "Policy Science." My colleagues were positively smitten with numbers. There was no policy problem and no personal problem (Should I marry my girlfriend or boyfriend?) for which statistics couldn't find the best answer. Almost everyone else on the faculty was teaching our students how to find the mathematically best answer to policy problems. As the only political scientist, my job was to teach them how to get their neat solutions through the messy political process. I didn't know much about statistics but I sure knew they don't carry much weight with politicians. I knew that stories are more persuasive than numbers. And I knew that politicians, advocates, and activists could use numbers for both good and evil.

On the side of good, there was asbestos. In the 1960s, labor unions and doctors used numbers to document that breathing asbestos fibers causes mesothelioma, a fatal lung cancer. Finding the link between asbestos and cancer was one of many public health triumphs indebted to numbers. On the side of evil, there was the Vietnam War. Robert McNamara, Lyndon Johnson's defense secretary, measured success in Vietnam by counting dead Vietnamese people, the infamous "body counts" of the nightly news. Over the course of my career, I've seen numbers be touted as either Jekyll or Hyde. At one moment, numbers are the only facts we can trust. At another, there are "lies, damned lies, and statistics."

Nowadays, the battle between the two cultures often takes place under the banner of "Numbers Versus Stories." My town, Brookline, Massachusetts, hosts the first marijuana dispensary in the Greater Boston area. As the town was getting ready to license a second one, nine hundred residents signed a petition asking the town to put restrictions on both dispensaries. At a public hearing, neighbors complained of litter, public urination, and "consuming in public." They spoke about crowded sidewalks, traffic congestion, and parking problems, all harmful to nearby businesses. One woman said she felt afraid to walk home at night.

"Stories aren't facts," the president of the first company responded. "We take the concerns of our neighbors very, very seriously and will continue to do so, but facts and data really need to drive this discussion." By "facts" and "data," she meant numbers. She was staking a familiar claim: People are hopelessly subjective and biased. They see the world from their own narrow point of view. Their

anecdotes are nothing but fleeting glimpses of their distorted perspective. Numbers, by contrast, are objective.

I'm all in favor of the pot shops. The "stories aren't facts" gambit bothers me, though, because it dismisses citizens who can't express their experience in numbers. Calling for more data makes a great stalling tactic, too. It tells town officials, "Stick with the status quo until we get some numbers."

On the other hand, what's not to love about objectivity? Objective means fair and impartial—the opposite of biased and playing favorites. For scientists, objectivity means that when different people study the same problem or count the same things, they'll get the same answer. They'll get the same answer because, if they're good scientists, they strip themselves of personal biases. In the words of someone who bills himself as a science advocate, "There is a world. It is real. It is home to objects and processes that exist independent of us and our beliefs." I love that world. It's the world where I can spend hours at a pond contemplating the beavers and frogs, the wind gusts and water ripples, the trees, the clouds, and an oncoming storm. None of those "objects and processes" gives two hoots about what I think of them. That world is a physical world. It is home to things like rocks and tornadoes that don't morph according to how we feel about them.

This book is not about that world. This book is about the social world. The social world is filled with human ideas and experiences that most definitely shapeshift in response to our thoughts and feelings. This book is about how we take the measure of those nebulous notions connected to the meaning of life that goaded me in college and still do. How do we count how much freedom and equality we have? How do we decide who is poor or disabled and deserves society's help? How do we measure democracies to know how democratic they are and how we can make them more so? How do we measure pain so doctors can help us cope with it? How do we measure students' knowledge and teachers' teaching ability to find out how the two are connected? How do we count racial and ethnic identity, and why *do* we count it, anyway? How do we measure the size and strength of a nation's economy? How do we find out how many people are unemployed? How do we count violence and crime?

There's no way to take biases out of these questions because they're not objects independent of us and our beliefs. They're ideas and interpretations of our experience. We fashion and interpret these not-things in the workshops of culture, religion, gender, race, and politics.

In my quest to bridge the two cultures, I've come to think that reimagining numbers is the key. Numbers are, so to speak, the tiniest particles of scientific thinking. They seem like hardcore facts: 1 is 1 and 3 are 3 and there are no two ways about it. But 3 what? Three pieces of freedom? Pasting a number on an idea doesn't tell you what you've got in your hand. The number only makes you believe

that you caught whatever you were trying to catch by counting.

Numbers spring from leaps of imagination, from seeing likenesses between things that aren't exactly the same. To count how many people are unemployed, you've first got to decide what unemployment means. You've got to find the hidden likeness between a worker who was displaced by his inability to compete with a robot and one who was displaced by her inability to afford childcare. Our current way of counting the unemployed doesn't see this likeness. We fight about how to measure unemployment or anything else by making imaginative leaps and trying to get others to leap along with us. Those imaginative leaps are metaphors, the same metaphors that are, so to speak, the tiniest particles of literature and art.

To see numbers as metaphors doesn't render them useless. Like all tools, numbers are much more useful if we know what they're made of and how they work. Then we can use their underlying metaphors as springboards for our own imaginative leaps. We can't do *without* numbers, so the challenge is how we can do a lot better *with* them.

In the social world, numbers aren't mere figures. They're authority figures. For centuries, people have wondered why readers and theatergoers suspend their critical faculties long enough to enjoy living in a made-up world. I wonder why people (including me) so often trust numbers, seeing as how finagling with numbers is a common way to cheat. I shudder at some of the ways we allow numbers to determine our own and other people's fates. And I marvel at how the very process of counting can change how we behave. Anyone who's dieted or worn a Fitbit knows how that works.

If every number begins with a judgment, and if we allow numbers to determine people's fates, we should hold numbers to the same ethical standards we hold our judges to. We should expect those who count to disclose and justify their judgments. We should make sure people harmed by counting-decisions have opportunities to challenge them. The more we outsource decisions to automated counting systems, the more important it becomes to authorize humans to make exceptions. Above all, we shouldn't use numbers to cover over our deep conflicts and ethical dilemmas. That's what the Founding Fathers did. They reconciled the North and South by counting slaves as three-fifths of a person in the federal census. Some questions can't be answered with a number. To count well, we need humility to know what can't or shouldn't be counted.

Every chapter in this book tells stories about the life of numbers. The stories illustrate how numbers spring from their creators' imaginations, how their creators infuse them with meaning, and how they wield power. Almost every example could fit nicely in a different chapter from the one where I put it. That's because there are many ways to tell a story about anything, and numbers are no exception. If you see other stories about my numbers besides the ones I tell, as an

author I couldn't ask for more.

Brené Brown studies vulnerability and shame. She's an academic researcher who collects people's stories as her data. "Stories are just data with a soul," she says. Too often numbers are used as data without a soul. But numbers are made of stories. They *are* stories. This book is about how to put the soul back into numbers.

COUNTING

1

There's No Such Thing as a Raw Number

When I began work on this book, I thought I should consider how children learn to count, so I headed straight for *One Fish, Two Fish*. If anyone could make counting fun, surely Dr. Seuss is the man. He has a way of getting in league with kids against grown-ups and all their seriousness. But I had a surprise coming. Here's how the book begins:

One fish, two fish,
Red fish, blue fish
Black fish, blue fish
Old fish, new fish
This one has a little star,
This one has a little car
Say! What a lot of fish there are.

Say! What happened to my counting lesson? There are no number words after two. We get lots of fish *qualities* but wind up with the vague quantity term "a lot." It's as though Dr. Seuss has already given up counting after the first line, because he's enchanted by something special about each fish. But let's keep going. Maybe he'll eventually get beyond two.

Some are fast.
Some are slow.
Some are high.

And some are low.
Not one of them
is like another.
Don't ask us why.
Go ask your mother.

Well, no help with counting here. *One Fish, Two Fish* is not a learn-to-count book, as I'd remembered. Dr. Seuss meant this book as a message about tolerance, celebrating differences, and having fun together. But for me, *One Fish, Two Fish* is also a profound statement about why it's impossible to count objectively.

Dr. Seuss never asks, "What makes them all fish? What is fish-ness?" That's the unanswered question and the paradox we can't resolve. Dr. Seuss *ignores* differences to count them all as fish at the same time as he *celebrates* differences to count them all as fish. Here is the existential dilemma of counting: How can we possibly count things if not one of them is like another?

And here is where counting meets power. The only way to count is to force things into categories by ignoring their differences. By the time we're adults, we've lost sight of the mental coercion entailed in counting. So let me refresh your memory by taking you back to preschool.

First, we teach you the sequence of number words in your native language—one, two, three. When you can recite those, we start pointing to objects and saying number words as we point. In the earliest counting lessons, adults put objects or pictures in front of kids, implicitly telling them, "These are all the same. They each count as one member of a group." They're all fish.

But counting is more than merely attaching number words to a heap of things. Before you can tally up how many "somethings" there are, you have to sort things and decide which ones belong to the group of things you want to count, unless an adult has already done the sorting for you. It's one thing to put a row of peas in front of a kid and ask her to count them. It's quite another challenge to give her a heap of peas and soybeans and ask her to count the peas.

We start training children very early to distinguish between what counts as important and what doesn't. A classic type of counting worksheet shows several triangles, rectangles, circles, and stars. Each shape comes in different sizes and colors—small stars, big stars, red stars, blue stars, and so forth, rather like *One Fish, Two Fish*. The point of this exercise is to teach kids to classify before they count. A teacher, or perhaps the worksheet, asks, "How many triangles are there? How many stars?" A child can't do this task unless a grown-up has already taught her some clear-cut rules: "If it has 3 points, it's a triangle. It doesn't matter what color a shape is or how big or small. If it has 3 points, it's a triangle." Along with learning the shape rules, the kid is learning to ignore color and size. The kid is

also learning to stereotype. All things with 3 points get treated as triangles, even though some are red and some are blue and some are not very big at all.

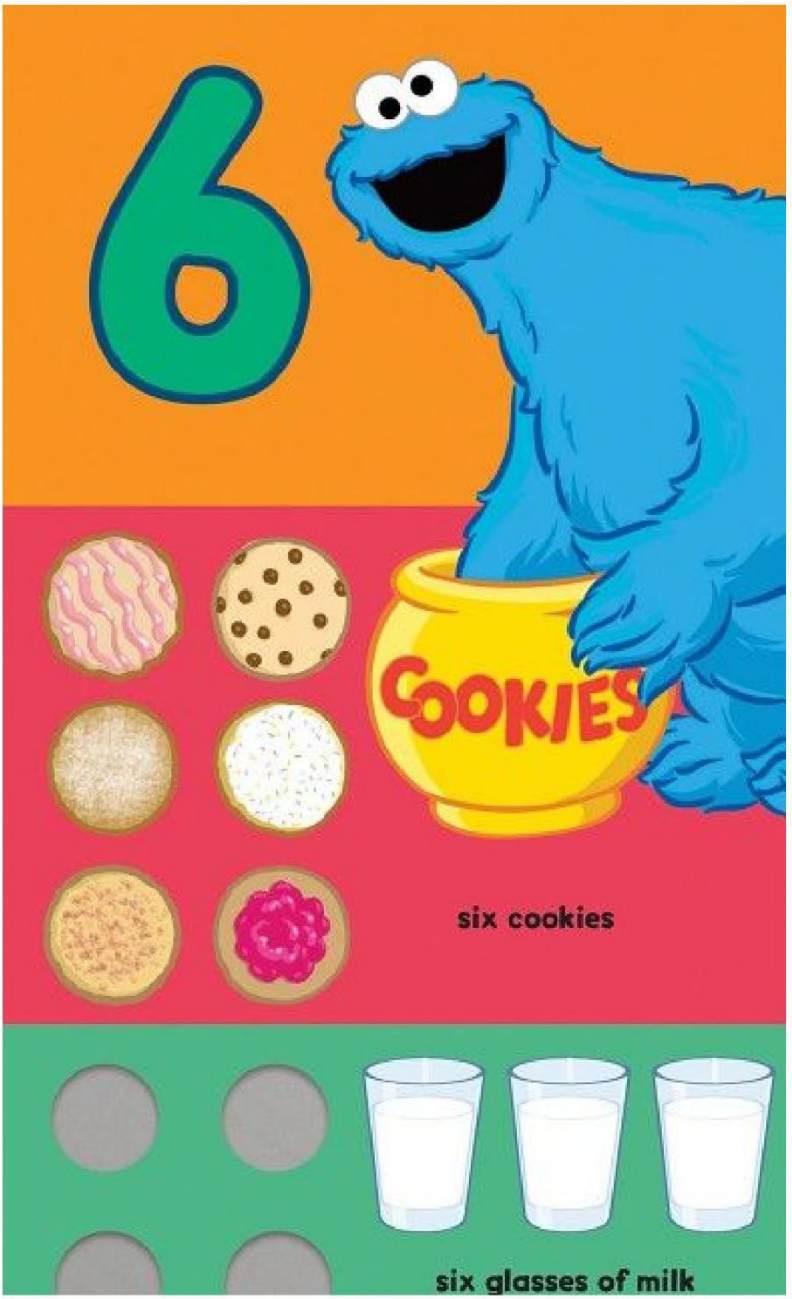
Counting, then, entails two mental moves: first classifying, then tallying. In the first phase, counting is a way of making metaphors, because we start by finding similarities among things that are different. Numbers—those things people revere because they're so precise and objective? We construct them by making our own decisions about how to separate things into groups. In the split second before we decide, the thing could go either way; it could be a *this* or it could be a *that*. Numbers are a magic wand that resolves ambiguity into one-ness.

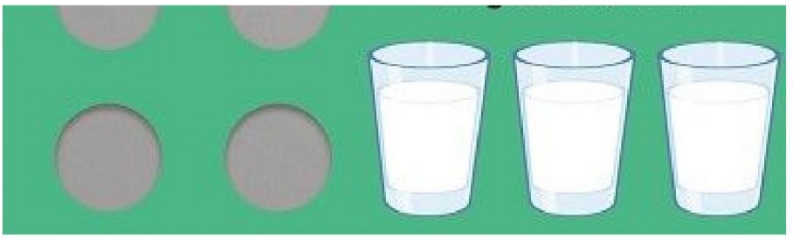
Learning to count is much like learning to talk. The first step in learning to talk is learning to name things. When kids learn the word for "nose," they learn to point to "my nose," "Daddy's nose," "Mommy's nose," "Fido's nose," and to think of all these different things as belonging to the same category, never mind that they look, feel, and *are* different. That wet thing at the tip of Fido's snout is like this little knob on my face and that pointy thing on Mommy's face. They all have the same name so they're all the same. Language is all metaphor.

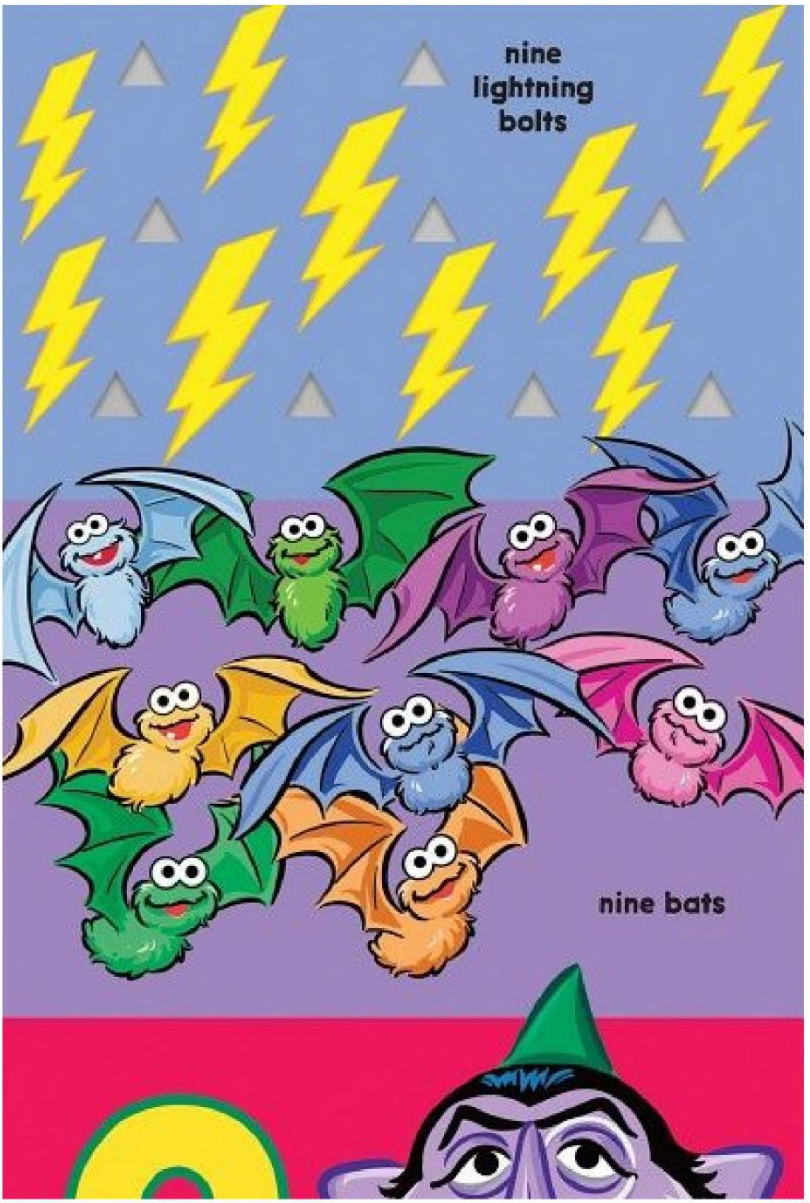
The connection between naming and counting leapt to mind when I overheard a snippet of conversation in Venice. I was on a vaporetto gliding down the Grand Canal toward the giant domed church called La Salute. In front of me sat a French couple with their little boy, about two, I guessed. As we approached La Salute, he pointed to it and exclaimed, "La Tour Eiffel!" Perhaps to him the words Eiffel Tower meant something like "big," or "the tallest thing around." How else to explain his thinking except that some concept of size was embedded in his understanding of the name? He was learning to classify objects according to one feature—in this case size—and name them accordingly. And if I'm right, then the way he ignored shape, color, and everything but size to name the building was no different from how a child follows a counting rule such as "If it has 3 points, it's a triangle." We use the same principle to name and to count. Naming is another way of "counting as."

Counting and naming both require us to find similarities between things that are different. Children's learn-to-count books subtly teach about classification along with tallying. In the Sesame Street book *1 2* 3 *Count with Elmo*, Cookie Monster stands next to the numeral 6 with his paw in the cookie jar, smiling at 6 glasses of milk and 6 cookies. The Count points to the numeral 9 while he savors a night sky with 9 lightning bolts and 9 bats. The milk glasses and lightning bolts are exactly the same in size, shape, color, even their orientation on the page, but no two cookies are alike and no two bats are alike. Some cookies have much more enticing frosting, with pink squiggles, chocolate dots, cherry jam, or sprinkles. Others are more plain. The bats are different colors, some are smiling and some have closed mouths, and some of them have teeth. To a kid, those differences are

worth considering. But kids are supposed to learn that even though the cookies look different and taste different and some of them are prettier than others, they're all cookies. Even though some bats look like better playmates than others, for purposes of counting, they're all the same.







Here, at last, is the lesson you didn't get in preschool. When kids learn to count, they're not just learning number words and numerals; they're learning *how adults see things* and the unspoken rules adults use to consider some things alike and some different.

The U.S. Census Bureau counts racial and ethnic identity using the unspoken rule in the Obama cartoon. Until recently, the census mainly assigned people to five categories that were first proposed by a German doctor in 1776: Caucasian, Asian, Pacific Islander, African American, and American Indian. The Census Bureau hired people to go door-to-door counting noses and marking down a race for each person. Census officials, like most people at the time, imagined the categories as biological facts, but their written instructions for the census takers revealed the

sheer political power behind the categories. In 1930, a door-to-door canvasser was told: "A person of mixed white and Negro blood should be returned [counted] as a Negro, no matter how small the percentage of Negro blood." This was the infamous "one-drop" rule that Southern states used to consign Negroes to lesser legal status and discourage interracial marriage.

To census officials of the time, Negroes were easier to classify than Mexicans. "Practically all Mexican laborers," the instructions continued, "are of a racial mixture difficult to classify." To help the census takers, the instructions offered a clear rule: *"It has been decided* [by whom, we don't know] that all persons born in Mexico, or having parents born in Mexico, who are definitely not white, Negro, Indian, Chinese, or Japanese, should be returned as Mexican (Mex)." Clear? Put on your census-taker hat and try implementing that definition.

Gradually, the Census Bureau added more race categories and gave people more freedom to classify themselves. Starting in 1960, the bureau mailed questionnaires for residents to fill out. Enumerators visited only households that either didn't have a mailing address or didn't return the questionnaire. In 1980, the bureau added a new question, separate from the race question, asking people whether they consider themselves Hispanic—yes or no. (How and why that happened is another story, which we'll get to in Chapter 5.) Then, in 2000, for the first time the race question gave people the option to check more than one race. Now there were at least 14 races to identify with, plus a "Some other race" box with space for writing in one's preferred race label. No longer was race something to be assigned by an unnamed authority. Nor was race an all-or-nothing proposition where a person would be counted as having one race regardless of mixed ancestry. Or so it seemed.

"Census: White Becoming Minority in the U.S."

New York Times, June 20, 2018

"The U.S. Will Become 'Minority White' in 2045, Census Projects"

Brookings Institution, *The Avenue* blog, March 14, 2018

Headlines like these come about because when the Census Bureau predicts the future, it still assigns people to race categories using the one-drop rule. People who embrace a mixed heritage by checking "White" and any other box in the race question aren't counted as white. When mixed-heritage couples fill out the census form for their children, they usually try to honor both parents' heritages by checking multiple boxes. That means most children of mixed marriages aren't counted as white. Because intermarriage is increasingly common and children of mixed marriages count as nonwhite—presto!—the white population is going down. And that's not all. The only people who count as whites are those who say they're

not Hispanic and check *only* the "White" box in the race question. They're called "non-Hispanic whites," as if Hispanics can't be real whites. Everyone else, including Hispanics who say they're white, gets counted as nonwhite and labeled as "Minority." Presto! The U.S. will soon be a "minority-white" nation.

The Census Bureau's counting rules do a number on racial and ethnic integration. Intermarriage is a sure sign of social assimilation. By counting children of mixed-race marriages as nonwhite, the bureau segregates them statistically. It's as though census officials refuse to see progress in social harmony.

How we count makes all the difference—and therein sleeps a giant conundrum. We want to believe numbers are objective, yet we know statistics can lie.

It's easy to see why many people believe numbers are objective. When we first meet them in childhood, they're introduced to us as creatures with impeccable credentials. They're precise, accurate, and beyond dispute. In preschool we learn that there's only one way to count. In elementary school, we learn that every arithmetic problem has one right answer.

As we grow up, we gain another reason to put our faith in numbers: we want to be treated fairly. When people make decisions about us, we want them to decide for good reasons. We want them to be objective. If people with power over us consider only measurable factors in their decisions, we feel somewhat protected against their whims, prejudices, and whatever else might be eating them on the day they decide our fate.

Because numbers enjoy an aura of objectivity, it's tempting to resolve political and moral conflicts by translating them into arithmetic problems. Perhaps no area of law is as thorny and contentious as equal treatment. Title IX of the Civil Rights Act concerns equal educational opportunity for women and girls. One section requires colleges and universities to provide equal athletic opportunities to male and female students. In 2010, a case against Quinnipiac University came down to a classification question similar to whether a cookie with plain white frosting counts the same as one with fancy pink squiggles. The question was: Does cheering and tumbling count as a varsity sport? If cheering and tumbling *does* count, then the university had an equal number of varsity teams for men and women and met its obligation to provide "equal opportunity." A federal judge ruled that cheering and tumbling couldn't be counted as a varsity sport. To achieve parity, the school would have to either add another women's varsity team or eliminate one of its men's teams. There were other issues in the case, including whether the school accurately reported the number of female athletes on its teams. Still, you see the point. Is there an objective, truthful answer to whether cheering is a sport? Or

whether a school provides equal opportunity for men and women in sports? Nope.

Most of the big questions we care about, like equal treatment, are hard to wrap our minds around. If we break them down into counting problems, we feel as if we've tamed them and made them manageable. Then again, most of us know better than to trust numbers. As the saying goes, if you torture the numbers long enough, they'll confess to anything. Stuart Rice, who served as president of the American Statistical Association and as a high official in the Census Bureau, once warned: "Statistical method and statistical data are never ends in themselves. They are always accessory to some purpose." You can almost hear Sherlock Holmes tiptoeing into a conference of statisticians to suss out Nefarious Purpose.

Sixty years ago, a little-known magazine writer made it his business to suss out statistical perps in a book whose title you probably know, even if you haven't read it: *How to Lie with Statistics*. Darrell Huff introduced his book as "a sort of primer in ways to use statistics to deceive." He explained: "It may seem altogether too much like a manual for swindlers. Perhaps I can justify it in the manner of the retired burglar whose published reminiscences amounted to a graduate course in how to pick a lock and muffle a footfall: The crooks already know these tricks; honest men must learn them in self defense."

Huff showed how crooks could distort honest statistics with deceptive packaging—things like biased samples, weasel words, misleading graphics, and taking numbers out of context. But the problems with statistics run far deeper than Huff imagined. Statistics aren't born with honest meanings that people later corrupt with false advertising. Every number is born of subjective judgments, points of view, and cultural assumptions. Numbers are filled with bias through and through, because that's what categories do. Categories are ways of seeing and *not* seeing, in the same way a racist sees skin color without seeing a person.

There's no way out. Categorizing cooks the numbers—not in the sense of deliberate fudging, though there's plenty of fudge to go around, but in the sense that someone has to make judgments and interpretations before counting can begin. Numbers are products of our imagination, *fictions* really, no more true than poems or paintings. In this sense of fiction, all statistics are lies.

One of my friends read a draft of this chapter and protested, "I'm a physicist and I don't think all statistics are lies." His comment brought me up short. Physicists, I quickly realized, deal with the physical world. In that world I'm quite trusting of statistics, too. Every time I drive over Boston's Zakim Bridge, I thank the statistics that proclaimed how strong the suspension cables should be to keep me from plunging to my death. I'm not a physical scientist, though. I'm a social scientist. I deal with the social world. Social scientists truck in ideas and emotions, motives and intentions, hopes and fears, cooperation and conflict, love and hate—and a lot more that I've left out. The social world certainly has elements of the

physical world. We live in physical bodies, we walk on the earth, and we sense the physical world every minute with our eyes, ears, noses, tongues, and skin. The physical world is crucial to our survival. Yet as fascinating as that world is, the social world fascinates me more. I'm drawn to the mysteries of social relationships and the puzzles of philosophy. I'm trying to find my way through a world of intangibles. In that world, counting only gets us so far.

In Rachel Kushner's short story about a prison, Gordon Hauser has just started a new job prepping inmates for the GED test. Hauser poses a word problem to one of his tutees: "If there are five children and two mothers and one cousin going to the movies, how many tickets do they need? (a) seven, (b) eight, (c) none of the above."

"What movie are they going to?" the woman asks.

The tutor tells her, "That's the wonderful thing about math: it doesn't matter. You can count without knowing the details."

The woman persists. She says she needs more detail in order to "imagine these people." Hauser has already pinned a judgment on her. He thinks she's a tad obtuse and can't grasp abstraction, so he simplifies the question for her by stripping away some of the details: "There are three adults and five children. How many tickets do they need?"

"You didn't say if they let kids in free, so how can I know how many they need? And depending on what kind of people they are, what theater this is—are they ghetto or are they squares like you? Because maybe they let one of the adults, like that cousin, in through the emergency side door, after they pay for two tickets."

In math class, no matter what kind of thingamajigs you're counting, 5 + 3 = 8. Details about the 5 and the 3 don't matter. Outside the classroom, details matter. Lopping off the details of human experience is like amputating an arm or a leg. Before we amputate, we'd better make sure the patient will benefit.

The inmate-narrator in the story doesn't need remedial first-grade arithmetic. She's sick of being on the butt end of condescension. Instead of telling the tutor straight out, though, she outsmarts him with an excellent tutorial on counting. She teaches him not to start measuring a situation until he understands how people think and behave. And by the way, he ought to learn some details about *her* before he jumps to conclusions about her smarts.

Abstraction, leaving out the details, is a powerful thinking tool. Leaving out the details lets us see the unadorned essence of things. Without abstraction, Dr. Seuss's fanciful fish, the red one, the blue one, the one with a car, and the one with a star—they wouldn't all be fish. Without abstraction, we couldn't compare people's economic situations because when it comes down to the details of income

and expenses, "not one of them is like another." With abstraction, we lose important information unless someone like Dr. Seuss gives us the information in words.

Think about Amazon's customer product ratings. A row of five stars sits just beneath most product names. At a glance, you can see a product's overall score, from 1 to 5 stars. When I'm browsing, a 1- or 2-star overall rating kills the deal, but if I'm halfway interested in a product with three or more stars, I click to read the words. Often the words are useless. "I bought this coffee maker for my wife. She loves it." More often than not, though, the verbal comments tell me what people like and don't like about the product and its seller. Numbers help me winnow my choices, but words let me decide what matters to *me*.

Abstraction is more than a thinking tool. It can be a powerful political tool, for better and for worse. It can be a way of stereotyping, as the prison inmate knows so well. It can also start people agitating for political change. Abstraction enables people to conceive of human rights that apply to blacks as well as whites, women as well as men, and fetuses as well as infants. Try lumping women and men together to count them both as humans and you'll get pushback, maybe not in *your* kitchen, but in a sharia court you'll feel the crush of opposition. Don't count fetuses as humans and you'll get an angry protest at an abortion clinic.

Amputations hurt people when they're carried out with machetes by warring tribesmen, but they can help people, too, and usually do when they're performed by surgeons. Antidiscrimination laws could be seen as salutary amputations. They eliminate race, gender, and religion as "details" that can be used to decide whether to hire people, sell them homes, or arrest them.

We can't escape abstraction nor should we try, but we should be careful how we use it.

Trying to measure abstractions such as equality or human rights puts us in peril of the double-edged sword, the one with a blade that cuts two ways. Here's a double-edged sword from Afghanistan. Afghanistan's Independent Human Rights Commission aims to stop human rights violations, with a special focus on gender-based violence. Monthly reports from around the country show that the number of complaints has been increasing from year to year. So has the number of complaints that the commission finds to be genuine human rights violations. One way to interpret the bigger numbers is that the human rights situation is getting worse. But the commission leaders see the increase as a big success. They have worked to educate people about their rights and to encourage people to report violations. To the commission, more reports mean that the culture of human rights is getting stronger. Which is it? Do bigger numbers mean failure or success?

I go with the commission's interpretation, because you can't change people's actions without first changing their ideas and attitudes.

Here's another double-edged sword. If a doctor keeps you waiting for an appointment, is that a sign of good care or bad? In my informal polls, most people are annoyed by lateness, especially when it interferes with their own busy schedules. They think a late doctor is an inefficient doctor and should be graded accordingly. Other people—I'm one of them—take running late as a good sign. It means the doctor spends as much time as each patient needs. For these people, a late doctor gives better, more dedicated care and should get bonus points. It's hard to say whether lateness means good care or bad.

How about this double-sided slicer: Which store offers more value for the money, the one with lower prices or higher prices? Low prices mean affordability for consumers. A dollar goes further in a store with low prices than it does in one with higher prices. But low prices might also mean low-quality goods and low wages for employees, some of whom also shop at the store. Are low prices a good measure of value? It depends on your point of view. Are you a consumer or an employee? What if you're both?

At the risk of hacking you to pieces, here's one more double-edged sword. Foreign-aid agencies would like to target their aid to democratic countries. For that, they need to measure democracy. They need to know how much of it nations have and whether a nation has advanced or backslid on the path to democracy. How do they find bits of democracy they can observe and count? Nearly everyone in the democracy-assessment business thinks elections are an essential element of democracy, but they don't always agree on what makes some elections better than others. Some experts think that if a country requires its citizens to vote, higher turnout makes elections more representative; thus, mandatory voting enhances democracy. Others think mandatory voting impinges on citizens' freedom, thus diminishing democracy. Is there a right answer? No, it's a thorny question of "counting as." There are good reasons to count both ways.

In the physical world, things carry on apart from our beliefs about them. It might not be easy to count subatomic particles, but at least they exist outside our heads. Much of what we care about in the social world exists only inside our heads. Sure, events such as doctor visits and elections take place outside our heads. We can count those events rather easily, but measuring what they mean is a different kettle of fish.

For understanding human experience, purely subjective measures have a lot to offer. Unless you've led a blissful, pain-free existence, you've been asked by doctors to rate your pain on a scale from 1 (barely noticeable) to 10 (worst

imaginable). Most people I know find this exercise difficult and resist it. "I *hate* that question," a friend told me when I mentioned I was writing about pain scales. We were enjoying a pain-free walk in the Arnold Arboretum, but I stopped admiring the trees to ask her, "Why do you hate it?"

"It's so subjective," she answered. I pressed her to explain.

"My tolerance isn't the same as another person's."

I probed some more: "Isn't it helpful to let doctors know how much *you* can tolerate?"

She thought for a minute. "Maybe it's not hurting at all when I go into PT," she started, "but when they touch me or move me, it hurts like hell. So which number is it?"

Pain is the most isolating experience there is. No one else can know how your pain feels, much less feel it. As crude as pain scales are, they help us to communicate the inexpressible, not only to get sympathy but, ideally, to get help.

Ronald Melzack was a graduate student at McGill University in the 1950s when doctors there developed an instrument to measure pain objectively. As you might suspect, the "dolorimeter" was an instrument of torture, albeit mild. Researchers focused an intense light on subjects' skin, noting when the subjects first cried "Ouch" and when they couldn't stand it anymore and pulled away. In one study, researchers asked pregnant women to say when the pain produced by the light on the back of their hand was equal to the pain of a labor contraction. (Now there's an algebra formula I bet you never learned in school.)

Melzack had the good sense to know that "a tiny burn is not like a headache, a toothache, a heart attack or a kick on the shin"—nor like giving birth—and he quickly rejected the reigning idea that pain could be measured on a simple 1-to-10 scale. During a year as a postdoctoral student, his mentor sent him to a pain clinic and told him to "listen to patients suffering from more pain than you can imagine." The patients, Melzack later wrote, had "a rich vocabulary" to describe their pain in vivid detail. Melz-ack started collecting words and sorting them into categories. One category described sensory experience, such as pulsing, shooting, pinching, gnawing, tugging, burning, and stinging. Another category included emotion words, such as exhausting, sickening, terrifying, cruel, or wretched. Another he called "evaluative": annoying, troublesome, miserable, intense, and unbearable. Then there were miscellaneous words, including tight, squeezing, cold, freezing, nagging, and torturing. I don't understand why he grouped some of the words the way he did, but that's not important. With all these ways of describing pain, Melzack realized, it was no longer tenable to believe that all pain is experienced the same way, varying only in intensity from "barely noticeable" to "off the charts."

Melzack developed what became the widely used McGill Pain Questionnaire, a

sort of thesaurus for pain words. It groups words in an ingenious way that allows patients to communicate the quality of their experience much better than they can with a single number. As another plus for his system, words such as burning, stabbing, or cramping can sometimes enable doctors to pinpoint a diagnosis. Patients' answers to the questionnaire can also tell doctors whether a treatment helps reduce specific kinds of pain. Melzack and his colleagues went on to create numerical scales from the words. But unlike the simple 1-to-10 scale, Melzack's scale requires clinicians to let patients go through the entire questionnaire, checking off all the words that apply.

Words are better than numbers for helping patients overcome the loneliness of pain, and they're better for helping doctors figure out what's causing the pain. Yet almost all medical clinics use the 1-to-10 scale. I once asked a physical therapist why. She knew Melzack's scale well and said she preferred it to the number scale. "But," she added without a moment's hesitation, "insurance wants numbers."

As I talked with more people about the 1-to-10 pain scale, I learned how it has become a covert medium of communication. One friend who struggles with cancer pain said matter-of-factly, "They don't want you to be above a 5." I wasn't sure what she meant.

"Do you mean they try to influence your number?"

"No," she said; "above a 5 means your pain isn't under control. They will want to do something about it."

"So you mean before you give a number, you think about what they want to hear?" I asked.

My friend is a social scientist and intellectually curious right down to her own suffering, so it didn't surprise me when she answered by blurting out the title of a famous sociology book: "It's *The Presentation of Self in Everyday Life.*" Each time she visits her clinic, she said, she is asked to rate her pain on a scale from 1 to 10. Before she answers, she thinks about how she wants to appear to her medical team and what actions her answer will trigger. About a year after this conversation, she brought me more news from the pain front. "Now they don't even bother asking me the full question. I sit down and they say, 'Number?'" I wish I could convey her cold, brusque tone and her look of disgust.

Since that first conversation, I've thought a lot about "the presentation of self" when people answer the pain question. A patient might think to herself, How wimpy or stoic do I want to appear? Do I want to trigger a dose increase? Or do I want to hold off and save the big guns for later because I know the pain is probably going to get worse? Even though my pain is unbearable, should I give a number somewhere in the middle to leave room for things to get worse? Should I give a lower number than I gave last week to signal to my doctor that she's

succeeding, so she won't give up on me?

In medicine, insurance, and drug research, clinicians have to document results with objective evidence. As my physical therapist indicated, subjective pain numbers now pass for objective measures. But patients know better. One of my students spelled it out for me: "When I was in the hospital for pancreatitis caused by a reaction to chemotherapy, I was on a Dilaudid drip. I quickly figured out that when they asked me for my pain score, the number I should give them was how much more opium I wanted, rather than how much pain I was in. Obviously these two are very different, because sometimes even if I was experiencing pain, that was preferable to being zonked and staring at the wall for days on end." Once I heard this story, I continued asking friends about their experiences with the pain scale. Everyone who'd had a problem for which they needed heavy-duty painkillers told me a version of the same story: patients use the numbers to assert control over their clinicians.

Of the many ideas and experiences we try to measure with numbers, pain falls at the toughest, most subjective end of the spectrum. To be sure, pain has a physical component that doctors can measure by testing how nerves conduct signals to pain receptors. As Melzack insisted, though, pain is an experience with many meanings. The 1-to-10 pain scale is far too crude to capture pain in any meaningful way. Patients have learned how to use those crude numbers as a language for telling their stories.

Numbers serve as a language for telling stories even for more concrete situations such as having a job or being unemployed. On the first Friday of each month, the federal government issues its new jobs report. There's one number—say, 201,000—that's supposed to be a tally of how many new jobs were added to the economy during the previous month. To get the jobs number, the Bureau of Labor Statistics surveys about 150,000 businesses and government agencies and asks them how many new people they hired during the previous month. From there, statisticians use some fancy math to estimate "new hires" for all employers in the country. But what does the jobs number actually mean besides what the pundits say it means? ("Job growth was strong" or "weak but respectable.") Never mind the guesswork that goes into projecting from a small sample to the entire economy. We have a fish problem:

Some jobs are fast and some are slow.
Some jobs pay high and some pay low.
Not one of them is like another.

Well, okay, some jobs *are* like others in ways that matter, but when it comes to

personal well-being, the differences are more important than the similarities. Some jobs provide such mind-boggling salaries and stock options that it's impossible to imagine how anyone could possibly spend it all. Facebook founder Mark Zuckerberg is said to have lost $2.7 million per second on a day in 2018 when the company's stock price plummeted, and he's no worse for the wear. In some jobs, employees are "nickel and dimed," to use Barbara Ehrenreich's famous book title. Only people who wait tables, clean homes and hotel rooms, or do construction as day laborers can fathom what life on such a pittance means. People in those kinds of jobs could work three lifetimes and not make as much as Zuckerberg lost in one second. Some jobs open up clear career ladders and pathways to advancement; others trap employees in dead ends. Some jobs are secure, with long-term contracts, health insurance, and pension benefits; others are temporary with no benefits except for employer contributions to Social Security. Independent contractors such as Uber drivers don't even get Social Security contributions. Some jobs provide scope for creativity and autonomy; others treat workers as robots, telling them exactly what to do, how fast to do it, and when they can go to the toilet.

A job is not a job is not a job. Like Dr. Seuss with his infinitely varied fish, the jobs number lumps together all these different ways of earning money and counts them as the same. The monthly jobs number is one big metaphor. When the Bureau of Labor Statistics says 201,000 new jobs were created last month, we have no idea how many were stifling jobs that grind people down and how many were interesting jobs that lift people up. To people who have a job or are looking for a new one, the *kind of* job matters almost as much as whether they have one at all.

For someone who's desperate, though, some job is better than none. Maybe we should try to count *unemployment*. Not having a job is pretty cut-and-dried, right? You either have a job or you don't. Not so fast. Here's how the U.S. government counts unemployment. At the behest of the Bureau of Labor Statistics, the Census Bureau surveys 60,000 households every month and asks the head of the household whether each adult member of the household is currently working and, if not, why not. Using the answers to a series of questions, the surveyors divide people into three groups: those who are currently working for pay (employed), those who "participate in the labor force" but are not working (unemployed), and those who are not even in the labor force (chopped liver). Only the middle category counts as unemployed.

If you're getting confused, you're not alone. You've mastered the art of counting triangles, but now you need to learn some rules about counting unemployment.

Lesson 1: If people tell you they're not working, ask them if they have looked for

work in the last month. Even if they tell you they've been desperately looking, don't count them as unemployed unless they utter some magic words about *how* they searched. If they tell you they answered a job ad or knocked on an employer's door, count them as "in the labor force and unemployed." If they tell you they study the help-wanted ads every day or spend hours networking to get job leads, place them outside the labor force and don't count them as unemployed. (Don't ask me why. Go ask your mother.)

Lesson 2: If people tell you they're not working but they're looking really hard, ask if they could start a new job right away if they got an offer. If they say "no," no matter what the reason—injury, illness, family responsibilities—count them as "not in the labor force" because they're not "available for work." Don't count them as unemployed.

Lesson 3: People who have been laid off, aren't currently working, and have given up job hunting should not be counted as "in the labor force." They're not even trying to work. Do not count them as unemployed. You may tell them, by way of consolation, that they will be labeled and tallied as "discouraged workers," but they probably won't make the nightly news when the jobs report comes out.

"I've stopped looking for work, which, I believe, helps the economic numbers."

Are you catching on? The "labor force" as created by the Bureau of Labor Statistics is a land riddled with rabbit holes. Lots of people disappear down them and won't be counted as either working or unemployed.

It's not so simple to count employment and unemployment after all. Many strands of homespun philosophy weave through the official rules, the main one being "Money makes the world go 'round." The government decided a long time ago to count only work for pay, with one notable exception: unpaid work in a profitable family business. So, if you volunteer your time on a profitable family farm—raising pigs, for example—you'll avoid the rabbit hole and be counted as employed, even though you're unpaid. But if you volunteer your time in the family home raising kids who might someday turn out to be a Mark Zuckerberg or a Mother Teresa, down the rabbit hole you go, out of the labor force, neither employed nor unemployed.

Excluding almost all unpaid work from the unemployment measure is fair enough. The measure was always intended to capture whether people are able to earn a living. As a gauge of contributions to the economy, though, the unemployment measure leaves some important things out. The human species would wither if no one cared for children and the sick. Churches, schools, and sports clubs would collapse without volunteers. Elections run mainly on volunteer work. Wikipedia wouldn't exist without it. Can work be productive even if it's unpaid? That's a big question that measurers must decide. So far, they say no.

Another philosophical strand runs through the unemployment measure—the notion of the "deserving poor." In 1878, Carroll Wright commissioned one of the first U.S. unemployment surveys, which he billed as the first official attempt "to ascertain the facts." The country was still in a depression following a financial panic in 1873 and the press was reporting some scary unemployment numbers. As head of the Massachusetts Bureau of Labor Statistics, Wright wanted to refute the high numbers in order to dampen political unrest. He asked town assessors and police officers to count the out-ofwork population in their areas and gave them specific instructions about who to count: not people under 18, not women, and only those able-bodied men "who really wanted to work." How the surveyors were supposed to determine "really want" is anybody's guess, but we can imagine that some juicy gossip and rough-and-ready stereotypes went into the mix. Child labor was common at the time and children and teenagers were major contributors to family income, as were women. Wright's counting rules disappeared a lot of workers. He got the "gratifying" numbers he wanted.

Wright would soon go on to become head of the national Bureau of Labor Statistics. His mode of counting unemployment by inquiring into each person's

willingness to work became the essential test for unemployment statistics unto today. Two future presidents confronted with the Great Depression, Herbert Hoover and Franklin Roosevelt, would borrow Wright's strategy: first, talk about how unscientific the unemployment numbers are, then insist on counting only deserving people. As the president of the American Statistical Association warned, statistics are "always accessory to some purpose." If you want to make sense of a statistic, track down the purpose it aided and abetted.

At a rally during the time between the 2016 election and Donald Trump's inauguration, Trump called the government's unemployment number "totally fiction." He elaborated on his claim with a story much like one you just learned in your job training at the Bureau of Labor Statistics: "If you look for a job for six months, and then you give up, they consider you give up. You just give up. You go home. You say, 'Darling, I can't get a job.' They consider you statistically employed. It's not the way. But don't worry about it because it's going to take care of itself pretty quickly."

Critics accuse Trump of disregarding facts and making up his own truths. In this case, though, Trump had a certain kind of truth on his side. The unemployment number *is* a fiction in two important senses. To begin with, its authors have selected only a few kinds of unemployment to include in their count. Counting unemployment is just a more complex version of how we teach children to count cookies: look for one or two features they all share and ignore the differences. The unemployment number is a giant metaphor.

The unemployment number is fiction in another sense, too. It doesn't measure what people actually do. It measures what people *say* they do when they answer survey questions. Some people are ashamed they don't have a job and won't admit it to an interviewer. Some people work off the books and won't admit that either. The unemployment number captures people's stories, not their actions. Even worse for accuracy, people don't get to tell their stories in their own words. Census Bureau employees shape the stories by eliciting only the bits of information that interest their bosses. The unemployment number is a story told by a government with a point of view.

That said, however, the unemployment number isn't "totally" fiction. It's anchored in real situations. It comes from an earnest attempt to measure a social problem scientifically, even if it incorporates some particular views about what should and shouldn't count as unemployment. Once the statisticians have set forth their definitions of "unemployed," they stay true to the definitions while they count people. They don't randomly stick people into categories. Before they do their surveys, they test the wording of their questions on focus groups to

ensure that, as much as possible, respondents will interpret the questions in the same way. Moreover, the government does tabulate the number of discouraged workers, the people who Trump says have given up. That unemployment rate goes by the geeky name U-7 and is published every month, too. But geeky U-7 is no crowd-pleaser and no match for Trump's evocative story about a man who slumps home to tell his honey that he hit a brick wall.

Trump knows that statistics carry stories about people's lives and he knows how to compose fiction to make statistics come alive. He challenged the validity of the unemployment numbers by speaking to an emotional truth. Many people in Trump's audience were no doubt discouraged workers who felt threatened by poverty and loss of purpose. Trump tapped into their fear and told them that the government doesn't care about them. That officials dismiss their suffering by calling them "statistically employed." That people like them don't count.

This book explores how counting works in the social world and why numbers can't do everything we wish they could. Numbers have come to serve as reality tests ("If you can't measure it, it doesn't exist") and truth detectors ("Show me the numbers"). Too often people rely on numbers to make and justify their decisions, instead of doing the hard work of thinking, questioning, and discussing. If I devote more space to unpacking the limits of numbers than to praising their virtues, that's because I hope to make them serve us better.

Done right, counting can help us think more clearly about what we value and what we mean by our big words. Words such as "equality," "democracy," "poverty," "danger," "peace," or "productivity"—those are powerful ideas but feeble instruments. Their very fuzziness inspires many a book, film, and seminar. The exercise of trying to measure vague concepts like these forces us to ask ourselves what they mean, or rather, what *we* mean by them. Counting sharpens our minds if we count mindfully.

As a university professor, I feel my mind getting sharpened every time I grade a student paper. I'm forced to measure fuzzy ideals. What makes a good paper? What is good thinking? All teachers know that our grading is partly subjective, even as we aspire to be scrupulously objective. Part of my evaluation hinges on whether the student got the facts right. Does the student understand the lectures and the reading material and convey their content accurately? Part of my evaluation hinges on more subjective factors: Can the student grasp big ideas and theories beyond small facts? Apply big ideas to new topics? Does the student ask original questions or put forth a novel way of seeing the topic? Once I've answered these questions, I have to ask myself how I weigh the different factors. What if the student makes an elegant argument but the work contains a whopping error?

Whether I'm putting a letter grade or a number grade on a student's paper, having to categorize the work forces me to question myself and articulate my reasons for deciding as I do. I'm always aware that my students' hopes and self-image are riding on my decisions, and that each student deserves to question me about why I gave the grade I did. As I'm thinking about a grade, I imagine how I'll justify it to a disappointed student. If I think students deserve a high grade, I justify that, too, by telling them what they did well.

To nail the point, I'm not proposing to do away with counting (as if we could). I'm asking that while we count, we think about the good or the damage our numbers could do. Our numbers will serve us better if we reflect on how we arrive at them as carefully as we hope others do when they make judgments about us.

2

How a Number Comes to Be

The great child-development pioneer Jean Piaget devised an experiment to find out whether young children can count. He lined up two rows of 6 clay pellets and asked three- and four-year-olds whether the rows were the same or one row had more. Most children thought the rows contained the same number of pellets. While the children watched, Piaget removed 2 pellets from one of the rows and stretched it out so it was longer than the row with 6 pellets. He asked again if the rows were the same or one had more. Now most of the children thought the longer row had more pellets. Piaget concluded that toddlers don't understand quantity.

Several years later, two MIT psychologists repeated Piaget's experiments, only this time they used M&M's instead of clay pellets. They didn't ask the children which row had more. They offered, "Take the row you want to eat and eat all the M&M's in that row." Most children reached for the row with more M&M's. "Given sufficient motivation," the psychologists concluded, children can overcome their counting difficulties. Indeed, motivation explains a lot about counting. The correct answer to the question "Which group has more?" is "It depends on whether I want to eat it."

Humans aren't the only creatures who count. Birds do it. Bees do it. Rats do it. Even fish do it. Guppies given a choice between joining a small school of fish and a larger one choose the larger one. They have enough number sense to know where safety lies. Most experiments with animals use food as a reward for getting the right answer. Pigeons and rats learn to count in order to eat. Remember the

statistician who advised, “Numbers are always accessory to a purpose.” Even animals count for a purpose.

Numbers are the answers people get when they want to eat what they count. Or, when they don’t want to be eaten by those who count *them*. If we want to know how numbers materialize, we need to know more than what rules people use to classify things they count. We need to know what motivates them to count in the first place. What do they notice about their world that they think is worth counting? Why do they care about the numbers they’ll get when they’re done counting?

A famous experiment you can watch on YouTube shows a video of people playing basketball and asks viewers to count how many times the ball is passed. During the video, a person dressed in a gorilla costume strolls through the fast-moving tangle of players. When the video ends, the researchers ask viewers if they noticed anything unusual. Very few people noticed the gorilla because they kept their eyes on the ball, exactly as they were told. The experiment demonstrates what the researchers call “inattentional blindness”: we don’t see what we aren’t paying attention to. And, I’ll add, if we don’t see it, we won’t count it.

Health researchers have measured how breastfeeding and formula feeding affect babies’ and mothers’ health, but in all the scientific hoopla, no one paid much attention to Dad. I wouldn’t have thought of taking a father’s point of view, either, until I read an essay by Nathaniel Popper about his family’s experience with the breast-versus-bottle debate. Popper and his wife had read all the studies suggesting that breastfed babies are less likely to develop asthma, diabetes, or earaches, and that nursing moms have a lower risk of breast cancer. His wife went to great lengths to breastfeed their first son but it wasn’t happening, so she reluctantly gave in to formula.

The switch to formula, Popper writes, “gave my relationship to my son a depth that I, as a father, would have otherwise missed out on, and that has continued long after he stopped drinking from a bottle.” When their son cried at night or in public, “I instinctively started toward him.” Before formula, his wife had been the “first responder” because they both assumed crying meant the baby was hungry. “Now, I was just as capable of feeding him as she was. This meant that I not only fed him but learned about all the times when he wasn’t actually hungry but needed a burp or a clean diaper, or something else we couldn’t figure out but was part of the essential mystery of parenting.” When their second son came along, Popper secretly hoped that breastfeeding wouldn’t work so he wouldn’t miss out on “those endless hours of providing my baby with exactly what he needed.”

Fathers are invisible gorillas in the baby-feeding debates. Few studies, if any,

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