

EVERYBODY LIES

BIG DATA, NEW DATA,
AND WHAT THE INTERNET
CAN TELL US ABOUT WHO
WE REALLY ARE



SETH STEPHENS-DAVIDOWITZ

FOREWORD BY STEVEN PINKER

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SETH
STEPHENS-DAVIDOWITZ

DEDICATION



To Mom and Dad

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FOREWORD

Ever since philosophers speculated about a “cerebroscope,” a mythical device that would display a person’s thoughts on a screen, social scientists have been looking for tools to expose the workings of human nature. During my career as an experimental psychologist, different ones have gone in and out of fashion, and I’ve tried them all—rating scales, reaction times, pupil dilation, functional neuroimaging, even epilepsy patients with implanted electrodes who were happy to while away the hours in a language experiment while waiting to have a seizure.

Yet none of these methods provides an unobstructed view into the mind. The problem is a savage tradeoff. Human thoughts are complex propositions; unlike Woody Allen speed-reading *War and Peace*, we don’t just think “It was about some Russians.” But propositions in all their tangled multidimensional glory are difficult for a scientist to analyze. Sure, when people pour their hearts out, we apprehend the richness of their stream of consciousness, but monologues are not an ideal dataset for testing hypotheses. On the other hand, if we concentrate on measures that are easily quantifiable, like people’s reaction time to words, or their skin response to pictures, we can do the statistics, but we’ve pureed the complex texture of cognition into a single number. Even the most sophisticated neuroimaging methodologies can tell us how a thought is splayed out in 3-D space, but not what the thought consists of.

As if the tradeoff between tractability and richness weren’t bad enough, scientists of human nature are vexed by the Law of Small Numbers—Amos Tversky and Daniel Kahneman’s name for the fallacy of thinking that the traits of a population will be reflected in any sample, no matter how small. Even the most numerate scientists have woefully defective intuitions about how many subjects one really needs in a study before one can abstract away from the random quirks and bumps and generalize to all Americans, to say nothing of *Homo sapiens*. It’s all the iffier

when the sample is gathered by convenience, such as by offering beer money to the sophomores in our courses.

This book is about a whole new way of studying the mind. Big Data from internet searches and other online responses are not a cerebroscope, but Seth Stephens-Davidowitz shows that they offer an unprecedented peek into people's psyches. At the privacy of their keyboards, people confess the strangest things, sometimes (as in dating sites or searches for professional advice) because they have real-life consequences, at other times precisely because they *don't* have consequences: people can unburden themselves of some wish or fear without a real person reacting in dismay or worse. Either way, the people are not just pressing a button or turning a knob, but keying in any of trillions of sequences of characters to spell out their thoughts in all their explosive, combinatorial vastness. Better still, they lay down these digital traces in a form that is easy to aggregate and analyze. They come from all walks of life. They can take part in unobtrusive experiments which vary the stimuli and tabulate the responses in real time. And they happily supply these data in gargantuan numbers.

Everybody Lies is more than a proof of concept. Time and again my preconceptions about my country and my species were turned upside-down by Stephens-Davidowitz's discoveries. Where did Donald Trump's unexpected support come from? When Ann Landers asked her readers in 1976 whether they regretted having children and was shocked to find that a majority did, was she misled by an unrepresentative, self-selected sample? Is the internet to blame for that redundantly named crisis of the late 2010s, the "filter bubble"? What triggers hate crimes? Do people seek jokes to cheer themselves up? And though I like to think that nothing can shock me, I was shocked aplenty by what the internet reveals about human sexuality—including the discovery that every month a certain number of women search for "humping stuffed animals." No experiment using reaction time or pupil dilation or functional neuroimaging could ever have turned up that fact.

Everybody will enjoy *Everybody Lies*. With unflagging curiosity and an endearing wit, Stephens-Davidowitz points to a new path for social science in the twenty-first century. With this endlessly fascinating window into human obsessions, who needs a cerebroscope?

—Steven Pinker, 2017

INTRODUCTION

THE OUTLINES OF A REVOLUTION

Surely he would lose, they said.

In the 2016 Republican primaries, polling experts concluded that Donald Trump didn't stand a chance. After all, Trump had insulted a variety of minority groups. The polls and their interpreters told us few Americans approved of such outrages.

Most polling experts at the time thought that Trump would lose in the general election. Too many likely voters said they were put off by his manner and views.

But there were actually some clues that Trump might actually win both the primaries and the general election—on the internet.

I am an internet data expert. Every day, I track the digital trails that people leave as they make their way across the web. From the buttons or keys we click or tap, I try to understand what we really want, what we will really do, and who we really are. Let me explain how I got started on this unusual path.

The story begins—and this seems like ages ago—with the 2008 presidential election and a long-debated question in social science: How significant is racial prejudice in America?

Barack Obama was running as the first African-American presidential nominee of a major party. He won—rather easily. And the polls suggested that race was not a factor in how Americans voted. Gallup, for example, conducted numerous polls before and after Obama's first election. Their conclusion? American voters largely

did not care that Barack Obama was black. Shortly after the election, two well-known professors at the University of California, Berkeley pored through other survey-based data, using more sophisticated data-mining techniques. They reached a similar conclusion.

And so, during Obama's presidency, this became the conventional wisdom in many parts of the media and in large swaths of the academy. The sources that the media and social scientists have used for eighty-plus years to understand the world told us that the overwhelming majority of Americans did not care that Obama was black when judging whether he should be their president.

This country, long soiled by slavery and Jim Crow laws, seemed finally to have stopped judging people by the color of their skin. This seemed to suggest that racism was on its last legs in America. In fact, some pundits even declared that we lived in a post-racial society.

In 2012, I was a graduate student in economics, lost in life, burnt-out in my field, and confident, even cocky, that I had a pretty good understanding of how the world worked, of what people thought and cared about in the twenty-first century. And when it came to this issue of prejudice, I allowed myself to believe, based on everything I had read in psychology and political science, that explicit racism was limited to a small percentage of Americans—the majority of them conservative Republicans, most of them living in the deep South.

Then, I found Google Trends.

Google Trends, a tool that was released with little fanfare in 2009, tells users how frequently any word or phrase has been searched in different locations at different times. It was advertised as a fun tool—perhaps enabling friends to discuss which celebrity was most popular or what fashion was suddenly hot. The earliest versions included a playful admonishment that people “wouldn’t want to write your PhD dissertation” with the data, which immediately motivated me to write my dissertation with it.*

At the time, Google search data didn’t seem to be a proper source of information for “serious” academic research. Unlike surveys, Google search data wasn’t created as a way to help us understand the human psyche. Google was invented so that people could learn about the world, not so researchers could learn about people. But it turns out the trails we leave as we seek knowledge on the internet are tremendously revealing.

In other words, people's search for information is, in itself, information. When and where they search for facts, quotes, jokes, places, persons, things, or help, it turns out, can tell us a lot more about what they really think, really desire, really fear, and really do than anyone might have guessed. This is especially true since people sometimes don't so much query Google as confide in it: "I hate my boss." "I am drunk." "My dad hit me."

The everyday act of typing a word or phrase into a compact, rectangular white box leaves a small trace of truth that, when multiplied by millions, eventually reveals profound realities. The first word I typed in Google Trends was "God." I learned that the states that make the most Google searches mentioning "God" were Alabama, Mississippi, and Arkansas—the Bible Belt. And those searches are most frequently on Sundays. None of which was surprising, but it was intriguing that search data could reveal such a clear pattern. I tried "Knicks," which it turns out is Googled most in New York City. Another no-brainer. Then I typed in my name. "We're sorry," Google Trends informed me. "There is not enough search volume" to show these results. Google Trends, I learned, will provide data only when lots of people make the same search.

But the power of Google searches is not that they can tell us that God is popular down South, the Knicks are popular in New York City, or that I'm not popular anywhere. Any survey could tell you that. The power in Google data is that people tell the giant search engine things they might not tell anyone else.

Take, for example, sex (a subject I will investigate in much greater detail later in this book). Surveys cannot be trusted to tell us the truth about our sex lives. I analyzed data from the General Social Survey, which is considered one of the most influential and authoritative sources for information on Americans' behaviors. According to that survey, when it comes to heterosexual sex, women say they have sex, on average, fifty-five times per year, using a condom 16 percent of the time. This adds up to about 1.1 billion condoms used per year. But heterosexual men say they use 1.6 billion condoms every year. Those numbers, by definition, would have to be the same. So who is telling the truth, men or women?

Neither, it turns out. According to Nielsen, the global information and measurement company that tracks consumer behavior, fewer than 600 million condoms are sold every year. So everyone is lying; the only difference is by how much.

The lying is in fact widespread. Men who have never been married claim to use on average twenty-nine condoms per year. This would add up to more than the total

number of condoms sold in the United States to married and single people combined. Married people probably exaggerate how much sex they have, too. On average, married men under sixty-five tell surveys they have sex once a week. Only 1 percent say they have gone the past year without sex. Married women report having a little less sex but not much less.

Google searches give a far less lively—and, I argue, far more accurate—picture of sex during marriage. On Google, the top complaint about a marriage is not having sex. Searches for “sexless marriage” are three and a half times more common than “unhappy marriage” and eight times more common than “loveless marriage.” Even unmarried couples complain somewhat frequently about not having sex. Google searches for “sexless relationship” are second only to searches for “abusive relationship.” (This data, I should emphasize, is all presented anonymously. Google, of course, does not report data about any particular individual’s searches.)

And Google searches presented a picture of America that was strikingly different from that post-racial utopia sketched out by the surveys. I remember when I first typed “nigger” into Google Trends. Call me naïve. But given how toxic the word is, I fully expected this to be a low-volume search. Boy, was I wrong. In the United States, the word “nigger”—or its plural, “niggers”—was included in roughly the same number of searches as the word “migraine(s),” “economist,” and “Lakers.” I wondered if searches for rap lyrics were skewing the results? Nope. The word used in rap songs is almost always “nigga(s).” So what was the motivation of Americans searching for “nigger”? Frequently, they were looking for jokes mocking African-Americans. In fact, 20 percent of searches with the word “nigger” also included the word “jokes.” Other common searches included “stupid niggers” and “I hate niggers.”

There were millions of these searches every year. A large number of Americans were, in the privacy of their own homes, making shockingly racist inquiries. The more I researched, the more disturbing the information got.

On Obama’s first election night, when most of the commentary focused on praise of Obama and acknowledgment of the historic nature of his election, roughly one in every hundred Google searches that included the word “Obama” also included “kkk” or “nigger(s).” Maybe that doesn’t sound so high, but think of the thousands of nonracist reasons to Google this young outsider with a charming family about to take over the world’s most powerful job. On election night, searches and sign-ups for Stormfront, a white nationalist site with surprisingly high popularity in the

United States, were more than ten times higher than normal. In some states, there were more searches for “nigger president” than “first black president.”

There was a darkness and hatred that was hidden from the traditional sources but was quite apparent in the searches that people made.

Those searches are hard to reconcile with a society in which racism is a small factor. In 2012 I knew of Donald J. Trump mostly as a businessman and reality show performer. I had no more idea than anyone else that he would, four years later, be a serious presidential candidate. But those ugly searches are not hard to reconcile with the success of a candidate who—in his attacks on immigrants, in his angers and resentments—often played to people’s worst inclinations.

The Google searches also told us that much of what we thought about the location of racism was wrong. Surveys and conventional wisdom placed modern racism predominantly in the South and mostly among Republicans. But the places with the highest racist search rates included upstate New York, western Pennsylvania, eastern Ohio, industrial Michigan and rural Illinois, along with West Virginia, southern Louisiana, and Mississippi. The true divide, Google search data suggested, was not South versus North; it was East versus West. You don’t get this sort of thing much west of the Mississippi. And racism was not limited to Republicans. In fact, racist searches were no higher in places with a high percentage of Republicans than in places with a high percentage of Democrats. Google searches, in other words, helped draw a new map of racism in the United States—and this map looked very different from what you may have guessed. Republicans in the South may be more likely to admit to racism. But plenty of Democrats in the North have similar attitudes.

Four years later, this map would prove quite significant in explaining the political success of Trump.

In 2012, I was using this map of racism I had developed using Google searches to reevaluate exactly the role that Obama’s race played. The data was clear. In parts of the country with a high number of racist searches, Obama did substantially worse than John Kerry, the white Democratic presidential candidate, had four years earlier. The relationship was not explained by any other factor about these areas, including education levels, age, church attendance, or gun ownership. Racist searches did not predict poor performance for any other Democratic candidate. Only for Obama.

And the results implied a large effect. Obama lost roughly 4 percentage points nationwide just from explicit racism. This was far higher than might have been expected based on any surveys. Barack Obama, of course, was elected and reelected president, helped by some very favorable conditions for Democrats, but he had to overcome quite a bit more than anyone who was relying on traditional data sources—and that was just about everyone—had realized. There were enough racists to help win a primary or tip a general election in a year not so favorable to Democrats.

My study was initially rejected by five academic journals. Many of the peer reviewers, if you will forgive a little disgruntlement, said that it was impossible to believe that so many Americans harbored such vicious racism. This simply did not fit what people had been saying. Besides, Google searches seemed like such a bizarre dataset.

Now that we have witnessed the inauguration of President Donald J. Trump, my finding seems more plausible.

The more I have studied, the more I have learned that Google has lots of information that is missed by the polls that can be helpful in understanding—among many, many other subjects—an election.

There is information on who will actually turn out to vote. More than half of citizens who don't vote tell surveys immediately before an election that they intend to, skewing our estimation of turnout, whereas Google searches for “how to vote” or “where to vote” weeks before an election can accurately predict which parts of the country are going to have a big showing at the polls.

There might even be information on who they will vote for. Can we really predict which candidate people will vote for just based on what they search? Clearly, we can't just study which candidates are searched for most frequently. Many people search for a candidate because they love him. A similar number of people search for a candidate because they hate him. That said, Stuart Gabriel, a professor of finance at the University of California, Los Angeles, and I have found a surprising clue about which way people are planning to vote. A large percentage of election-related searches contain queries with both candidates' names. During the 2016 election between Trump and Hillary Clinton, some people searched for “Trump Clinton polls.” Others looked for highlights from the “Clinton Trump debate.” In fact, 12

percent of search queries with “Trump” also included the word “Clinton.” More than one-quarter of search queries with “Clinton” also included the word “Trump.”

We have found that these seemingly neutral searches may actually give us some clues to which candidate a person supports.

How? The order in which the candidates appear. Our research suggests that a person is significantly more likely to put the candidate they support first in a search that includes both candidates’ names.

In the previous three elections, the candidate who appeared first in more searches received the most votes. More interesting, the order the candidates were searched was predictive of which way a particular state would go.

The order in which candidates are searched also seems to contain information that the polls can miss. In the 2012 election between Obama and Republican Mitt Romney, Nate Silver, the virtuoso statistician and journalist, accurately predicted the result in all fifty states. However, we found that in states that listed Romney before Obama in searches most frequently, Romney actually did better than Silver had predicted. In states that most frequently listed Obama before Romney, Obama did better than Silver had predicted.

This indicator could contain information that polls miss because voters are either lying to themselves or uncomfortable revealing their true preferences to pollsters. Perhaps if they claimed that they were undecided in 2012, but were consistently searching for “Romney Obama polls,” “Romney Obama debate,” and “Romney Obama election,” they were planning to vote for Romney all along.

So did Google predict Trump? Well, we still have a lot of work to do—and I’ll have to be joined by lots more researchers—before we know how best to use Google data to predict election results. This is a new science, and we only have a few elections for which this data exists. I am certainly not saying we are at the point—or ever will be at the point—where we can throw out public opinion polls completely as a tool for helping us predict elections.

But there were definitely portents, at many points, on the internet that Trump might do better than the polls were predicting.

During the general election, there were clues that the electorate might be a favorable one for Trump. Black Americans told polls they would turn out in large numbers to oppose Trump. But Google searches for information on voting in heavily black areas were way down. On election day, Clinton would be hurt by low black turnout.

There were even signs that supposedly undecided voters were going Trump's way. Gabriel and I found that there were more searches for "Trump Clinton" than "Clinton Trump" in key states in the Midwest that Clinton was expected to win. Indeed, Trump owed his election to the fact that he sharply outperformed his polls there.

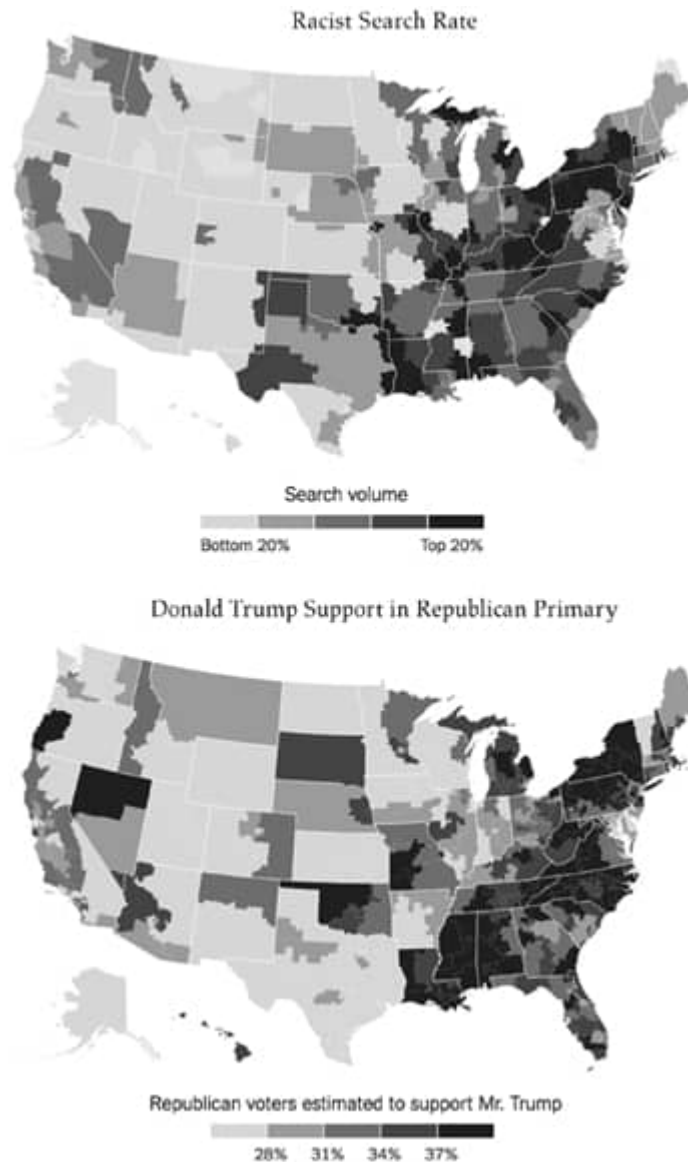
But the major clue, I would argue, that Trump might prove a successful candidate—in the primaries, to begin with—was all that secret racism that my Obama study had uncovered. The Google searches revealed a darkness and hatred among a meaningful number of Americans that pundits, for many years, missed. Search data revealed that we lived in a very different society from the one academics and journalists, relying on polls, thought that we lived in. It revealed a nasty, scary, and widespread rage that was waiting for a candidate to give voice to it.

People frequently lie—to themselves and to others. In 2008, Americans told surveys that they no longer cared about race. Eight years later, they elected as president Donald J. Trump, a man who retweeted a false claim that black people are responsible for the majority of murders of white Americans, defended his supporters for roughing up a Black Lives Matters protester at one of his rallies, and hesitated in repudiating support from a former leader of the Ku Klux Klan. The same hidden racism that hurt Barack Obama helped Donald Trump.

Early in the primaries, Nate Silver famously claimed that there was virtually no chance that Trump would win. As the primaries progressed and it became increasingly clear that Trump had widespread support, Silver decided to look at the data to see if he could understand what was going on. How could Trump possibly be doing so well?

Silver noticed that the areas where Trump performed best made for an odd map. Trump performed well in parts of the Northeast and industrial Midwest, as well as the South. He performed notably worse out West. Silver looked for variables to try to explain this map. Was it unemployment? Was it religion? Was it gun ownership? Was it rates of immigration? Was it opposition to Obama?

Silver found that the single factor that best correlated with Donald Trump's support in the Republican primaries was that measure I had discovered four years earlier. Areas that supported Trump in the largest numbers were those that made the most Google searches for "nigger."



I have spent just about every day of the past four years analyzing Google data. This included a stint as a data scientist at Google, which hired me after learning about my racism research. And I continue to explore this data as an opinion writer and data journalist for the *New York Times*. The revelations have kept coming. Mental illness; human sexuality; child abuse; abortion; advertising; religion; health. Not exactly small topics, and this dataset, which didn't exist a couple of decades ago, offered surprising new perspectives on all of them. Economists and other social scientists are always hunting for new sources of data, so let me be blunt: I am now convinced

that Google searches are the most important dataset ever collected on the human psyche.

This dataset, however, is not the only tool the internet has delivered for understanding our world. I soon realized there are other digital gold mines as well. I downloaded all of Wikipedia, pored through Facebook profiles, and scraped Stormfront. In addition, PornHub, one of the largest pornographic sites on the internet, gave me its complete data on the searches and video views of anonymous people around the world. In other words, I have taken a very deep dive into what is now called Big Data. Further, I have interviewed dozens of others—academics, data journalists, and entrepreneurs—who are also exploring these new realms. Many of their studies will be discussed here.

But first, a confession: I am not going to give a precise definition of what Big Data is. Why? Because it's an inherently vague concept. How big is big? Are 18,462 observations Small Data and 18,463 observations Big Data? I prefer to take an inclusive view of what qualifies: while most of the data I fiddle with is from the internet, I will discuss other sources, too. We are living through an explosion in the amount and quality of all kinds of available information. Much of the new information flows from Google and social media. Some of it is a product of digitization of information that was previously hidden away in cabinets and files. Some of it is from increased resources devoted to market research. Some of the studies discussed in this book don't use huge datasets at all but instead just employ a new and creative approach to data—approaches that are crucial in an era overflowing with information.

So why exactly is Big Data so powerful? Think of all the information that is scattered online on a given day—we have a number, in fact, for just how much information there is. On an average day in the early part of the twenty-first century, human beings generate 2.5 million trillion bytes of data.

And these bytes are clues.

A woman is bored on a Thursday afternoon. She Googles for some more “funny clean jokes.” She checks her email. She signs on to Twitter. She Googles “nigger jokes.”

A man is feeling blue. He Googles for “depression symptoms” and “depression stories.” He plays a game of solitaire.

A woman sees the announcement of her friend getting engaged on Facebook. The woman, who is single, blocks the friend.

A man takes a break from Googling about the NFL and rap music to ask the search engine a question: “Is it normal to have dreams about kissing men?”

A woman clicks on a BuzzFeed story showing the “15 cutest cats.”

A man sees the same story about cats. But on his screen it is called “15 most adorable cats.” He doesn’t click.

A woman Googles “Is my son a genius?”

A man Googles “how to get my daughter to lose weight.”

A woman is on a vacation with her six best female friends. All her friends keep saying how much fun they’re having. She sneaks off to Google “loneliness when away from husband.”

A man, the previous woman’s husband, is on a vacation with his six best male friends. He sneaks off to Google to type “signs your wife is cheating.”

Some of this data will include information that would otherwise never be admitted to anybody. If we aggregate it all, keep it anonymous to make sure we never know about the fears, desires, and behaviors of any specific individuals, and add some data science, we start to get a new look at human beings—their behaviors, their desires, their natures. In fact, at the risk of sounding grandiose, I have come to believe that the new data increasingly available in our digital age will radically expand our understanding of humankind. The microscope showed us there is more to a drop of pond water than we think we see. The telescope showed us there is more to the night sky than we think we see. And now, digital data now shows us there is more to human society than we think we see. It may be our era’s microscope or telescope—making possible important, even revolutionary insights.

There is another risk in making such declarations—not just sounding grandiose but also trendy. Many people have been making big claims about the power of Big Data. But they have been short on evidence.

This has inspired Big Data skeptics, of whom there are also many, to dismiss the search for bigger datasets. “I am not saying here that there is no information in Big Data,” essayist and statistician Nassim Taleb has written. “There is plenty of information. The problem—the central issue—is that the needle comes in an increasingly larger haystack.”

One of the primary goals of this book, then, is to provide the missing evidence of what can be done with Big Data—how we can find the needles, if you will, in those larger and larger haystacks. I hope to provide enough examples of Big Data offering

new insights into human psychology and behavior so that you will begin to see the outlines of something truly revolutionary.

“Hold on, Seth,” you might be saying right about now. “You’re promising a revolution. You’re waxing poetic about these big, new datasets. But thus far, you have used all of this amazing, remarkable, breathtaking, groundbreaking data to tell me basically two things: there are plenty of racists in America, and people, particularly men, exaggerate how much sex they have.”

I admit sometimes the new data does just confirm the obvious. If you think these findings were obvious, wait until you get to Chapter 4, where I show you clear, unimpeachable evidence from Google searches that men have tremendous concern and insecurity around—wait for it—their penis size.

There is, I would claim, some value in proving things you may have already suspected but had otherwise little evidence for. Suspecting something is one thing. Proving it is another. But if all Big Data could do is confirm your suspicions, it would not be revolutionary. Thankfully, Big Data can do a lot more than that. Time and again, data shows me the world works in precisely the opposite way as I would have guessed. Here are some examples you might find more surprising.

You might think that a major cause of racism is economic insecurity and vulnerability. You might naturally suspect, then, that when people lose their jobs, racism increases. But, actually, neither racist searches nor membership in Stormfront rises when unemployment does.

You might think that anxiety is highest in overeducated big cities. The urban neurotic is a famous stereotype. But Google searches reflecting anxiety—such as “anxiety symptoms” or “anxiety help”—tend to be higher in places with lower levels of education, lower median incomes, and where a larger portion of the population lives in rural areas. There are higher search rates for anxiety in rural, upstate New York than New York City.

You might think that a terrorist attack that kills dozens or hundreds of people would automatically be followed by massive, widespread anxiety. Terrorism, by definition, is supposed to instill a sense of terror. I looked at Google searches reflecting anxiety. I tested how much these searches rose in a country in the days, weeks, and months following every major European or American terrorist attack since 2004. So, on average, how much did anxiety-related searches rise? They didn’t. At all.

You might think that people search for jokes more often when they are sad. Many of history’s greatest thinkers have claimed that we turn to humor as a release from